

**Office of Research**

University of South Carolina

2018

# DISCOVER USC

Research | Scholarship | Innovation

## Collected Abstracts:

Collected abstracts that showcase research, scholarship, leadership and creative projects by undergraduate and graduate students, postdoctoral scholars and medical scholars representing the entire USC System.

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UNIVERSITY OF  
**SOUTH CAROLINA**  
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# **Undergraduate Students**

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# **presentations**

**Adams, Maria**

**Mentor(s) -- Ms. Amber Fallucca**

**The Power of Education**

Education is something that we as college students often take for granted. Our entire lives we have been going to school with the goal of attending college and getting our dream job. There are millions of children around the world that do not have the opportunity to receive an education at all, let alone attend college. During my time at the University of South Carolina, I was elected to serve as a representative for an organization called Circle of Sisterhood. Circle of Sisterhood is a non-profit organization founded and powered by sorority women on a mission to raise financial resources to remove education barriers for girls facing poverty and oppression. Myself and twelve other women have worked for two years to raise awareness and funds to build a school in Senegal in December 2018. One school build at time, we will help break the cycle of poverty by providing young women with the opportunity to receive an education. When a woman receives an education, she has the power to change the world. Through my experience of working with such a diverse group of women, I have learned not only learned how to be a servant leader, but also the importance of diversity. I have grown in my communication, leadership, and problem solving skills. My presentation will discuss the importance of education and diversity and also highlight the leadership and personal skills I have gained while serving this organization.

**Adams, Hope**

**Mentor(s) -- Dr. Keri Weed**

**Math Anxiety May Be Reduced With Awareness And A Positive Interpretation**

The purpose of this study is to see if reinterpreting anxiety in a positive way is equally effective for math anxious students with different levels of mindfulness. A 2 (mindfulness: high or low) by 2 (condition: anxiety reappraisal, no anxiety reappraisal) between subjects design was used. Participants were randomly assigned to one of two reappraisal condition. The experimental group watched a video that focused on reappraising anxiety within three performance domains: karaoke, public speaking, and math. This video explains that interpreting anxiety positively improves performance in all three domains. The control group watched a promotional video of college students enjoying a winter karaoke gathering. The sample will include 60 undergraduate women. Surveys measured math anxiety and mindfulness (in general and math specific); a median split was used to classify participants into high and low mindfulness groups. Electrodermal activity was measured while participants completed a computerized arithmetic verification task. We expect to find that participants with high mindfulness combined with anxiety reappraisal will result in optimal performance (i.e., better accuracy, faster reaction time, and greater EDA reactivity) and the group with high mindfulness without anxiety reappraisal will perform the worst, because they are aware of their bodily sensations but may interpret them negatively. A pilot of this study found that math anxiety was related to judgmental attitudes. Our goal for research is to allow math anxious individuals to reappraise their anxiety positively, and in turn, perform better. Data will be analyzed using an analysis of variance (ANOVA) in SPSS when data collection is complete.

**Agho, Victory**

**Mentor(s) -- Dr. Cheryl Armstead**

**Weight Bigotry, Racism, and Shiftwork Stressors Predict Body Habitus Among Morbidly Obese African American Women**

Inequities and injustices in the distribution of chronic stressors, among southern African-American women (AAW) may contribute to poor adherence to weight loss programs and bariatric surgery outcomes. AAW who are morbidly obese ( $BMI \geq 35$ ) and have serious weight related health conditions may require bariatric surgery as an adjunctive tool to promote weight loss. In South Carolina, AAW represent a disproportionately high rate of bariatric (weight loss) surgery patients. Multiple stress

burdens contribute to poor dietary adherence, should a woman decide to have later bariatric surgery. I am reporting secondary analyses in support of my Magellan Guarantee Project. My data comes from a clinical community-based lifestyle randomized trial (CCTT). My findings will contribute to developing a culturally tailored intervention trial addressing weight bigotry, racism, perceived stress, and occupational stress among AAW preparing for bariatric surgery.

Methods: Questionnaire responses from 146 adult AAW were analyzed. Participants had post-high school educations. Measures of body habitus were body mass index [BMI = weight(kg) / height(m)<sup>2</sup>], fat mass [FM], and waist to hip ratio [WHR]). Participants, on average, were at the Class 2 level of obesity (Mean BMI of 34.7(±7.7) kg/m<sup>2</sup>). Their average fat mass in pounds was 91.82(±35.03). Their mean WHR was 0.85(±0.80). Participants engaged in 5.4 years (± 7.9) of lifetime shift work on average. Depressive symptoms were relatively high (6.6, ±5.1).

Results: Stepwise linear regression models estimated the role of stressors in predicting body habitus. Weight discrimination (bullying) was the strongest and most consistent predictor across our three body habitus models. BMI was predicted by increased weight discrimination, depressive symptoms, lifetime shift work, and lower levels of racism (R<sup>2</sup>=.25, p<.001). Predictors of FM were weight discrimination, depressive symptoms, lifetime shift work, (R<sup>2</sup>=.20, p<.001). Eleven percent of the variance in the WHR was predicted by weight discrimination and education (p<.001). General life stress had no explanatory value.

Conclusions & Recommendations: Our results show that inequitable treatment and shift work stress contribute to adverse body habitus among southern AAW. Culturally tailored pre-surgical behavioral interventions focusing on resilience, action, and adaptive coping to social stressors are beneficial for AAW preparing for bariatric surgery.

**Ahrens, Ella**

**Mentor(s) -- Dr. Jessica Klusek**

### **Propositional Density as an Indicator of Premature Language Decline in Women with the FMR1 Premutation**

Introduction: Approximately 1 in every 151 women has the FMR1 premutation, which means they are a carrier for the gene responsible for the most commonly inherited intellectual disability known as fragile X syndrome (Seltzer et al., 2012). Considering how prevalent the FMR1 premutation is, little is known about the associated phenotype, especially regarding language use. A study conducted by Sterling et al. (2013) found that speech dysfluencies, which reflect difficulties with linguistic planning and execution, increased with age for women with the premutation while the comparison group had no correlation between speech dysfluencies and age (Sterling, 2013). This suggests that women with the premutation show premature language decline. The goal of this study was to determine if women with the FMR1 premutation show other language deficits, such as decreased propositional density during a picture description task compared to age-matched control women. Propositional density is a measure of how much information (adjectives, prepositions, verbs, conjunctions, and adverbs) is conveyed in a text or an utterance related to the total number of words and has been shown to decrease with age (Kemper & Sumner, 2001). Methods: Participants included 32 FMR1 premutation women (mean age=45.84) and 15 control women with no premutation (mean age=43.17). Both groups were given two picture description tasks: the cookie theft description task and the picnic description task. Both pictures displayed a scene that the participant narrated. Their narration was recorded and then transcribed according to the Systematic Analysis of Language Transcriptions conventions. From those language samples, propositional density was calculated using Computerized Propositional Idea Density Rater (CPIDR). The CPIDR program obtains a propositional density proportion score by calculating the number of propositions divided by the total number of words. Results: There were no significant differences between propositional density in women with the FMR1 premutation (M=.497, SD=.011) and control women (M=.494, SD=.013), p=.406. Conclusion: These results suggest that women with the FMR1 premutation do not have lower propositional density scores than the typical

population and that propositional density may not be an indicator of premature language decline in middle-aged women with the permutation. References: Full references on poster.

**Albrecht, Claire**

**Mentor(s) -- Ms. Lisa Camp**

**Female Leadership in Marching Music's Major League**

I lead The Cadets Drum Corps through two summers over 90 consecutive days each season. I was the head drum major who conducted an ensemble of 150 world-class musical performers. The Cadets are 10-time Drum Corps International World Champions and are an 84-year-old marching music organization based in Allentown, Pennsylvania. As the head drum major, my role was to keep the drum corps together musically and communicatively. I was the primary liaison between the staff and administration and the student membership. The Cadets traveled over 15,000 miles and performed 34 shows at professional football venues such as Lucas Oil Stadium. I participated in drum corps because I have a passion for music and wanted to spend a summer performing with the oldest and one of the most competitive drum corps in history. My role as a female leader taught me that everything is a choice. One common stereotype I faced was being labeled as emotional even though I never considered myself as such a type. I found that I had to be even more thoughtful with my actions and reactions as a female leader because I was under a critical lens.

Returning to school and entering into a professional environment, I am grateful for my experience at The Cadets because I had a summer's worth of practice in thinking through how my behaviors can be read in various leadership situations. Moving forward, I plan to spend one final summer performing with The Cadets. The experiences I have gained through my membership have fundamentally changed the way I approach professionalism in any situation.

**Alessio, Jaime**

**Mentor(s) -- Ms. Lisa Camp**

**A Comparison Between The Boeing Company Internship and Class Consulting Project**

Within the first experience I was able to lead a consulting project in one my GSCOM courses. The second experience was as a Supply Chain Analyst Intern at The Boeing Company. These two endeavors were fantastic hands-on experiences that allowed me to apply what I have learned throughout college and solidify that GSCOM is a career field I will be pursuing post-graduation. The purpose for the class project was to help a local business, our client was Columbia's premier oriental grocery store. We implemented operations management techniques focused on efficiency with an ultimate goal of improving the business model of our client. The Boeing internship was the result of seeking a challenging internship where I could attain more hands-on exposure to the supply chain operations industry.

After these two particular experiences I was able to pin point out the varying methods of projects between class and internship projects. Specifically, with the different stakes such as doing a project for a grade versus working a project that has a direct impact to a billion-dollar company and can affect weather or not you receive a full-time return offer. The significance of this analysis is that through class group projects you are going to be able to gain exposure to the importance of meetings and how to be an attendee or a facilitator and you should take advantage of these opportunities. The ability to manage a group meeting well will give you valuable talking points during interviews. Next thing you know you are going to be at an internship, with much higher stakes, leading presentations in front of analyst and managers. Therefore, I encourage students to take school projects seriously, as they are a mirror image of the real world and seek internships, conferences or co-ops to embellish their leadership skills.

It is quite fascinating how life comes full circle. Reflecting on my college supply chain internships, class consulting projects I realize that these "Beyond the Classroom Experiences" have led me to my next adventure. After graduation I will be working at IBM as a supply chain software consultant.

**Alexander, Deztane****Mentor(s) -- Ms. Theresa Harrison****Making Magical Moments through Passion**

During the Fall Semester of 2017, I worked at Walt Disney World attending the Disney College Program (DCP). Coupled with the chance to gain experience in a once in a lifetime opportunity, The Disney College Program also gave students a hands on experience of the hard work it took to give magical moments. Walt Disney World did not become the happiest place on earth because of the castle, or because of the pixie dust. The cast members deliberately gave all guests an exceptional experience that made them feel as if they were in a fairytale. The differences in our physical appearance did not matter, because at Disney, we were all beautiful and amazing. During my seven months in the Disney College Program, I was given the opportunity to make many magical moments with individuals who were going through heartbreaking situations, while working at the Whispering Canyon as a Hostess. As a Hospitality Management major at the University of South Carolina, the Disney College program gave me a realistic outlook as to what Hospitality really was. From working every holiday, standing long hours on my feet, exceeding expectations from demanding guests all while giving exceptional customer service, all taught me that hospitality was not something a student could learn in a classroom, but through experiences itself. Through these experiences, my passion for hospitality soared, and I started to look forward to working on these holidays and meeting demanding deadlines, because I knew it would give someone a magical day. Hospitality is not a job, but a passion to give every guest a great experience. While attending the DCP, I learned that every individual was a very important person, or as we called it, VIP. My presentation will discuss the insights I obtained about my passion for Hospitality as well as the positive impact the DCP has had on my job performances, and shaping me as an individual.

**Alkendi, Najaya****Mentor(s) -- Mrs. Lisa Camp****Traveling opened magnificent doors for me**

My name is Najaya Alkendi I am an international student from Sultanate of Oman. I am a student at the University of South Carolina majoring in finance and human resources management. I am trying to deal with people and money in a perfect way. When I first came to Columbia I was 17 years old. I faces many difficulties and troubles but those things made me stronger and wiser. Being far away from my family and my house was one of my biggest fears. That was such a nightmare for me. I could not imagine living far away from my family for a week. After getting my high school result, I remembered how I was in indecision about where I want to complete my educational journey. The decision was tough to me. I prayed many time to choose the right path. However, after a long thinking and consultations I chose to study in the United States. Now, after being in the United States for more than three years, I can proudly say that this was one of the rightest decisions that I have ever made because this allowed me to see new and different sides and angles of the world. In addition, meeting new people and identifying a new cultures was so interesting and enthusiastic. I did not imagine or even thought that this decision opens millions good things to my life. There are much more to come and to do because the journey does not finish yet. However, there were many challenges that I endured and there are more that I must endure because am doing something that is irregular. I joined to the USC's community in August 2015. I didn't imagine how the days are running. Now I just have few months to graduate from USC.

**Allender, McKenzie****Mentor(s) -- Mr. Rico Reed****How My Internship Abroad Changed My Life**

The summer after my freshman year, I was given the opportunity to travel to a small island called

Eleuthera in the Bahamas for an internship with the Caribbean Ministries Association. I was able to live in a completely new culture for two months. When I talk about this experience, most people think that I spent a summer in a nice and lavish place full of tourism and people thriving off of money and success. However, that is not the case. It is an island without a lot of things most people in our country would consider necessary, like a hospital. I lived with and came alongside a missionary family living there. I engaged in the community to form and build relationships, helped in leading short-term service trips, helped to facilitate a summer camp for children, and learned more about myself than I had ever before. When I applied for this internship, I was terrified. The thought of being away from home, and even more, out of the country, right after my first year of college was daunting. However, I knew it was something that would push me far outside of my comfort zone, and up until then, all of the most important things I had learned in life were from times when I was pushed out into the unknown where I had room to grow. I was able to grow in knowledge of diversity and how important it is to be aware of differences. From that, I gained an important self-awareness, which is one of the most valued attributes one can have as a social worker. This experience was a defining moment in my decision to choose social work as a profession. It created a passion in me for other people, and it inspired me to help and care for people in the best and worst moments of their lives. In the future, I hope that I can continue to gain awareness and understanding about people and their differences, and how I can provide them with the necessary tools in life to be successful individuals.

**AlSayed, Rahaf**

**Mentor(s) -- Dr. Kimberly Shorter**

**An Investigation of the Effects of Folic Acid on Histone Modifications and Dendritic Spine Density in a Human Neuronal Cell Line.**

Autism spectrum disorders (ASD) are characterized by difficulties in social interactions and increased repetitive behaviors due to abnormal neuromorphology (increased dendritic spines). Previous studies have shown autism is epigenetic in origin. Epigenetic modifications including DNA/histone methylation are altered through the folic acid (FA) metabolic pathway. FA consumption and ASD rates have both increased in recent decades; therefore, we questioned if excess FA consumption is linked to ASD. In our research, we investigated the effects of a 2x FA dose on histone modifications at histone 3 and on dendritic spine density in a human neuronal cell line. We treated SHSY5Y cells with a 2x FA dose or water (control). We isolated histones and determined histone 3 modifications using ELISA format array plates to determine levels of various histone 3 methylation and acetylation marks. We stained control and FA treated neurons with Dil stain to determine the dendritic spine density. Results showed a decrease in active histone methylation and acetylation marks (a pattern associated with decreased gene expression and with ASD) and a significant increase in dendritic spine density in FA treated cells. Our results indicate excess FA could be linked to increases in ASD-related neuromorphology changes and histone modification changes.

**Alwan, Akilah**

**Mentor(s) -- Dr. Claudia Benitez-Nelson, Dr. Gwen Geidel, Dr. Katherine Ryker**

**Creating a Sense of Belonging through Geoscience UnEarthed**

Geoscience is one of the least diverse areas of study within all of STEM programs. Low-income and ethnic minority students are not represented in geoscience due to lack of exposure to geoscience, lack of representation and positive role models, and lack of knowledge about opportunities for scholarships and careers within the field. In addition, low-income and minority students who do have geoscience interest and prior exposure still lack a sense of belonging. Through a partnership with the School of the Earth, Ocean, and Environment and Swansea Freshman Academy, a school where 100% of the students are on Free or Reduced Lunch, two groups of high school students traveled to USC to gain exposure to a collegiate geoscience program. The students interacted with an augmented reality sandbox, conducted marine science labs, toured Green Quad and the Sustainable Carolina

Garden, and talked to SEAS and Geoscholar students. The research question for this project was whether providing this exposure to these students who are underrepresented in the geoscience can create an interest in or improve a sense of belonging within the field. Before and after the students' activities on campus, they were given a survey to measure their current interest and sense of belonging. The surveys were then processed and compared to see if there was any significant difference between the pre and post surveys. A large limitation to this project is that it was restricted to a one-day study. A future improvements would be a longitudinal study following students throughout a school year to better understand how providing long term geoscience exposure impacts interest and sense of belonging.

**Alwan, Akilah**

**Mentor(s) -- Dr. Katherine Ryker, Dr. Claudia Benitez-Nelson, Dr. Raymond Torres**

**Project Sandbox: Exploring the Effectiveness of Augmented Reality Sandbox Technology in Geoscience Education**

Augmented reality (AR) sandboxes are a new technology within geoscience education that are used to demonstrate earth surface systems and processes with students. Previous studies have been conducted that showed students had positive interactions with the AR sandbox technology, yet post assessments have shown that students did not consistently gain content knowledge from the exposure. Based on these results, an effective way to use the sandbox as part of the classroom/lab curriculum has not been determined and therefore needs more data to explore the concept. Part of the current challenge with AR sandbox technology is how to apply it to different levels of student group, e.g. class or major. This study will provide data on how different student groups interact with the AR sandbox, which will give insights on how to use the sandbox most effectively with different audiences. The participants in this study were high school freshmen from the Swansea Freshman Academy, college freshmen geoscience majors (non geology or geophysics) and upperclassmen geology majors from the University of South Carolina. Participants were asked to interact with an AR sandbox and give their reactions and responses verbally, which were recorded via audio and/or video. These responses were transcribed and coded based on the type of interaction. Patterns within and between the different student groups will be shared, along with suggestions for how to improve the incorporation of the AR sandbox into lab settings.

**Amalean, Anjali**

**Mentor(s) -- Dr. Daniel Fogerty, Ms. Rachel Miller**

**Melody Contour Discrimination with Cochlear Implant Simulation**

Though cochlear implant technology has proven helpful for speech perception, music perception abilities are limited. In general, CI listeners report that music perception is an important and enjoyable part of life, but this enjoyment often decreases post-implantation due to inherent limitations in the device. This study aims to determine which perceptual cues are available for melody differentiation so that cochlear implant technology can be better understood and ultimately improved. Normal hearing participants from USC's undergraduate student body were tested on a cochlear implant simulated melodic contour discrimination task. Melody contour stimuli were created with the music notation software Sibelius using the MIDI piano setting. Contours were created using five notes each with the root note staying constant at 440 Hz (A4). Two different interval distances were used to design the melodic contours: a major second (2 semitones, M2) and a perfect fourth (5 semitones, P4). Within each interval dimension, contours were assembled into nine different patterns. These patterns consisted of simple "flat," "rising," and "falling" pitch contours and slightly more complex pitch contours including "rising-falling" and "flat-rising." The contours were then run through a four channel cochlear implant simulation in randomized pairs to normal-hearing participants in a sound-attenuating booth via headphones. Participants were instructed to select whether the two contours sounded the same or different and to qualify the similarity of the two contours on a 1-7 scale with 1 being very similar and

7 being very different. Currently, data is being analyzed to examine the effects of interval size, contour pattern, and presentation order. It is predicted that the patterns with the larger interval distance and those that are more dissimilar will be easier to differentiate, as explained by the frequency resolution of the cochlear implant simulation.

**Anderson, Yasmeen**

**Mentor(s) -- Mrs. Anna Oswald-Hensley**

**Distinctive Uniqueness**

In the Fall semester of 2017, I was a peer leader in a University 101 class. As a peer leader, I was to assist the instructor, as well as conduct a minimum of five (5) activities for the class. With the activities, I made sure that they all went along with the covered topic for that week or day. I chose to become a peer leader because, I wanted to be able to help freshmen with learning how to be a successful college student. Being a peer leader also allowed me to become a better college student and provided me the opportunity to help people in a way, that they did not even realize. Conducting the activities in the class helped me improve my communication and organization skills, with trying to get the activity together and explaining it to someone who has never done the activity before. Being a peer leader showed me the importance of taking the University 101 class during one's freshman year of college, because it gives you the necessary tools to help you throughout your entire college career. Through this experience, I plan on continuing to help other students with the basic survival skills of college.

**Anderson, Laura**

**Mentor(s) -- Mrs. Maegan Gudridge**

**Stepping Out**

The most rewarding thing in my life has been traveling to places where I have never been and often times do not understand how to speak the language. Last Spring, I had one of these experiences when I studied abroad in Rome, Italy for four months at John Cabot University, an English speaking university located in the center of Rome. At John Cabot, I took three business classes and one Italian literature course, where I learned about how past travelers experienced Italy and was able to travel to nearby museums and see paintings and statues that inspired different literary works.

Through my courses and travels within Italy, I learned about Italian culture and values and got a glimpse of how those differ between different regions in Italy. My favorite experiences were those in which I got to experience a new place with the help of a local.

Reflecting on my experiences, I have come to the conclusion that it is important to go out of your comfort zone and travel to unfamiliar places. Traveling allows you to learn a lot about a country's culture and the different perspectives on how they approach life. This impacts your view of the world and the way you think - helping develop a new perspective on how to approach issues. It also encourages you reflect on your own culture and values; which I believe is important.

As I prepare for a professional career in the global economy, I will take with me a lot of the lessons I learned from studying abroad. I want to encourage others to take a chance and travel to new places so they too can benefit from the experience. Stepping out of your comfort zone and going somewhere unknown is not always easy, but it challenges you to redefine the way you think and grow in new and unexpected ways.

**Anderson-Horecny, Elisabeth Zoe**

**Mentor(s) -- Dr. Matthew Melvin-Koushki**

**Occultism in the Pre-Civil War South**

Traditions in occult sciences—astrology, medicine, divination--were established in the colonial South and served an integral role in daily life through the education of elites to guidelines for small farmers. This went beyond racial lines through African traditions adapted by slaves in a new landscape and the endurance of Native American cultural practices. These traditions pointed towards Southern distinctiveness contrasting Puritan centered morality and ethics in the North, which worked to suppress “magic.” Although the practice of occult sciences could endure through the American South, effects of The Second Great Awakening and the schisms of Protestant denominations from their Northern counterparts would dilute its presence within the historical narrative. Educational systems were radically changed through these new ideologies as were the interpretations of occultism in the past to fit these beliefs.

This blending of Stoicism within a renewed, Puritan-like morality only served to misrepresent past philosophical traditions and incompatibly match them with the religious justifications of the time. Previously considered outside perspectives that focused on barbarism or superstition of gambling and other occult practices taking place in the South would dominate the record, which contradicted realities of actual practice. The denominational schisms and religious rhetoric surrounding slavery would denote the South as operating in a different collective consciousness than the North as a signal of further separation to come decades before the Civil War. The conditions of occult traditions and ultimately the suppression of them within the historical record occur due to the education and occupations of whites, the institution of slavery importing African occult traditions, and the interactions between whites and Native American tribes in the South. As the conditions surrounding these factors shifted before and through the Civil War traditions in the occult sciences would be forgotten, segregated and dismissed as “folk,” and removed from the South.

**Andrulat, Schuyler**

**Mentor(s) -- Dr. Eran Kilpatrick**

### **Digitization of the Herbarium Collection at the University of South Carolina Salkehatchie: Contributing to a Regional Network of Herbaria**

An herbarium is a systematically archived collection of preserved plant specimens and associated data used for scientific study. There are 96 active herbaria across the southeastern United States with regionally representative collections. Advancements in imaging technology and web-based data sharing have provided a way to link networks of specimen records that would otherwise remain unavailable to researchers. In 2014, the curators of nine herbaria in South Carolina were awarded an NSF grant to build and sustain a research database for all specimens housed within the state. The objectives of the project at USC Salkehatchie were to prepare, catalog and image each specimen in the USC Salkehatchie Herbarium (SALK) collection. Dried and pressed plant specimens were mounted on standard herbarium sheets along with an accompanying locality label, barcode and herbarium seal. Skeletal data for each specimen was then entered into the Southeast Regional Network of Expertise and Collections (SERNEC) database. Specimens were imaged using a Canon EOS 5D digital camera with a 50mm macro lens in combination with an imaging station. After proofing each image with Microsoft Digital Photo Professional, the Adobe Lightroom application was used to compress the raw (CR2) image to JPEG format. Images were then uploaded to the Cyperduck Library, a web-based cloud, then paired with their appropriate skeletal record via SERNEC through final digitization by barcode entry and synchronization. A total of 456 specimens were processed representing 82 families, 180 genera and 314 species. The majority of the collection (88%) represents flora from counties within the Savannah River and ACE Basin watersheds of South Carolina. The remaining specimens are from North Carolina, Georgia, Tennessee and Arkansas. The SALK collection, originating from the ecologically diverse ACE Basin, is available to the public via the SERNEC web portal in combination with all other network herbaria. SERNEC users can customize parameters related to taxonomy, location, global position and collector to refine each search. Herbarium records provide a means of (1) tracking past and present occurrence trends for species with conservation status, (2) determining

ecological integrity and (3) guiding land management decisions.

**Anilonis, Kaitlin**

**Mentor(s) -- Ms. Lisa Camp**

**Gaining a New Perspective**

While my courses during my time here at the University of South Carolina have paved the way for me to become prepared for my future, it has been the pursuit of my degree that has led me to discover what I am truly passionate about. My experiences as a member of the executive committee of Zeta Tau Alpha, internships with iCIMS and Hip New Jersey, and a study abroad trip to Oman all contributed to pursuing Graduation with Leadership Distinction in Professional and Civic Engagement.

During my sophomore year, I decided to go on a Maymester trip led by the Journalism School to Oman because I knew that going to this Middle Eastern country would be a once in a lifetime opportunity. Our mission was to film an interview a citizen of Oman about an aspect of their culture as we traveled through the deserts, mountains, and beaches of Oman. My group and I chose to interview the first Omani to ever graduate from the University of South Carolina about her view and comparison of women's rights in the United States and those of Oman. What she said was startling. She told us that in fact she did not see that much of a difference between the women of each country. While the women in the two countries were living in different cultures, the desire for equality is what makes us all the same.

This interview gave me a new perspective on how I viewed other people. Instead of only seeing the obvious differences between two people, I started to see the similarities. I have adapted this lesson and incorporated it into my life and leadership style throughout my remaining time here, such as my position as Risk Management. Throughout various situations, I made an effort to understand where every person is coming from to find the solution that was best for them. Finding a common ground and learning to understand my peers is an invaluable skill that I was able to apply to my leadership position and will be able to help me in my future positions.

**Armstrong, Kaitlyn**

**Mentor(s) -- Dr. Andrew Hatchett, Dr. Brian Parr**

**The Effect of a Curved Non-motorized Treadmill on Running Gait Length, Imbalance and Step Angle**

Running on a non-motorized, curved-deck treadmill is thought to improve gait mechanics. It is not known, though, if the change in gait carries over to running on a motorized treadmill or level ground. Purpose: To determine the effect of running on a curved non-motorized treadmill (CNT) on gait characteristics measured during a subsequent bout of running on a traditional motorized treadmill (TMT). Methods: Sixteen healthy college-aged participants, age (mean±SD) 20.4±1.6 years volunteered to have their gait analyzed while running on a TMT and CNT. After familiarization and warm-up on both treadmills, each subject completed five, 4-minute bouts of running alternating between traditional motorized and curved non-motorized treadmills: TMT-1, CNT-1, TMT-2, CNT-2, and TMT-3. Variables of interest included step length (m), stride length (m), imbalance score (%), and step angle (°) and were measured using Optogait gait analysis equipment. Differences in gait characteristics among TMT-1, TMT-2, and TMT-3 can be attributed to running on the CNT. Results: The results show that running on a CNT resulted in significant changes in gait characteristics. Conclusions: These findings suggest that running on a CNT can significantly alter gait characteristics may result in improvements in running gait that persist to subsequent running on a TMT.

**Arnold, Stephanie**

**Mentor(s) -- Dr. Jennifer Pournelle**

## **Maintaining and Restoring Sustainable Hydrology in Iraq**

MaRSHil (Maintaining and Restoring Sustainable Hydrology in Iraq) is an applied archaeology research program, conducted in cooperation with the University of Basra, Iraq. MaRSHil is now testing how constructed wastewater treatment wetlands can be integrated with wetland agriculture to restore ecosystem-provisioning services, such as livestock fodder and fisheries. This pilot study will assess potential for long-term fish production in a model wetland: Phinizy Swamp, Augusta, Georgia. It was reconstructed 30 years ago on exhausted farmland, used for wastewater treatment for two decades, then left to develop naturally.

Phinizy Swamp was chosen for this pilot study because its marsh water volume and quality, species mix, climatic range, latitude, and proximity to urban environments are similar to those around Basra. Bioproductivity and species abundance data will be collected by hand-netting fish in the wetland, using techniques typical of those ethnographically attested in the marshes of southern Iraq. Once collection is complete, MaRSHil colleagues will use the findings as a model to project expected fish biodiversity and productivity in a reconstructed wetland in Southern Iraq, for the purposes of reviving collapsed fisheries.

Fish productivity in reconstructed wetlands are incidental to the establishment of the biogeochemical processes for deammonification. Collecting this data on fish species abundance and productivity would inform managers of the presence of potentially impactful species on ecosystem function in the wetland, and could be used as an additional indicator for ecosystem health. The results of this study will also be beneficial to developing more sustainable aquaculture and agriculture methods in Iraq.

## **Askins, Amanda**

**Mentor(s) -- Dr. Nathan Hancock**

### **Analysis of F2 Activation Tagging Wheat Lines**

Transposable elements are DNA sequences that can jump from one location to another in the genome, inducing mutations in an organism. These elements can be used for gene discovery because of their ability to change an organism's genome and alter phenotype. Our goal is to use a non-autonomous transposable element known as mPing, first discovered in rice, for mutagenesis of wheat. Wheat is one of the most widely grown crops in the world; however, because it is a polyploid, simple gene deletion is not usually sufficient to cause a phenotype. An activation tag shows the function of genes by causing overexpression of nearby genes by inserting promoter sequences into the genome. Thus, we have developed an activation tagging version of mPing, called mmPing20F, by inserting an enhancer sequence from the figwort mosaic virus promoter into a hyperactive version of mPing. Mobilization of this element requires two proteins, ORF1 and Transposase. Our F1 generation of plants showed that mmPing20F was able to transpose when combined with plants that express both proteins. Transposition analysis in the F2 generation is being conducted through PCR screening in order to determine the levels of germinal transposition occurring in each line. Our goal is to identify a line that is suitable for production of a large mutagenesis population for gene discovery in wheat.

## **Atkin, Victoria**

**Mentor(s) -- Dr. Magdalena Grudzinski-Hall**

### **How leadership in faith based organizations changed my life**

There are over 35 registered faith-based organizations at the University of South Carolina that offer students the opportunity to learn new ideas and explore their faith. Faith based organizations give students the space to be vulnerable and develop deep community with other people. I have found that having that deep meaningful community with other people is essential for college students and can help relieve stress and help in mental health issues that come up in college. During my time at the University of South Carolina most of my time has been spent as a member of InterVarsity Christian Fellowship which is an interdenominational organization on campus. I have served as a leader in InterVarsity for three years as missional coordinator, president, and small group leader. These lead-

ership roles helped me grow in self-confidence, develop leadership and public speaking skills, and develop organizational abilities. As a leader in this organization I was pushed to discuss and interact with topics that pushed me out of my comfort zone and learn to take the perspectives of people that are different from me. My presentation will highlight the benefits I gained from leadership in InterVarsity and how my involvement in a faith-based organization changed my life.

**Atkins, Jessica**

**Mentor(s) -- Dr. Anna Swartwood-House**

**Portraying Pestilenza: The Black Plague in Renaissance Art**

My project combines art historical and epidemiological methods to analyze depictions of plague in Italian art from the mid 14th century, when *Yersinia pestis* first made landfall in Venice, through the 18th century. The Black Plague ran rampant through Europe and the Middle East more or less unchecked for more than a millenia, killing 50 million Europeans in the 14th century alone. I incorporate firsthand accounts of those who experienced life during outbreaks of bubonic plague from figures like historian Lodovico Muratori, physician Giovanni Pressi and author Giovanni Boccaccio with scholarly writing on the subject with visual analysis of contemporary works of art by masters that depict victims of the plague, 'plague saints' being martyred or interceding on behalf of the victims and God's wrath. I also consider the important context of early modern medical theory and practice. In addition to the other evidence I will also be consulting early modern medical theory and practices for the treatment of bubonic plague as medical culture and public perception of hospitals add another level of analysis to the works. One modern scholar in particular, Millard Meiss, almost single handedly refreshed this topic in 1951 with his publication *Painting in Florence and Siena after the Black Death*, many of the sources I've used have referenced this work. One of my personal interests and points of departure from other literature is I have found not only translation of actual epidemiological symptoms into visual media, but also elisions and sanitized symbols of those symptoms. Thus what is said is as important as what is left unsaid, or unrepresented. The takeaway from this project should be for the audience to have a better understanding of the bubonic plague and of its depictions in visual art as well as its impact on daily life for contemporary peoples and the power of visual art to transform disease from tragedy into a tool for healing.

**Augustus, Jordyn**

**Mentor(s) -- Dr. Lara Ducate**

**More than a Student-Athlete**

It's easy to spot the athletes on campus. They're always sporting the newest gear, are usually a foot taller than everyone else, and constantly have the spotlight on them. However, athletes are more than their sports. When they take their jerseys off they're regular people too. As a student-athlete working in the greater Columbia community, I've learned that softball isn't who I am, but rather something that I do that provides me with the platform to touch the lives of those around me. As the Community Service Chair for the Student-Athlete Advisory Committee I had the power to organize events between student-athletes and community groups and witness firsthand the effects that athletes can have beyond their playing fields. In particular, the Food Drive Frenzy was one event that brought about this realization. Conducting one fundraiser helped the student-athletes at the University of South Carolina raise enough money and food to provide 15,380 meals for the people in the midlands by inspiring local businesses, students, coaches, and the citizens of Columbia to join the fight against hunger. Making the game saving headlines are great, but headlines fade and one day the game will come to an end. However, the person that the athlete is off the field and the lives altered due to their influence will last forever.

**Aveldanes, Jose**

**Mentor(s) -- Dr. Jennifer Augustine, Dr. Carla Pfeffer**

## **Exploring Patterns of Fertility among Women in Same-Sex Unions**

While research on children raised in same-sex families has proliferated over the past decade, little to no research has focused on the impact that marriage—and union status in general— have on the gay and lesbian individuals who decide to bear children. This study, thus, aims to provide greater knowledge of the fertility patterns of women in same-sex families while also stimulating greater research efforts devoted to investigating family dynamics of same-sex dyads. As part of these efforts, we investigate the question of whether the impact of being married has a different effect on fertility patterns for women in same-sex unions (married vs. cohabiting) relative to women in different-sex unions (married vs. cohabiting). We investigate, how being in a same-sex union impacts fertility patterns in conjunction with answering the question of what individuals who have children within same-sex unions look like demographically. Using data from the American Community Surveys (2001-2016) and find preliminary evidence that women from ages (18-50) report higher odds of having children relative to women in different-sex unions.

**Ayala, Emanuel J.**

**Mentor(s) -- Dr. Mark A. Sarzynski, Mr. Jacob L. Barber, Mr. Jonathan J. Ruiz-Ramie**

### **HDL Anti-Inflammatory and Anti-Oxidative Responses to Endurance Exercise Training**

Cardiovascular disease (CVD) is the leading cause of death in the US. Atherosclerosis is a chronic inflammatory disease that causes CVD. The development of atherosclerosis is partly attributed to oxidized low-density lipoprotein (LDL) particles causing plaque accumulation in vascular tissue. Furthermore, one of the crucial first steps in atherosclerosis is the inflammation of endothelial cells, which is mediated by vascular cellular adhesion molecules (VCAM-1). High-density lipoprotein (HDL) is well known to be protective against CVD, which is believed to be partly due to its anti-inflammatory and anti-oxidative properties. Thus, identifying possible treatments that improve the functional properties of HDL particles is an important next step. However, the effects of exercise on the cardioprotective properties of HDL are largely unknown. The aims of this project are to 1) determine the effects of exercise training on the ability of HDL particles to protect against LDL oxidation and 2) to inhibit VCAM-1 expression. These aims will be tested using plasma blood samples that were collected at baseline and after 20 weeks of training in the HERITAGE Family Study. Specifically, 20 sedentary participants that completed the training program were selected for this pilot study. The isolation of HDL will be performed through fast protein liquid chromatography (FPLC). The anti-inflammatory properties of HDL will be analyzed by measuring the ability of HDL to inhibit the expression of VCAM-1 in human umbilical vein endothelial cells before and after exercise training. The concentration of VCAM-1 will be measured using RT-qPCR. The anti-oxidative properties of HDL will be tested by measuring the ability of HDL to inhibit LDL oxidation using a fluorescence-based assay. We hypothesize that HDL particles will become more effective in the inhibition of LDL oxidation and the inhibition of VCAM-1 expression after exercise training. This project is supported by a Magellan Scholar award to William Clarkson, who will lead the experiments related to Aim 1-anti-oxidative, and Emanuel Ayala, who will lead the experiments related to Aim 2-anti-inflammatory.

**Aycock, Kenneth**

**Mentor(s) -- Dr. Guiren Wang**

### **Optimization of microfluidic chip fabrication via femtosecond laser ablation**

Microfluidic devices have a promising future as low cost testing tools for both point-of-care (POC) and research applications. Research has been focused on the reduction in cost of these devices, commonly known as Micro Total Analysis Systems ( $\mu$ TAS). Despite the advancements in  $\mu$ TAS, the manipulation and fabrication of these systems can be tedious and expensive. Researchers would benefit substantially from a rapidly protoypable device fabrication system. Laser ablation of tape substrates has shown promise in producing cost-effective, rapidly manipulable devices, but the work done thus far has utilized continuous wave lasers that perform suboptimally due to the relatively long wave-

lengths used and the introduction of joule heating. Previous research has shown that polymeric substrates can be manipulated without absorbing heat when ablated via picosecond pulses or shorter. Thus, we are seeking to fabricate microfluidic devices with drastically increased resolution by using a pulsed laser capable of operating at wavelengths in the near ultraviolet, visible, and near infrared spectra. We ablated substrates using a laser that provides energy in ultrashort pulses, well below the previously mentioned threshold. To make this fabrication method truly rapid, we have investigated the use of numerous biocompatible substrates. We have shown the influence of numerous input parameters such as laser power, magnification, substrate travel speed, and wavelength on the resulting ablation profile. We have demonstrated the efficacy of using ultrashort pulses for the rapid prototyping of microfluidic devices. We are continuing this experiment to optimize our protocols and validate the performance of these devices in common microfluidic assays.

**Bacak, Patrick**

**Mentor(s) -- Dr. Dan Freedman**

**Global Learning: How my Semester Abroad Shaped my Career Path**

I spent last spring semester studying abroad at the University of Leeds in northern England. Traveling the globe and exploring as much of the world as I can has always been a goal of mine. While in Leeds, I had the opportunity to explore much of the European continent from the gusty coast of Ireland to the castles in Slovakia. Besides travelling, my passion lies in sports. While travelling throughout Europe, I made many detours to experience first-hand the exciting and intense world of European soccer. I have always known that I wanted to integrate my passion for sports into my career but wasn't quite sure how. While attending various European soccer matches, I was amazed at the levels of passion from the fans and how connected the team was to their home city. With this in mind, I took a sport sponsorship class that ended up having a big influence on my life. The combination of observations while abroad and class curriculum shaped my desire to follow a career in sport sponsorship.

**Backmon, Kendrick**

**Mentor(s) -- Dr. Todd Shaw**

**Graduation with Leadership Distinction: Discovering True Leadership**

I decided to challenge myself in 2016 by travelling to Cambridge, Massachusetts to take a course on the presidency. This course changed the trajectory of my life and led to a continuous state of personal transformation. After the summer course, I returned to the University of South Carolina on a mission to make a difference. I became a college senator and a resident mentor. In the 108th Senate, I proposed the Backmon-Carter 2040 Vision for USC to promote inclusive academic standards, advocate for a school of government, and offer a different model for undergraduate instruction (e.g. increased research activity, increased accessibility to various campus resources, etc.). Resident mentors often change the lives of their residents; however, my residents changed my life. I used to be robotic—too formal, orderly, and scripted—until my residents showed me how to truly connect with people. I learned three key insights in classes at the University of South Carolina: The Looking-Self Glass Theory by William Horton Cooley and how this impacted my leadership, (2) collective action and how this concept from the political science courses guided my thinking when recruiting students for political causes, and (3) the importance of vitamin-c, connectedness, when seeking to make a difference in the world. Several courses and mentors have transformed me into the leader I am today. I lobbied at the State House for three months through student government, took a stand in the college senate, founded two college organizations, and led a residence hall because of my desire to make a meaningful difference in the world; these experiences played a significant role in preparing me for the challenges ahead.

**Bagnell, Anna**

**Mentor(s) -- Dr. Sofia Lizarraga, Mrs. Seonhye Cheon**

## **Characterizing the Impact of the Gene ASH1L in the Regulation of Neuronal Gene Expression**

Autism spectrum disorder (ASD) is a neurodevelopmental disorder associated with defects in neuronal connectivity and is highly heritable. A significant proportion of ASD cases are of a complex genetic-etiology which reflect the impact of gene environment interactions. The mechanism which facilitates these complex genetic and environmental interactions are not well understood. Genetic findings suggest that there is an overrepresentation of chromatin regulatory genes associated with autism which may exert their effect by modulating epigenetic mechanisms that alter circuitry development. We have found that that ASH1L, a chromatin remodeling gene, is strongly downregulated in human neurons treated with Valproate (VPA), a robust environmental ASD risk factor. ASH1L dimethylates Histone H3 on Lysine 36 (H3K36me2), a histone mark implicated in transcriptional activation and repression. Therefore, ASH1L could differentially modulate expression of genes relevant to ASD in response to the environment. How mutations in ASH1L lead to deficits in neuronal connectivity associated with autism pathogenesis is not well understood. This project aims to characterize the impact of ASH1L on neuronal development and pathogenesis of ASD. We are using genome editing and shRNA knock-down approaches to interrogate the function of ASH1L in stem cell derived human neurons. This study is important as ASD pathology could be associated in part with deficits in neuronal arborization that would lead to defects in neuronal circuitry.

**Bailey, Alexis**

**Mentor(s) -- Prof. Joe Jones, Ms. Stephanie Suarez**

### **Walking the Pathway to Social and Political Activism**

I have always been captivated with the idea of creating meaningful change in the world, a passion which motivated me to major in public health and minor in political science. I recognize that every interaction I have with someone is an opportunity to make a positive impact on them. This belief has encouraged me to be an active member of the communities I inhabit and seek out opportunities such as the community service ambassador program as a means of social activism. A common factor across all these roles, which I have been able to reflect on through the graduation with leadership distinction program, is that each has allowed me to evolve into an active citizen by giving back to my community and the people in need there. The culmination of skills and knowledge I have gained from my courses and student organizations has pushed me to walk a pathway of social and political engagement. As a current intern at Planned Parenthood, I am understanding the interaction between health and politics and the role nonprofit organizations can play in both. This position lets me weigh in on the issues occurring in my community, as well as allows me to work to improve these conditions. Experiences such as this one, makes me realize that I can be socially and politically active by volunteering with service organizations and actively working to resolve issues close to my heart, something I hope to continue in my future career.

**Bailey, Thomas**

**Mentor(s) -- Prof. Elizabeth Easley**

### **The establishment of norms, interpersonal relationships, and active participation facilitate a well-rounded and cohesive work environment.**

I work as the assistant to the aquatics director. I assist in the hiring and training of staff as well as help coach the satellite practice of the YMCA Rays swim team. I am also responsible for scheduling staff and helping to oversee the day to day operations of the pool. While my job is neither prestigious nor high demand, it is an incredible learning opportunity. The first thing you learn when working with others is that your opinion or perspective is not always the best. I believe that understanding this is part of being a leader. One must accept that asking for the opinions of others is not a sign of inferiority but a way to achieve a more well-rounded solution. The differing perspectives, skill sets, and backgrounds of the individuals you work with are a resource. Failure to utilize these things can only be seen as detrimental. The single most important thing I have learned is to be a leader and not a direc-

tor. Serving as a leader is a state of action. It is about being active and engaged alongside others, while serving as a director is hallmarked by disconnect from others and a lack of active participation. Leaders add to the cohesiveness of the group by establishing working hard, dedication, diligence, and good interpersonal relationships as workplace norms. While I have learned a little about what it means to be a leader, I have a lot left to learn. I believe that what I am learning now will serve me well in my future endeavors. This experience may not have much to do with the medical field, aside from CPR and helping to prevent drownings, but it has everything to do with working with others as well as working with the public. Both of these experiences directly pertain to my goal of becoming a nurse. This job has taught me and continues to teach me more about how to work with others than I could ever hope to learn from books and I feel that that education is just as valuable as my formal education.

**Bain, Quentin**

**Mentor(s) -- Dr. Joshua Cooper**

**Small Ramsey Numbers**

In this study, we use the probabilistic method to get a better understanding of small Ramsey numbers  $R(k, l)$ . We investigate individual and joint frequency distributions of red and blue cliques in the complete graph  $K_n$  and determine the extent to which the frequency distributions are Poisson. We also consider failures of certain frequency distributions to realize the Poisson paradigm. Moreover, we consider values of  $n$  other than  $R(k, l)$  in order to obtain a more complete understanding of the distributions of cliques, and obtain asymptotic bounds on the covariance of red size  $k$  cliques and blue size  $l$  cliques.

**Barna, Kaela**

**Mentor(s) -- Mr. Rico Reed**

**Medical Service Learning in Peru**

The summer after my junior year of undergraduate studies, I took part in a month-long medical service trip to Huancayo, Peru through the non-profit organization Foundation for International Medical Relief of Children. With goals of providing modern medical care to families in disadvantaged communities, my group and I provided assistance in local hospitals, led outreach programs to the surrounding communities, worked with children in local orphanages and with teen moms, and provided a sustainable food source to families in the rural areas around the city. I took part in this trip to take a step out of the box by traveling to another part of the world, and to gain experience in a third world country to prepare myself for graduate school. With aspirations to become a P.A. I wanted to have seen first-hand what disadvantaged communities face everyday. I learned that in comparison to the United States, people of developing countries have many more challenges when it comes to accessing quality medical care which leads to larger death rates due to disease or injury, and chronic complications from mistreated injuries or medical problems. This experiences has shaped me in that I now understand the advantage that those of us have in healthcare by living in a developed and modern society, and as a future health care professional I will reach out to rural communities who also experience the same disadvantage in healthcare due to lack of resources or inability to pay. I also want to expand upon my experience further by participating in Doctors Without Borders in order to provide quality treatment to more developing communities of the world while also learning how to work in areas with limited resources, bettering my abilities to face any challenges that arise in medical care. I want others to know that many other countries and even rural areas in the US do not have access to the modern medical technology or health care providers and so in turn the people experience more health issues and may chronically deal with problems.

**Baumstark, Emily**

**Mentor(s) -- Mrs. Asheley Schryer**

## **Keeping the Lights On**

Santee Cooper is a power electric utility for the State of South Carolina that originated to generate and distribute power to the rural areas of South Carolina. Today, it is a power electric utility that has generation, transmission, and distribution. I interned for Santee Cooper for 3 summers, I was in the Substation Relay and Control Design Group. I chose to work at this company because I have grown up in the Lowcountry of South Carolina, and I wanted to be able to give back to the place that I will love and cherish forever as my home. In my internship, worked with engineers in my department who were updating the relaying that is used on the system to newer technology. I helped the engineers with design work; updated templates for day-to-day activities like ordering materials for projects; drafted drawings that they did not have time to do; designed a distribution station that was based off new templates that had not been used or checked. My eyes were opened to the fact that when power goes out at my house, it is necessary for the integrity for the rest of the system, and the relaying department is responsible for preemptive measures that are in place to keep power on as long as possible. It has allowed me to gain a higher respect for all that is done in protective measures to make sure that the people on the receiving end have power when they need and want it. I have now accepted a job at Aiken Electric Cooperative, which is a smaller power utility that deals simply with distributing power to members in the rural community of Aiken, SC. My internship at Santee Cooper has given me a strong background in learning about the structure of a power company. I also hope to take the technical knowledge about relaying and protection to my new position and help as this company makes improvements in the future.

## **Beal, Hannah**

### **Mentor(s) -- Ms. Moryah Jackson**

#### **From a Sports Fan to a Fan of the Business**

My name is Hannah Beal and I am pursuing a GLD for Professional and Civic Engagement. I am a Sport and Entertainment Major and a Business Administration Minor. My presentation will focus on how important it is in this industry to push yourself, make relationships, and to take advantage of opportunities. The sport and entertainment management field is vast; however, it seems that everyone knows everyone in the industry. That being said it is always important to form strong connections and relationships with as many people in the industry as you can because you never know when one connection can lead you to a foot in the door at your dream job. In my time here at the University of South Carolina I have worked with a startup company in Louisiana that produced their first music festival. I also got to travel to Amsterdam to work the European Athletic Championships, work with SEC productions for USC Softball and Volleyball, and work with Campus Recreation. In my second semester at USC, I was able to become a founding member of an SPTE Professional Fraternity. I was able to be on the board as the first Standards Chair and then move up this year to be the Treasurer and on the Executive Board. This really helped me branch out and take on a more peer leader role. I also became a SPTE mentor in my senior year. This was a wonderful opportunity to talk to incoming freshman and transfer students about the experiences that I have had and what the industry expects from them.

## **Becker, Andrew**

### **Mentor(s) -- Dr. Celena Kusch**

#### **Transitional Communities and European Modernist Architecture**

'Transitional Communities and European Modernist Architecture' explores European modernist aesthetics through architectural space in contemporary contexts. Filming architectural structures throughout the European continent, researchers gathered footage for a website which details the aesthetics of modernism. From de Stijl and the Amsterdam School of Holland, to Art Nouveau in Spain, Belgium, and France, to Streamline modern in Berlin, even to a Bauhaus in Switzerland—this project not only catalogs the divergent and convergent repertoire of modernist architectural aesthetics, but also ex-

plores the international context of European culture from which the aesthetics arise. As the disciplines of modernist art and architecture in the late 19th and early 20th centuries were often defined by the ideals of social progress through radical change, their idiosyncratic styles often differ from the traditional surroundings in which they were built. Even today, these structures play ambiguous roles in their communities of purpose. Documenting the relationship between the contemporary communities and the spaces of modernist architecture which continue to occupy them reveals the possibilities of positive civic engagement through both artistic and communal space. The project shows where these spaces have continued to play active roles within a cultural context of European communities, as well as how they have transformed and subverted original intentions. For instance, in Barcelona, Catalonia/Spain, La Sagrada Familia Basilica of Antoni Gaudi, although grandiose, still remains under construction and continues to divide the community while providing an immense spectacle for tourists to document their experience through camera lens instead of Gaudi's original intent of the Basilica as a communal religious use. Similarly in Berlin, Erich Mendelsohn's Streamline modern Mossehaus continues to see progress through surrounding construction and renovation, not too far from the former dividing line of Germany. As communities continue to develop and change with new buildings replacing old, and more residents moving back to metropolitan areas, the importance of innovative plans and sustainable infrastructure demands an evaluation of the impact of communities worldwide. By defining the functions of place and space and their changing significance to said areas, people can better comprehend the impact of architecture on their communities.

**Beckett, Dalya**

**Mentor(s) -- Prof. Ernest Wiggins**

**Politics 101: How Social Justice Led to an Internship of a Lifetime**

The political climate of the United States has intensified over the past year and a half, following the presidential election of Donald Trump as many Americans are still trying to grasp the results. As a Mass Communications major and Political Science minor, I knew that I wanted to see firsthand how the political process worked. One evening while working on a project for my Principles of Visual Communications course, I met Courtney White (an upper-division Public Relations major) who assisted me with InDesign and told me about her internship at Sen. Tim Scott's office. I was thoroughly intrigued and decided to look further into obtaining an internship such as the requirements and decided to apply. Following an interview, I was accepted into the internship program and did traditional intern duties, such as answering the phone, writing emails, getting the mail, etc. However, the real-world experience and close working relationship with Sen. Scott's media liaison at the Columbia office allowed me to talk directly with constituents, conduct important research among other duties. I expanded my network of media contacts around the state and had the opportunity to directly help the senator with a political forum that took place at Winthrop University in April 2017. I combined my skills in journalism with my passion for social advocacy and love of politics to ultimately have one of the most rewarding internship experiences a student could have. I met Congressman Trey Gowdy and he gave priceless advice to me, a future law student -- "Don't go unless you really want it." I plan to attend law school in the fall.

**Bedenbaugh, Yasmin**

**Mentor(s) -- Dr. Adam Pazda**

**Increasing Likelihood of Cognitive Biases by Increasing Belief in Conspiracy Theories**

The objective of this study is to see if there is a connection between belief in conspiracy theories and likelihood of committing a cognitive bias. There is very little literature review regarding conspiracy theory belief and cognitive bias so this study will further the knowledge of the two.

**Behr, Hannah**

**Mentor(s) -- Ms. Theresa Harrison**

## **Discovering communities need for youth development programs**

During the summer of 2017, I volunteered as a program coordinator intern at the Charlotte, North Carolina nonprofit, Girl Talk Foundation, Inc., This organization helps girls learn about themselves through workshops and other activities in safe and inclusive environments. While volunteering, I aided in coordinating their core fall program, Tailoring Teens for Success, by looking for a venue, securing facilitators, registering participants, and connecting with businesses for donations. I found that this organization's goals are to provide a need in the community by supporting young girls through character and leadership building workshops. My experience working with this organization unveiled to me that there is a need in many communities for programs that can provide young girls with a safe and socially inclusive environment; that helps girls in the community successfully navigate our gendered society. This type of work is meaningful to me because I want to design and conduct research related to prevention for youth issues such as teen pregnancy, suicide, drug abuse, and homelessness. Working with Girl Talk Foundation influenced me to pursue graduate school in community psychology; where I can work for nonprofits like these that value youth experiences and take them seriously.

**Beman, Molly**

**Mentor(s) -- Dr. Daniel Fogerty**

### **The Identification of Speech from Partial Information**

The purpose of this study is to investigate how listeners understand speech using partial information. In order to investigate this phenomenon, an experiment was conducted using a battery of tests assessing speech recognition. The test battery consists of various speech, hearing, and cognitive tasks completed over five sessions. The speech tasks required participants to listen to speech in different types of noise. Manipulation of the task requirements assessed the role of perceptual learning, partial information processing, and attention on speech recognition abilities. Based on preliminary results, it is evident that participants displayed robust learning across different background noise conditions. Strong effects of attention and informational content were also observed. The eventual goal of this test battery will be to assess how individual sensory and cognitive abilities contribute to understanding partial speech information presented in challenging background noise conditions.

**Benedict, Emilie**

**Mentor(s) -- Mr. Ryan Lloyd**

### **Connecting Through Distance**

Throughout my experiences of the past four years, I have noticed the reoccurring theme of how culture influences the way people connect with each other. I was interested in how interconnectedness shifts in response to cultural and social distance. In addition to my education at the University of South Carolina, my semester studying at ESSEC Business School in France provided useful frameworks for analyzing this topic. I discovered that with international business, being able to overlook global distance in order to form relationships is critical for communication. I was able to test this theory myself by living with a French host family, traveling, and volunteering abroad. Sometimes differences create gaps, but other times they lead to questions, answers, and growth. We inherently view the world through individual lenses made up of beliefs, values, and habits. Our lenses may vary, however our innate desire to connect surpasses even the greatest cultural boundaries.

**Bennett, Caroline**

**Mentor(s) -- Dr. Ray Thompson**

### **Comparative study of Dominant vs Non-Dominant limbs using Accelerometer-Based Mechanomyography to Assess Muscular Endurance**

Female athletes are 2 to 4 times more likely to experience a noncontact anterior cruciate ligament (ACL) injury than male athletes. Current hypotheses suggest the ratio of hamstring:quadriceps muscle strength is a predictor of future ACL injury, however the ACL injuries are more likely to occur after

the athlete begins to fatigue. Muscle fatigue leads to an acute reduction in muscle force production. Therefore, the primary purpose of this study is to compare skeletal muscle endurance of dominant and non-dominant hamstrings and quadriceps muscles using accelerometer-based mechanomyography (aMMG). The second purpose is to compare peak torque of the dominant and non-dominant lower limbs using a BioDex Isokinetic dynamometer and correlate to aMMG data. aMMG assesses the acceleration of electrical muscle stimulation (EMS) induced muscle twitches. The percent change in acceleration from the beginning to the end of the test is the Endurance Index (EI). Data collection will require one visit that will last at a maximum on 180 minutes in order to test both lower limbs using aMMG and isokinetic dynamometer. During this 180-minute session, the rectus femoris and biceps femoris will each receive thirty milliAmps of electrical stimulation for 3 five-minute periods, allowing thirty seconds of rest between periods, via a low frequency biphasic cycle (4 Hz). Accelerometer data will be rectified and expressed as percent drop in the acceleration magnitude (EI) and the duration for a 20% drop in acceleration between dominant and non-dominant legs. Using isokinetic dynamometer to determine peak torque of the rectus femoris and biceps femoris respectively, subjects will perform three repetitions of leg extension (rectus femoris) and flexion (biceps femoris) at the rates of 120 degrees per second and 60 degrees per second. This process is repeated on both the dominant and non-dominant legs. Peak torque is reported as the highest value recorded for each muscle respectively, the values then compared between dominant and non-dominant legs.

**Bennion, Matthew**

**Mentor(s) -- Dr. Joshua Ruppel**

**Synthesis and characterization of beta- and meso- functionalized carbohydrate-porphyrin conjugates (CPCs)**

Researchers have examined the utility of porphyrin-based photosensitizers in photodynamic therapy due to their desirable activation wavelengths, however many challenges remain to develop an effective and highly selective porphyrin based PDT therapy. The use of “click” chemistry has emerged as one possible approach to address the synthetic challenge of creating porphyrin-based photosensitizers. The term ‘click reaction’ refers to reactions that are high yielding (limiting the need to perform extensive purifications), wide in scope, and can be conducted in easily removable or benign solvents. One type of “click reaction” is the 1,3-dipolar cycloaddition reaction which creates a 1,2,3-triazole from an azide and terminal alkyne. Using alkynylated derivatives of porphyrins in combination with azido-carbohydrates, we have demonstrated the use of these so-called “click reactions” to produce a series of meso- (mono and di) and beta- functionalized carbohydrate-porphyrin conjugates (CPCs). Conjugation is successful with mono- and di-saccharides with excellent yields while undergoing the 1,3-dipolar cycloaddition reaction to create the desired carbohydrate-porphyrin conjugate. The spectral data obtained from the carbohydrate-porphyrin conjugates will be directly compared along with the analogous aryl-conjugates previously synthesized to determine which position (aryl-, meso-, beta-) provides the most desirable spectral properties for use as a photosensitizer in PDT.

**Bernard, Olivia**

**Mentor(s) -- Ms. Shannon Neusch, Ms. Christine Weber, Dr. Douglas Wedell, Dr. Svetlana Shinkareva**

**Mapping Discrete Emotions onto Affective Dimensions**

We have created and validated a set of dynamic naturally expressed emotions stimuli. Stimuli were silent video clips depicting either individuals or a group expressing a uniform discrete emotion for a duration of four seconds. Video clips were designed to evoke affective responses corresponding to each of eight discrete emotion categories (anger, disgust, fear, happiness-calm, happiness-excited, neutral, sadness, and surprise). Participants recruited from the University of South Carolina Psychology Participant Pool were presented the videos. Videos were rated on the three core affective dimensions of valence, arousal, and dominance as well as categorized into one of the eight discrete emo-

tions by participants. Stimuli with consistent discrete emotion judgments were selected to be used in further experiments examining the relationship of naturally expressed discrete emotions and underlying affective dimensions.

**Bertrand, Sophia**

**Mentor(s) -- Dr. Dan Fogerty, Dr. Jace Wolfe**

**Evaluation of Theory of Mind and Voice Emotion Recognition in Hearing Impaired Subjects After Auditory-Verbal Therapy**

Theory of mind is the ability to see someone else's perspective and then relate to them emotionally with that understanding. Children with hearing loss tend to have a harder time developing theory of mind when communication can be hindered. The purpose of this study was to determine whether children who receive Cochlear Implants or hearing aids during the first year or two of life and participate in an Auditory-Verbal therapy program are able to develop typical theory of mind and if developing a normal theory of mind correlates with a greater ability to recognize someone's emotion from their voice.

Two hypotheses were tested to determine 1) if children with hearing loss, and went through AV therapy, develop theory of mind at an equal level as normal hearing children 3) if theory of mind correlates with recognizing emotion in someone's voice.

I tested theory of mind of several children while at Hearts for Hearing Institute in Oklahoma City, OK. Annually, a summer camp is held which hosts a fairly large number of the patients they serve. In total we tested 40 children with the Theory of Mind Task Battery and tested the top 5 and lowest 5 scorers and 2 in the middle (n=12) with the Emotion Recognition from the Human Voice test. Due to the lack of availability, I was unable to have my own control group.

This project will determine if an Auditory-Verbal Therapy program helps children with Cochlear implants develop typical theory of mind. There was no correlation between age and theory of mind development for my participants who ranged from 7-15 years old. 1) There was no significant correlation between children with normal hearing and children with hearing loss who went through AV Therapy. 2) There was a correlation between scores on the TOM Task Battery and emotion recognition in voice. The results supported both hypotheses, so more research in this area would be beneficial with separate control and quasi-experimental groups.

**Beson, McLean**

**Mentor(s) -- Dr. Kate Flory, Mr. Josh Bradley**

**My Experience with USC Project to Learn About Youth**

During the Summer of 2017, I volunteered as a Research Assistant for Dr. Kate Flory with the USC Project to Learn About Youth. The overall goal of the project was to determine the morbidity of multiple behavioral and emotional concerns in children in grades K-12. My purpose with the project was to act as a research assistant and aid in data collection, data entry, and validation. As I helped provide basic support for the project I was also able to witness how a large study is conducted and how a large dataset of over 500 participants is stored and encoded. The experiences I gained were pertinent in my decision to continue with my higher education and not only pursue an MD but enroll in an MD-PhD program in the future.

**Besse, Margaret**

**Mentor(s) -- Ms. Shannon O'Connor, Dr. Jane Roberts**

**Heart Rate Associations to ADHD Symptoms in Infants and Preschoolers with FXS**

Fragile X syndrome (FXS) is genetic disorder associated with abnormalities on the FMR1 gene found

on the X chromosome. A reduction in FRMP protein on the FMR1 gene results in social and cognitive deficits and comorbidities such as attention deficit hyperactivity disorder (ADHD). Attention deficit hyperactivity disorder is characterized by symptoms such as inattention, impulsivity, and hyperactivity and affects approximately 5% of all children. Hyperarousal of the nervous system is responsible for the heightened state that children with ADHD exhibit. Hyperarousal, including an increased heart rate, is also a hallmark feature of FXS among school aged and adolescent males, but no studies have found the same increase in arousal in diagnosed infants. This could be representative of the shift from hypo- to hyperarousal in the first two years of life in children with FXS. Fragile X syndrome and ADHD both significantly increase heart rate in children ages 2-4. By studying infant heart rate we can look for factors to predict ADHD symptomatology. The present study seeks to determine when elevated heart rate emerges in individuals with FXS and TD individuals. We will perform correlations between ADHD symptoms and measures of heart rate variability at the ages of 12, 24, 36 and 48-months-old. Additionally, we will conduct t-tests to look at significant differences between the FXS and TD groups at each age. We hypothesize that there will be significant correlations between ADHD symptoms and heart rate in 24, 36, and 48 months old with FXS and TD, but not in the 12-month-old individuals. This is supported by the common age of diagnosis of ADHD in preschool aged children and the switch from hypoarousal to hyperarousal in infants with FXS at 24-months. We hypothesize that there will be a significant increase in baseline heart rate in individuals with FXS when compared to TD individuals within each age group due to the increased heart rate found in individuals with FXS.

**Blan, Julia**

**Mentor(s) -- Dr. Thomas Makris**

#### **Structural studies of Cytochrome P450 enzymes that generate Biofuels**

Due to growing concerns over the depletion of our current fossil fuel sources, efforts towards renewable fuel production are essential. OleTJE, a cytochrome P450 from *Jeotgalicoccus*, has received attention for its ability to generate terminal alkenes, a common component of liquid transportation fuels, from fatty acids (FA) via a decarboxylation reaction. The OleTJE reaction is highly atypical for P450s, which typically hydroxylate substrates. In order to understand the origins for this deviation, it is important to characterize the enzyme through structural methods. From previous studies, an active-site histidine (His85), solvent, and other residues have been implicated in mediating substrate binding and activity. In order to verify these roles, we have characterized an ortholog of OleTJE from *Staphylococcus aureus*, termed OleTSA, which has a predicted active-site construction that is similar to OleTJE. A codon optimized OleTSA gene results in high yields of protein expression from *E. coli* and highly homogeneous protein after a three-step chromatographic purification. Crystallographic conditions for OleTSA were determined through high throughput screening. Using these initial hits, several conditions were tested and optimized using pH and precipitant gradients. Several of these modifications resulted in suitably large crystals with varying morphologies. We have obtained a substrate-bound crystal structure for OleTSA with a resolution of 2.3Å. The secondary structure is highly conserved, including positioning of a distal F-G loop that was found to regulate product release and control the chemoselectivity of the enzyme. The majority of the hydrophobic residues in the FA-binding pocket are conserved; however, one notable difference is the presence of Thr47 in OleTSA (Phe46 in OleTJE). This difference may give more freedom to the FA-tail and allow for faster release of product in OleTSA. Current work aims to crystallize a series of mutant and substrate analogs to better understand the structure-function relationships of decarboxylases and tune the enzyme for higher activity.

**Bice, Briana**

**Mentor(s) -- Dr. Ron Prinz, Ms. Rachal Hatton**

#### **Parent and Family Research Center Independent Study**

The Parent and Family Research Center at USC is focusing on a clinical trial of the parenting intervention, the Positive Parenting Program. This study takes families with children, ages 3-7, experienc-

ing behavioral issues and is reviewing differences in outcomes from online versus in person delivery. Triple P is a globally developed and implemented intervention and in an increasingly digital world, it is important to test the validity of the online delivery of such a widely used therapy. In the past, Triple P has been studied and proven to improve parental satisfaction, and improvement of child behavior. This study reviews parents' interaction with their children at three different time points, before beginning, at completion of intervention (roughly 4 months from beginning), and roughly eight months after delivery of the intervention (this is about one year after beginning). Though results have yet to be analyzed, through my observations in assisting through independent study, the study will review the differences in outcomes for children and parents between the families randomly selected to receive the delivery of Triple P online versus in person with a specialist. My role in the study was primarily to assist with recruitment of families, facilitate the collection and cleaning of specific data, observe some of the intervention sessions. This study has the potential to add to the global wealth of knowledge about the Positive Parenting Program and to refine its practice. In an age where digital intervention may be considered a necessary viable or cheap resource to parents, it is important to determine its effectiveness.

**Bisaillon, Christina**

**Mentor(s) -- Dr. Sanjay Ahire**

**Capstone Consulting Project to Enhance PwC's Anti-Money Laundering Process**

During the Fall of 2017, a USC project team worked closely with PricewaterhouseCoopers (PwC) to create a Strategic Resource Planning model in order to create a baseline time table and estimate the total time and cost of their Anti-Money Laundering (AML) process. This resulted in a need for an operational tool in order to track actuals based on their estimated initial baseline. The Spring 2018 Capstone Consulting group in conjunction with the USC Supply Chain Center has developed an operational client tool using Microsoft Excel to further enhance the AML process for PwC. The group has developed a staff directory and current progress sheet to track performance and measure workload efficiency, project burn-down rates, variance from the baseline, and quality of work. Visual dashboards have been created on Power BI to enhance the understanding of current projections and cause for deviations. With this tool, PwC will be able to monitor progress on their AML projects broken down by employee, experience level of the employees, case complexity, and time period (weekly, monthly, and quarterly). This will allow them to make important managerial decisions such as developing optimal staffing plans, effectively allocating resources, and implementing new training methods.

**Blau, Emm**

**Mentor(s) -- Mrs. Alisa Liggett**

**Understanding and Implementing Better Sexual Assault Preventative Programing on Campus**

Many colleges and universities experience rampant sexual assault. A major issue is that numbers of reporting are increasing, as are requests for action, yet the availability of effective programing for education and prevention is not changing. In other words, people are becoming more comfortable reporting assaults, but schools are not adjusting their programming accordingly.

This research was designed to establish an understanding of effective programming and policies on college campuses nationwide, as well as develop a research-supported implementation guide that can be easily adapted."

**Bloos, Sean**

**Mentor(s) -- Dr. Philip Howe**

**Mechanism of TGF $\beta$ -induced Cancer Stem Cell Formation through ILEI and LIFR**

Patients who suffer from metastatic breast cancer with invasion into secondary sites often show poor prognoses in the clinic. Metastatic properties associated with invasion include the epithelial-mesenchymal transition (EMT), the ability of cells to proliferate and the ability to form cancer stem cells

(CSCs). Neoplastic cells and CSCs have demonstrated resistance to chemotherapies, making it difficult to treat such patients. Through efforts to investigate mechanisms and pathways associated with EMT and CSC formation, our lab has identified a novel Transforming Growth Factor- $\beta$  (TGF $\beta$ ) mechanism, which induces EMT at the translational step of mRNA expression. Heterogeneous nuclear ribonucleoprotein E1 (hnRNP-E1) is responsible for repressing the translation of EMT associated mRNAs. TGF- $\beta$  stimulation initiates the phosphorylation of hnRNP-E1 through AKT2, thus inactivating hnRNPE1 and inducing mesenchymal gene translation. Specifically, interleukin-like EMT inducer (ILEI) is a cytokine upregulated after hnRNP-E1 phosphorylation, which we hypothesize to play a significant role in the EMT process. Previous work in our lab has demonstrated that ILEI interacts with leukemia inhibitory factor receptor (LIFR) via yeast two-hybrid screening. LIFR is a well-established cytokine that plays a role in stem cell maintenance. Mammosphere formation is indicative of CSC phenotypes. Therefore, using a self-renewal mammosphere assay, we demonstrate that both ILEI and LIFR are necessary for sphere formation in TGF- $\beta$  treated nontransformed mouse mammary gland (NMuMG) cells and hnRNPE1 knockdown cells. We repeated the mammosphere assay using NMuMG E1KD shScr, shILEI and shLIFR cells treated with increasing concentrations of purified recombinant ILEI. The shScr and shILEI cell lines are both responsive to exogenous ILEI in their ability to form mammospheres, but shLIFR cells do not demonstrate such self-renewal capabilities. Therefore, ILEI is necessary for CSC formation and we demonstrate that LIFR is required for ILEI signaling and the CSC phenotype.

**Boan, Phillip C.**

**Mentor(s) -- Prof. James H. Knapp**

### **Structural Geologic Approach to Understanding Tectographic Origins of Early Life in Durham County, North Carolina: Part I**

Seilacher et al. (2000) claimed that *Vermiforma antiqua* specimens found along the banks of the South Fork of the Little River, Durham County, NC, were “tectographic” pseudo-fossils, instead of being a trace or body fossil. The segmented “worm-like” specimens (25-30 cm along their long axes) observed on bedding planes of laminated volcanoclastic strata of the Late Neoproterozoic Hyco arc were proposed to be the result of bedding-plane flexural slip during Late Neoproterozoic Virgilina deformation. Comparison of the orientation of the long axes (raking S55W on beds oriented N15E, 22 NW; Cloud et al. 1976) with regional structural geologic data from the Rougemont quadrangle suggest that a flexural-slip origin for *V. antiqua* would require interbed slip primarily subparallel to regional fold axes. New structural geologic data, collected at the site in January 2018 by University of South Carolina undergraduate students in collaboration with the North Carolina Geological Survey, tested the tectonic origin of the *V. antiqua* specimens. Measurements were taken in a ~100 x 50 m area of exposed bedrock, which included the original bedding surface from which the *V. antiqua* slab was removed in the 1970's. The measurements collected focused on the orientations of bedding surfaces, axial planar(?) cleavage, and a prominent joint set. More than 180 individual measurements were collected at more than 45 individual stations. Bedding surfaces strike consistently NNE and dip moderately NW, suggesting these rocks sit within the eastern limb of a regional, east-vergent, overturned syncline. Cleavage is typically steeply dipping, and strikes consistently NNE. Joints thought to be associated with Mesozoic rifting strike generally NW and are sub-vertical. These local data will be compared with regional data to re-evaluate the tectographic interpretation of *V. antiqua*.

**Bobadilla, Emily**

**Mentor(s) -- Prof. Karen Patten**

### **IIT Capstone Project: Never too Old to Learn something New**

The Heritage at Lowman is a continuing care retirement community that serves older adults throughout their retirement with a variety of levels of care. Heritage at Lowman offers different workshops and activities to the independent residents living onsite in order to keep them active and engaged.

Our Capstone project team met with the residents to determine their technology needs, developed and then delivered four workshops about different technologies to the residents. The purpose of these workshops is to educate the residents about technology so that they can stay connected to not only the world at large, but also their families. During our poster presentation, we plan to explain the process used to determine and develop the technical workshops and to provide resident feedback as well.

**Bodenheimer, Elyse**

**Mentor(s) -- Dr. Dan Freedman**

**Business Beyond the Numbers**

When I first stepped onto the campus at USC, I knew that the next four years would be full of change and opportunity, personal growth and new friendships, achievement and risks. The process I have gone through to pursue Graduation with Leadership Distinction in Professional and Civic Engagement has helped me to reflect on the past four years at Carolina, and has allowed me to pinpoint pivotal moments in my college career. I am majoring in Finance and Human Resource Management, with a minor in Leadership Studies, and my classroom experience as well as summer internships has enabled me to work in various industries with a diverse group of coworkers. Outside of the classroom, through my involvement in student organizations, I have developed many skills that are necessary to be successful personally, professionally, and civically. I believe that these experiences have equipped me to tackle the diversity of the workplace as I begin my career with EY (Ernst & Young) upon graduation. In my E-Portfolio for Graduation with Leadership Distinction in Professional and Civic Engagement, I have shared some of my experiences and key insights that have helped to shape me as a Gamecock, and more importantly have helped me understand business beyond just the numbers. I hope my portfolio conveys the impact my time at Carolina has had in my personal development, as well as identify opportunities to apply these experiences in the future.

**Boettcher, Marissa**

**Mentor(s) -- Dr. Adam Hartstone-Rose**

**The Ontogeny of Muscle Architecture in the Forearm Muscles of *Microcebus murinus***

The changes observed in muscle architecture associated with age have been widely studied in humans. Furthermore, it has been accepted that humans experience sarcopenia—the progressive deterioration of skeletal muscle tissue with age. This phenomenon, though, has not been thoroughly studied in non-human primate species. One such species is the grey mouse lemur which has been previously indicated as an excellent model for the human system. Our aim in this study was to quantify the changes seen in various muscle architectural properties such as muscle mass, average fiber length, and physiological cross-sectional area (PCSA) in *Microcebus murinus*. During preliminary analysis, it was found that a correlation exists between age and each variable, as well as body mass and each variable. The oldest individuals in the sample appeared to maintain PCSA values similar to that of the adults' due to an observed decrease in both fiber length and muscle mass. The youngest individuals possessed the smallest PCSA, muscle mass, and average fiber length values for the majority of the muscle groups, as was expected. The adult individuals encompassed a relatively large range which is likely due to individual variations. These findings suggest that force production capabilities increase with age, leveling off at maturity and ultimately remaining relatively constant despite the onset of senescence.

**Bonder, Madeline**

**Mentor(s) -- Dr. Josef Olmert**

**Immerse in Israel**

During the spring of 2017, I traveled over 6,000 miles, to study abroad in Tel Aviv, Israel. Bored with the idea of red and blue politics, I decided to enroll in a less-Western class my second year of college

at the University of South Carolina. It was here in Dr. Josef Olmert's class, that my attentiveness towards the Middle East was found. Discovering the complexity and rich history of Israel, my interest for this land only grew more. Here since the beginning of time, the Middle East is not only rooted around many religions and political views, but also geographies and cultures. By studying abroad in Israel, I felt I could immerse myself in all it had to offer; and what this country had to offer, was nothing short of life changing. While at Tel Aviv University, I became familiar with both the country of Israel, and the Middle East as a whole. I studied Hebrew, Israeli Politics, History of the Modern Middle East, Nuclear Weapons in the 21st Century, and so much more. This curriculum, along with my previous classes with Dr. Olmert, assisted in my understanding of the Middle East. Such conflicts abroad have always been present, and this can be a surprise to many who have no knowledge of Middle Eastern history. It is because of this, that we as students, researchers, leaders, government officials, educators, and so much more, must engage in some difficult discussions of this region. The world has great room for improvement in efforts of promoting peace, education, culture, and communication. As a political science major, concentrating in Middle Eastern studies, I plan for my future careers to surround such relations, and thinking of how the world continues to make it by another day, in an atmosphere of such grim conflict. My experiences, related both home and abroad, have offered me excellence in educational opportunities, in appreciating the many different cultures, ethnicities, religions, and geographical regions this world has to offer. I hope and plan to share these experienced insights with the rest of the world.

### **Booth, Alexandria**

**Mentor(s) -- Ms. Lisa Camp**

#### **Salkehatchie Summer Service**

Salkehatchie Summer Service is an organization that has been the most influential experience of my life ever since I first attended the week-long summer service camp nine years ago. In the years since, I have become more involved with Salkehatchie's service both during the summer and in preparation for each camp. In the summer of 2016, I was the bookkeeper for the home I was serving by managing receipts for purchases throughout the week, leading as a mentor for the young adolescents on my site, and attending planning meetings each night in preparation for the next day's work. Last year, I had the honor of serving as a co-site leader, leading a group of young adolescents through the process of rebuilding a home that had no running water or electricity. I am currently a member of the Salkehatchie Summer Service Steering Committee, and in January of 2017 and 2018, I attended the Directors' Retreat in Santee, SC as a representative for the Piedmont camp. At these annual meetings, I was a part of the statewide camps' budgets, safety plans, spiritual development, and more. I was elected to co-lead a presentation of Piedmont Salkehatchie's growth and achievements over the years at an upcoming 50th Anniversary Celebration. Through this presentation, this year's camp in June, and my service in the years to come, I look forward to growing as a site leader and board member. In the future, I hope to play an even larger leadership role in this organization that is so close to my heart. Salkehatchie Summer Service has taught me more than I ever thought I would know about selflessness, devotion, and leadership. The countless lives that have been touched as a result of Salkehatchie inspire me to live a giving life not only at my camp every summer but in every decision I make. As an educator, I look forward to showing my passion for community service through my career, and I hope to inspire my students to show that same dedication for the community they call home.

### **Booth, Alexandria**

**Mentor(s) -- Ms. Lisa Camp**

#### **Sandhills Middle School**

As a senior Middle Level Education major, I have had the honor of being placed at Sandhills Middle School in Lexington School District 4 for EDML 599: Internship B in the Middle School. Through this

experience, I have learned what it means to be a leader, servant, community member, and educator. As a lifelong resident of Swansea, SC, it has been an honor to serve the community I call home for this internship experience. While I always knew that I wanted to work in a rural school, this experience has confirmed that passion, and I am fortunate that I will be teaching at Sandhills Middle School for the 2018-2019 school year. This experience has helped me grow as an educator through building professional relationships with students, faculty, staff, and administration. Along with establishing these relationships, I have also grown in my instructional abilities through the teaching opportunities I have had daily. By planning and implementing English/Language Arts lessons for my seventh and eighth grade Montessori students, I have learned the importance of literacy, student interest and, therefore, engagement, and purposeful planning. I have analyzed student data from pre-assessments to compare their data to post-assessments, and I have learned the importance of personalizing and differentiating instruction to meet every student's individual needs. While teaching at a rural school has its challenges, including planning culturally relevant lessons for diverse students and managing student behavior, I am looking forward to continuing to grow as an educator at SMS. SMS is in the process of becoming a Professional Development School as well as becoming certified to offer a Project-Based Learning certificate add-on. As a lifelong learner, I look forward to being a part of these advances and devoting my career to foster the growth of young adolescents. Along with fostering my students' growth academically, I will devote my time to fostering their beyond-the-classroom experiences, including volunteering to help with BETA Club, yearbook staff, sports concessions, afterschool tutoring, and more. I will model my love of service and learning to teach my students to be lifelong learners themselves.

**Booth, Kayce**

**Mentor(s) -- Dr. Mohamad Azhar**

**Transforming Growth Factor Beta3 Ligand Is Required For Heart Development**

Kayce Booth, Nadia Al-Sammarraie, Mrinmay Chakrabarti, John Johnson, and Mohamad Azhar

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Transforming Growth Factor Beta3 (TGFB3) mutations in patients of Marfan Syndrome (MFS)-like disorders (i.e., Loeys-Dietz Syndrome (LDS)) and arrhythmogenic right ventricular (RV)dysplasia/cardiomyopathy (ARVD1) are associated with cardiovascular involvement, including congenital heart defects (CHD), aortic aneurysm, cardiac fibrosis/cardiomyopathy, and aortic and/or mitral valve disease. Although Tgfb3 is expressed in the cardiovascular system, most attention has been paid to its role in palatogenesis, as Tgfb3 knockout (KO) mice die at birth because of cleft palate.

Although Tgfb3 is expressed during heart development, no major cardiac defects have been reported in Tgfb3 KO or adult Tgfb3-haploinsufficient mice. Our hypothesis is that TGF $\beta$ 3 is required for heart development.

We showed that a significant fraction of the Tgfb3 KO fetuses (C57BL/6) developed double-outlet right ventricle, ventricular septal defects, hyperplastic outflow tract and atrioventricular cushions, and impaired compact and trabecular myocardium (RV was severely affected). This is consistent with higher expression of Tgfb3 in RV compared to left ventricle (LV) in embryonic hearts. These cardiac malformations were noted with a variable penetrance but over half of the Tgfb3 KO fetuses had one or more cardiac defects.

Since genetic mutations are found in ARVD1 and that Tgfb3 knockout mice die at birth, Tgfb3 conditional knockout allele (generated by us) will enable future studies of TGF $\beta$ 3 function in different cell

or tissue types in embryonic development, adulthood and in the formation and pathogenesis of adult congenital heart disease, including aortic aneurysm and cardiomyopathy. In conclusion, for the first time, our data establish that TGF $\beta$ 3 is required for heart development and cardiac chamber development, particularly the development of the right ventricular chamber in the heart.

**Boswell, Emma**

**Mentor(s) -- Dr. Patrick Hickey**

**Service Learning, Sanitation, and Health in Nicaragua**

A group of Capstone Scholars will travel to Ticuantepe, Nicaragua during Spring Break on a medical mission trip through International Service Learning. During our trip, we will be conducting home interviews and treating patients in local, temporary clinics for a variety of chronic and acute conditions. Ticuantepe is a mostly rural area close to Managua, the capital of Nicaragua, with a population around 34,000 people. ("Ticuantepe, Worth A Visit"). The population typically does not have access to healthcare or basic sanitation, with 45.9% of the region's population not having access to a sewer connection. (Larsen & Espojo 2013). Despite the region's proximity to the capital, due to time constraints and poor infrastructure, it is not realistic for them to travel to Managua on a regular basis to receive health care. Collectively, Nicaragua is the poorest country in Central America and has less improved sanitation than other nations in the region. (Larsen & Espojo 2013). Lack of access to basic sanitation leads to over 500 premature deaths every year, a number that could be reduced through improved access. (Larsen & Espojo 2013). While in country, we will be treating patients and witnessing the effects that the lack of sanitation have on the community of Ticuantepe. We hope to determine ways in which we can continue to improve the lives and health of both residents of Ticuantepe and our local communities. We expect to conclude that because of the lack of basic sanitation, the people of Ticuantepe will continually face chronic medical conditions and health concerns. Problems with parasites and vector-borne diseases will continue to be prevalent until sanitation improves, and as such, access to appropriate, affordable sanitation should be a top priority for the Nicaraguan government and relief organizations.

**Bowling, Emily**

**Mentor(s) -- Dr. Anne Bezuidenhout**

**Appositive relative clauses (ARCs) and the foreground/ background distinction**

Pragmaticians have long been interested in the information structure component of language. One issue concerns the distinction between foregrounded and backgrounded information. Our investigation concerns sentences that consist of a main clause and an appositive relative clause (ARC), such as: 'My friend Sophie, who is a classical violinist, performed a piece by Mozart.' It is generally assumed that main clauses express "at issue" content, whereas ARCs carry background information. In a series of web-based psycholinguistic experiments, we look at the effect that ARC placement and ARC type has on the comprehension of such sentences. Our first experiment is a partial replication of earlier work by Syrett and Koev (2015). Participants see mini dialogues between two speakers where Speaker A utters a sentence like the example above and Speaker B responds 'No, that is not true.' In some conditions the ARC is sentence-medial and sometimes it is sentence-final. The main question being investigated is whether the sentence position of the ARC influences what participants believe Speaker B is referencing with their denial. A second question being addressed is whether the type of relative clause influences the participants' decisions. Our first experiment manipulates whether the ARC describes a state of a person (e.g., 'is a classical violinist') or describes an event that the person is participating in (e.g., 'performed a piece by Mozart'). The experiment thus has a 2x2 design (ARC sentence-medial versus final; ARC expressing a state versus an event). Participants see twenty-four experimental dialogues plus thirty-six filler items. The fillers are two-clause sentences of other kinds intended to mask the experimental manipulation. Each participant sees each experimental item in only one of the four conditions, but across the experiment participants are exposed to all conditions.

The second experiment relies on a tripartite distinction between continuative, relevance and subjectivity ARCs proposed by Loock (2007). As in the first experiment, we manipulate clause position and ARC type. Both experiments show that ARC content can be foregrounded. This is of interest as it shows that contextual factors can influence what is foregrounded and that syntactic category alone does not settle the question.

**Bowman, Adriana**

**Mentor(s) -- Mrs. Jennifer Bess**

**National Fellowships and Study Abroad: The Critical Language Scholarship**

The Office of Fellowships and Scholar Programs is a crucial resource on campus for students to find funding for numerous academic endeavors, including research and study abroad. Many of the different fellowships and scholarships attempt to increase diversity in various academic fields. One such scholarship is the Critical Language Scholarship. The scholarship provides funding for a summer study abroad learning intensive language. It's specifically for funding students with diverse backgrounds studying underrepresented languages. I worked with the OFSP to create a competitive application that earned me the scholarship which I used to study abroad last summer in Xi'an, China.

This fellowship afforded me an opportunity that I wouldn't have had otherwise. As a low-income, first-generation college student, I believed that studying abroad was not in my realm of possibilities. Applying for the scholarship and studying abroad allowed me to see the numerous opportunities out there, including research and study abroad. The essays and application process allowed me to realize my academic and career potential and has inspired me to pursue a career as a foreign service officer. Studying abroad allowed me to see the world and learn about other cultures and languages. I hope my poster presentation will inspire and encourage everyone, especially disadvantaged students, to utilize their resources here at USC such as the OFSP in order to discover their opportunities and that there is truly no limit to what they can do.

**Brainard, Madison**

**Mentor(s) -- Mrs. Katie Hopkins**

**Know your own culture, before trying to understand the culture of others.**

It has always been a dream of mine to study abroad, and I am grateful for the opportunity to do so through studying abroad at the University of South Carolina. I have learned many different ideas throughout my coursework at USC, but one particular assignment in the International Human Resources Management course taught me something that I will hold with me forever. The assignment seemed simple, I was to write an essay describing my culture and consider how my culture influences my behavior in both my professional and personal life. This prompt challenged me to find and to learn more about my own culture and heritage, something I had never taken the time to think about before. I always visited other countries to seek culture, but had always looked over and had never explored my own background. This assignment allowed me to learn more about myself, which enhanced my experience and mindset as I travelled abroad. I was fortunate enough to spend one full semester in Madrid, Spain. Despite the 30 countries and cultures I had visited prior to my time in Madrid, this experience was much different, much more meaningful. My mentality was so different in Madrid because of the essay I wrote and learned from in MGMT 406. I knew who I was, and I knew where I came from. Because I understood myself, I was able to successfully be somewhere new. Throughout my time in Madrid, I learned more about culture than I ever had before. My horizons were broadened, and my mind had the freedom to explore with the new knowledge I gained of my own culture. Travel and culture now have much more meaning and impact because I understand myself. I look forward to continued travel, and a deeper understanding of culture. I encourage others to first learn about their own culture, before trying to understand the culture of others.

**Brainard, Taylor**

**Mentor(s) -- Ms. Asheley Schryer**

**The Importance of Communication**

I have had the opportunity to explore over 40 countries, with my family as well as through my study abroad experiences in Spain and Argentina. It is said that over 2 billion people use the English language on a regular basis. And although English is the language of Global Business, it is important to recognize there are 7,106 living languages around the world. Through my travels I have learned about the importance of language and communication. Through my studies at USC and abroad I have acquired a greater understanding of the Spanish language particularly. My appreciation and love for the Spanish language started with my mission trips to Costa Rica. Using the language to connect with the kids and families there, as well as help translate for the English-speaking doctors really allowed me to appreciate the importance of knowing second language. My ability increased during my month-long study abroad in Buenos Aires, living with a host family. My full immersion into a new home with a separate language, was a difficult, yet rewarding experience. Learning a second language, and immersing myself in certain situations have caused me to grow as a person and learn a lot about myself. I have become more confident, more appreciative of the little things, and more impressed by those who have mastered more than one language. I have also gained a greater appreciation for the English language. I hope to continue traveling, learning more languages, and experiencing different cultures while making a difference or impact along the way.

**Branham, Mary**

**Mentor(s) -- Ms. Sarah Gay**

**Project Vida**

Growing up fighting a constant battle with mental illness, I know what it feels like to be different. Now that I know recovery, stability, and health, I have decided to dedicate my life to guiding others into the same direction. Nobody deserves any less. Having a college career led by psychology and public health courses, I have learned both about the human experience, and how to develop and implement effective interventions. As a class project that spanned the length of the semester, I used the Generalized Program Planning Model to design an effective secondary prevention (screening) program for incarcerated men with HIV/AIDS, since they were a high risk population. After researching what is already being done and working, we made proposals to local jails, sponsoring agencies, and stakeholders to partner with and support our program. By the year 2025, it would drastically change the amount of inmates who are offered screening from 13% to 90%. The knowledge of their status would empower them to enter either primary or tertiary prevention programs. After this project, I was eager to apply everything I learned into the world and start making a difference. I was able to do this while serving as the president of Project Vida, which is a student organization that focuses on public health outreach for elementary school children who are at high risk. I used my knowledge from public health courses to administrate, delegate, and recruit our organization into one that has a solid foundation with support of USC students. I formed and maintained partnerships with Ezekiel Ministries Afterschool Program, and St. Lawrence Place (a transitional homeless shelter) where we present our lessons. The material that I learned in psychology gave me the ability to recognize trauma, so I was able to adapt our presentations to where they are at. Working with children who have experienced trauma has revealed a passion that I plan to carry into my future of being of being a License Clinical Social Worker, so that I can continue to help heal any child in need.

**Brant, Tyler**

**Mentor(s) -- Dr. Steve Mcanally**

**Integration of Sustainable Solutions to Water Supply and Water Purification for El Cedro, Ecuador**

The current goal of our group, Engineers Without Borders - USC, is to provide sustainable repair

solutions and designs to the pipeline which is currently the only source of water for the village of El Cedro, Ecuador as well as to implement a sustainable filtration and water treatment process. El Cedro's current water supply is a 16 kilometer polyvinyl chloride (PVC) pipe from a mountain spring that was installed over twenty years ago. This pipeline breaks regularly causing the citizens to lose access to water and what water they receive is contaminated with coliforms like E. coli which indicates it is not safe to drink. In order to identify specific problems, collect data, and develop relationships with the local government and citizens, an assessment trip was taken in May 2017. The trip determined three main issues with the water pipeline: erosion, suspension, and water contamination. Numerous sections of the pipeline were initially buried underground to protect them from damage by weather, UV light, and physical elements. Erosion over the past 20 years has exposed the pipeline to these dangers. Due to varying topography such as hills, rivers, and valleys, sections of the pipeline are suspended between trees, bridges, and the ground without the support necessary to prevent sag and relieve internal pipe stress. Water samples were taken at the source, along the pipeline, and at the exit points in the village, and E.Coli was detected in every sample. During the trip it was discovered that the citizens refuse to chemically treat their water out of fear of chlorination harming their health. Since the trip, EWB-USC has designed and helped fund general solutions for erosion and hanging pipe sections, and is currently putting together an educational program aimed towards convincing the citizens to implement a chlorination system to provide potable water. EWB-USC will return to El Cedro in May 2018 to begin the implementation phase of our proposed designs and to start moving the community opinion towards chemically treating their water.

### **Bright, Matthew**

**Mentor(s) -- Dr. Cynthia Nichols, Dr. David Hicklin, Dr. James Curtis, Dr. Martin Durkin**

#### **Sedation Dentistry: An application of medical histories and observation records to create a protocol aimed at identifying high-risk patients.**

Through retrospective medical record analysis at the Palmetto Health USC Medical Group Department of Dentistry, this study aimed to evaluate patient outcomes when treated with the sedative medications Midazolam, Fentanyl, Diazepam, and Demerol, in the hope of identifying high-risk markers that will guide patient selection for in-office sedative procedures.

By looking at the established Dental Patient Procedure Observation Records and prescribed combination of sedatives, in conjunction with the self-reported medical histories of approximately 375 sedation patients over a period of three years, a model of linear regression was developed to identify markers of statistical and clinical significance. The use of different sedative combinations was also of particular interest as current sedation practice often groups benzodiazepines with opioids. This study focused on the combination of Fentanyl with Midazolam juxtaposed against Diazepam with Demerol.

This study determined that, when used in clinical combination, the drugs Fentanyl and Midazolam significantly reduced in-office recovery time when compared to the combination of Diazepam and Demerol. It was also determined that a patient's age, number of comorbidities, sex, and weight were important indicators of sedation outcomes.

Moderate sedation provides a safe and effective option for treatment to those who need complex dental care or have a phobia associated with dental treatment. The identification of markers significant to a patient's sedation experience can increase provider confidence, sedation efficiency, and overall patient safety and satisfaction. With a growing number of general dental practitioners eager to provide patients with sedation dentistry, proper identification of high-risk markers, coupled with advanced training in sedation techniques, can help expand this service in a safer manner to those who avoid dental treatment due to fear and anxiety.

**Brown, Christian****Mentor(s) -- Dr. Amber Fallucca, Dr. Thomas Makris****Advancing Professional Development Strategies for Undergraduates in Chemistry and Biochemistry**

In the Department of Chemistry and Biochemistry at the University of South Carolina (the Chemistry Department), most curriculum-driven professional development for undergraduates is reserved for third- and fourth-year students. Academic instruction occurs at all levels, but the context comes late. Early exposure to career options and hands-on training is imperative for undergraduates to obtain maximum experiential education. The purpose of this project is to advance the current professional development strategies of the Chemistry Department, specifically targeting second- and third-year students. The study will survey students' current involvement in professional development activities as well as how the Chemistry Department is facilitating undergraduate involvement in professional development. We will use the data on extracurricular experience and post-graduation interest to design a workshop series to reach students with practical tools for success, such as networking skills and synthesizing intra- and extracurricular experiences. The impact of each workshop will be assessed with post-session surveys asking participants about the value and applicability of the information shared. The most beneficial topics will be incorporated into curriculum development of the Chemistry Department's one-credit hour undergraduate seminar course. By integrating more advanced professional development into the curriculum, chemistry and biochemistry undergraduates will be encouraged to pursue experiential education in their second and third years.

**Brown, Erin****Mentor(s) -- Dr. Magdalena Grudzinski-Hall****GLD: Professional and Civic Engagement**

This project reflects my efforts to graduate with Leadership Distinction in Professional and Civic Engagement. As a student at the University of South Carolina, I have engaged in a variety of leadership opportunities including my involvements on campus as a Resident Mentor and a member of Student Government. Studying Economics and Political Science, I have put my passion for the political process to use beyond the classroom through my internships in the U.S. House of Representatives and the South Carolina Office of the State Treasurer. My academic, extracurricular, and professional experiences have converged into several lessons and key insights I hope to utilize in my future as a professional in the legal field.

**Brown, Jalaina****Mentor(s) -- Mrs. Anna Oswald-Hensley****Jalaina Brown, Changing the Town**

At USC Sumter, I am a student ambassador. I participated in this activity, because I enjoy being active on campus. As an ambassador, I give tours of the campus, as well as help incoming students become more equipped with campus life. Being an ambassador has helped me become a better leader. I have learned leadership skills by practicing things that made me uncomfortable, for example speaking in front of large groups of people. Leadership skills were important when representing USC Sumter on and off campus. Being an ambassador is more than just something I was selected for, it's a way to get to meet people and give back to the community, here at USC Sumter. I want others to know that giving back is a great feeling and it's like nothing else you could ever experience. Helping people and giving back means a lot to me and being an ambassador at USC Sumter helps me do just that. My next plan for being an ambassador is to continue to help as long as I can and once I transfer become an ambassador at my next University.

**Brown, Leslee****Mentor(s) -- Dr. Ronald Erdei**

## **Creating Magic: A Disney Learning Experience**

During my freshman year, I applied for an internship titled the Disney College Program. The Disney College Program is an internship that typically lasts anywhere between 3-12 months. Applicants can apply to complete their program at the Walt Disney World Resort near Orlando, Florida, or the Disneyland Resort in Anaheim, California. Participants live in company-sponsored housing and take on one of the hundreds of cast member roles. "Roles" includes a wide range of positions such as a performer, lifeguard, server, florist, vacation planner, and many more! When I applied for this program I experienced a lot of negative opinions. I faced questions such as "What is that going to do with your career?" and "You're dropping out to go work for Disney"? No one understood exactly how intricate this program is or acknowledged the fact that being accepted into the program is extremely competitive. During the course of my program, I encountered multiple participants who were here after applying numerous times over the course of multiple semesters. Many of my colleagues assumed I got lucky and that I was there for fun when in fact I put in long hours daily and weekly, and filled multiple positions within the company. The Disney College Program is an amazing career building tool created specifically for college students. The program focuses on three main aspects and they are living, learning, and earning. During my program, I was given the opportunity to explore and train in different potential career fields. I was given the opportunity to enroll in classes at Disney University, a training program facility exclusively for Disney employees. I was exposed to numerous cultures through their international program. I was trained to break cultural barriers by looking beyond myself and learning to effectively communicate with people from any background efficiently enough to give every guest a magical and enjoyable experience. Lastly, I was given the platform to network with people all over the world, take classes, AND become financially stable in a structured environment. Since my program, I have been granted numerous opportunities both in my personal life and my career.

## **Bruns, Delaney**

**Mentor(s) -- Ms. Rachal Hatton, Dr. Ron Prinz**

### **USC Child and Family Program**

Young children are most often referred to mental health services due to disruptive behaviors. Many evidence-based treatments are available that are based on behavioral training for the parents. It involves a series of trainings by a mental health practitioner and then practice that is observed and later critiqued. I currently serve as an undergraduate research assistant on Dr. Ron Prinz's study evaluating the effectiveness of an online version of parenting program called Triple P (Positive Parenting Program), in comparison to its traditional, in-person administration. The children in the study range from ages 3-7 and have been identified as having severe and consistent behavioral problems by their parents, child care providers, or teachers. Through a series of Timepoint Assessments, the families' progress is evaluated before they receive the program, shortly after they finish the program, and eight months later. A team of coders use specific indicators in the filmed sessions and assessments to determine the degree to which the program was effective for each family. Then, the in-person and online program data will be compared. The purpose of the overall study, among other things, is to determine if online delivery of the parenting support program is as good as the same program delivered in person by a professional. This is an ongoing research study that will finish in the Spring of 2019.

## **Buben, John**

**Mentor(s) -- Ms. Maegan Gudridge**

### **Continuous Global Learning**

From an early age, I learned from my parents and teachers that globalizing my education would be an important developmental milestone. In the Spring of 2016 I made the decision to execute this vision by investigating opportunities to study abroad. I thought that exiting my comfort zone would present new challenges that I was prepared to conquer. I also wanted to prove to myself that I could live anywhere and quickly adapt to my surroundings. To do this, I researched different opportunities through

the University's study abroad office. I landed on spending the Spring semester of 2017 in Paris France at the American Business School of Paris.

While there I took a variety of business classes and one French civilization course that supplemented my USC business curriculum.

I learned that my preconceived notions of Parisians, which included rudeness and arrogance, were unfounded and we should do a better job of teaching the more human side of people as opposed to the stereotypes.

This was important for me to gain a deeper appreciation for French culture, cooking, and their overall philosophy of life. I would like others to know that you should embrace the differences in culture and seek out new opportunities to further globalize your learning. I would highly encourage others to go abroad for an extended period of time if they have the opportunity to do so.

I plan to continue my global education beyond my collegiate experience. I have developed a passion for travel and learning, and I do not believe the feeling will subside until the day I die. I have already begun planning the next steps, which include a cross country road trip immediately following graduation. I hope to use this experience to compare my travels abroad to an extended period of travel at home."

## **Buben, John**

**Mentor(s) -- Dr. Sanjay Ahire**

### **Smith & Nephew: Total Supply Chain Optimization**

We conducted an Operations and Supply Chain applied research / consulting project at Smith & Nephew to develop and implement a systematic process to optimize the inventory policy (consigned vs loaned) for implants and instruments for orthopedic surgeries at all hospital locations in the South-eastern United States. We have established decisions about centralizing consignment inventory for clusters of closely located customers, defined the optimal mode of transportation for each hospital (company owned vehicles vs FedEx), and optimized the total holding and transportation costs.

#### **Company Background:**

Smith and Nephew have millions of dollars (confidential) worth of orthopedics assets in the US that are used to support surgeries across the country each day. These assets reside in consignment at our customers or at internal "loaner" locations. The objective of this project is to optimize the total "cost to serve" for our business by determining which customers justify consignment.

#### **Project Methodology and Outcomes**

We were provided descriptive data regarding Smith and Nephew's inventory and pricing models regarding the company's instrument and implant sets. We were able to manipulate this data in Excel to provide meaningful answers in regard to how many knee implant and instrument sets should be consigned and loaned in order to minimize costs, leading to annual cost savings of \$???,000 (~50% savings over current costs).

## **Burrell, Allison**

**Mentor(s) -- Dr. Jerry Hilbish**

### **Integration of natural selection across the lifecycle stabilizes a mussel hybrid zone**

Biological hybrid zones are geographical areas where two distinct species meet and interbreed. The maintenance of hybrid zones is reliant upon complex and intricate interactions between the forces of natural selection and dispersal, which create new opportunities for hybridization. In Southwest En-

gland, a stable, naturally-occurring hybrid zone exists between two marine mussel species: *Mytilus edulis* and *Mytilus galloprovincialis*. Within this zone a mixing of *M. edulis* and *M. galloprovincialis* alleles is observed, and previous studies have shown that *M. edulis*-like individuals have lower survivorship than their *M. galloprovincialis*-like counterparts. Consequently, this directional selection within the adult population in favor of *M. galloprovincialis* alleles should cause a disproportionate amount of these alleles in the mussel population as compared to *M. edulis* alleles, rendering the hybrid zone unstable, but nonetheless, this hybrid zone has remained stable for over 30 years. Thus, there must be some counterselective force that continues to contribute *M. edulis* alleles to the zone. This project tests two hypotheses by which this counterselection may occur. One hypothesis is the phenomenon of differential fecundity, which posits that *M. edulis* may have greater reproductive output than does *M. galloprovincialis*, and consequently, strong directional selection in favor of *M. galloprovincialis* among adult mussels may be countered by greater reproductive success by *M. edulis*. A second hypothesis is that of counterselection during the larval development cycle in favor of *M. edulis* individuals. It is hypothesized that counterselection may occur during larval development, the phase of life between gamete and settled juvenile. If counterselection does occur in the larval development phase, selection in favor of *M. edulis* alleles among larvae would counter selection among adults in favor of *M. galloprovincialis* alleles, allowing the hybrid zone to remain stable. Thus, this project aims to test these two competing hypotheses in order to further elucidate the mechanism by which this mussel hybrid zone is maintained despite strong directional selection among adults.

**Burritt, Christopher**

**Mentor(s) -- Dr. David Hudgens**

**Filing for Global Citizenship: Learning How to Pass the Test**

On December 11, 2001, China joined the World Trade Organization. This event continues to impact the world in myriad ways—most notable are China’s vast exports to other member nations, including the United States. Another significant happening is China’s One Belt One Road Initiative, a development strategy aimed at revitalizing the ancient silk roads that once connected Eurasia. China has become increasingly prominent in global affairs over the course of my life and I give this fact much credit when I share why I chose my particular disciplines in college. Because I wanted to study international business and China, I decided to double major in international business and finance and minor in Chinese studies. Additionally, I joined the International Business and Chinese Enterprise (IBCE) program. The IBCE program has allowed me to spend nearly half of my collegiate career in China and has taught me first-hand how globalization and the democratization of technology are reshaping the world. My academic and professional experiences in both the United States and China have equipped me with diverse connections and an inherently international mindset. These are already proving to be tremendous assets as I enter a competitive global workforce. I will join EY (formerly Ernst & Young) after graduation and I aspire to eventually incorporate my international background into my work. In my E- Portfolio for Graduation with Leadership Distinction in Global Learning, I have chosen select observations from my four years as a Gamecock. I hope these insights communicate the value of my education and how it has prepared me for success.

**Burstein, Jacob**

**Mentor(s) -- Dr. Camelia Knapp, Dr. Daniel Brantley**

**Seabed Geophysical Mapping Offshore South Carolina for Wind Energy Development**

The Bureau of Ocean Energy Management (BOEM) has identified potential Wind Energy Areas (WEA’s) on the continental shelf of South Carolina characterized by favorable wind resource potential and minimal environmental and societal use. Multi-sensor geophysical surveys have been conducted to refine these WEA’s to study the shallow subsurface of the near-shore environment to analyze the seabed bottom type, seafloor roughness and geomorphology, potential sites of cultural resources and features such as active and inactive faults, filled channels, and potential slope instabilities. The geo-

physical surveys focused on the inner shelf ranging approximately 10 to 30 km offshore North Myrtle Beach and Georgetown, SC. Multibeam bathymetry, side scan sonar, chirp sub-bottom, and magnetometer data were collected and processed to create high resolution Geographic Information Systems (GIS) data sets of the seabed morphology and bathymetry, and subsurface structure and stratigraphy models. These GIS data sets were integrated to form high resolution 3D hydrographic surfaces that simultaneously visualize the seafloor surface and subsurface in a seamless transition. Our research team at the Earth Sciences and Resources Institute-SC (ESRI-SC) utilized these 3D hydrographic surfaces to provide a more thorough and geospatially accurate determination of the shallow geologic framework and bottom habitat and cultural resources potential, and to advise BOEM of locations characterized by favorable subsurface foundations for offshore wind farms.

**Bustamante, Brianna**

**Mentor(s) -- Mr. Rico Reed**

### **Adventures and Self-Actualization in South Korea**

For the entirety of the 2016-2017 academic year, I studied abroad at Sogang University in Seoul, South Korea. Growing up in a Mexican-American household, I have been immersed in a multicultural environment all my life. As a part of the generation with easy access to technology like the Internet, my exposure to media and influences from other countries and cultures only increased. However, I have always been frustrated with the limitations of my physical surroundings. Books, videos, and even cultural festivals can only teach you so much about the traditions and customs of another country. Thus, I was determined to study abroad at some point during my academic career, and thanks to the opportunities provided by the Study Abroad Office, I was able to achieve this dream during my junior year at USC. I chose to study abroad in South Korea because of my knowledge of the country from social media and personal study, and because I wanted to experience a non-Western culture. My time in South Korea lasted from August 2016 to July 2017. During this period, I committed myself to as many adventures as I could manage: I worked in a restaurant, I taught English, I volunteered in festivals, I traveled to locations all around the country, and much more. My year abroad in South Korea helped me to improve myself in terms of independence, education, and social communication. It also showed me that characteristics of American society that I had known all my life could be different. Aspects that I was uncomfortable with and wished could be different – things like public safety, modes of transportation, and community involvement – are not unalterable because that is “just the way things are.” I plan to continue to educate myself with different cultures and ways of life around the world. I hope to use this knowledge to better both my community and myself. I aspire to fulfill this goal by working as a psychologist in international environments to help others realize that we are more interconnected than we think.

**Bustamante, Brianna**

**Mentor(s) -- Dr. Jane Roberts, Dr. Abigail Hogan**

### **Determining parenting stress and stress-reducing resources available for parents of children with autism spectrum disorder**

Parenting stress is a customary part of the parenting experience that occurs when parental responsibilities exceed parents' expectations and the resources available to them to succeed in the role of parent. Parenting stress theories predict that parenting stress is influenced by numerous domains and factors. This study focuses on the factor of children with developmental disabilities, specifically in regard to autism spectrum disorder (ASD) and down syndrome (DS). ASD and DS are neurodevelopmental disorders that result in significant intellectual disability, behavioral challenges, and frequent comorbid medical conditions. Previous studies show that parenting a child with a developmental disability typically results in higher levels of parenting-related stress due to behavioral problems and functional limitations of the child. Children with ASD in particular have severe social-communicative deficits, whereas those complications are less prevalent in DS. It is possible that these social-commu-

nicative impairments contribute to even higher parenting stress in families affected by with ASD. Studies on this topic show that researchers frequently report greater amounts of parenting-related stress in families of children with ASD. Furthermore, families of children with ASD have also reported greater amounts of parenting-related stress than families of children with DS. This study contributes to these findings by investigating parenting stress in mothers of preschool-aged children with ASD and DS, contrasted with mothers of typically-developing children, in an effort to determine whether parents of children with ASD experience elevated parenting stress. This study analyzes parenting stress in mothers of children with ASD, mothers of children with DS, and mothers of typically-developing children with no family history of ASD. The Parenting Stress Inventory (PSI), a parent questionnaire, is used to measure parenting-related stress. It is hypothesized that mothers of children with ASD will show significantly higher levels of parenting stress than mothers of children with DS and mothers of typically-developing children, and mothers of children with DS will show significantly higher levels of parenting stress than mothers of typically-developing children. A review of guidelines for reducing parenting stress, and resources currently available in the Columbia, SC area will also be discussed.

**Buzza, Andrew**

**Mentor(s) -- Dr. Mark Uline, Dr. Melissa Moss, Mr. Nicholas van der Munnik**

### **Gold Nanoparticle Decorated with Polyacrylic Acid Polymers designed to Inhibit Amyloid Beta Aggregation**

The progression of Alzheimer's disease is generally attributed to the increasing aggregation of the amyloid beta protein. The three main components of an aggregation regime is a lag phase (where aggregation is not observed by spectroscopic methods), log phase, and stationary phase (equilibrium). In order to slow the progression of the disease, extension of the lag phase is necessary. The Mark Uline and Melissa Moss Labs aim to develop detailed molecular understanding of the amyloid beta aggregation regime. In order to combat the aggregation, nanoparticles have been created with a gold core and tethered polyacrylic acid (PAA) chains. The size of the nanoparticles varies 5.6 to 22.9nm in diameter and 35.8 to 138.8 repeated units. The nanoparticles are believed to disrupt the formation of amyloid beta quaternary or tertiary structures, slowing the aggregation of the protein. The nanoparticles range in size of the gold core and the PAA chain length. Additionally, a concentration of ions was implemented to mimic the effects of physiologic conditions. The aggregation environment contained varying concentrations of tris buffer and thioflavin T to allow the concentrations of amyloid beta, nanoparticles, and ions constant. As the aggregation is observed over the entirety of the regime, the nanoparticles have shown efficacy in lengthening the lag phase when compared to the controls in the no ion experiments (an approximate 20 percent increase without ions and 10 percent increase with ions), which is consistent with the proposed effect. However, the experiments that contained ion concentrations were less effective, but still had an effect of increasing the lag phase. Although these nanoparticles as utilized here are not safe for human use, the importance of these early findings is that nanoparticles can be applied to retard the progression of Alzheimer's disease.

**Byrd, Destiny**

**Mentor(s) -- Dr. Laura Lomicka**

### **Advocating for a Healthy Campus**

As a Changing Carolina Peer Leader (CCPL) at the University of South Carolina, I have influenced the health status of my peers through meaningful health education events, campaigns, and programs. CCPLs impact the Carolina community as advocates of Student Health Services through a holistic approach to health, including physical, mental, social, and environmental health. We strive to fulfill the vision of Student Health Services by collaborating with campus and community partners and empowering students to be well-informed and aware of the available resources to reduce academic impediments. My most influential experiences resulted from working closely with campus dietitians, assisting with Get Yourself Tested (GYT), facilitating University 101 presentations, and facilitating a small group

workshop called Body Project. As a public health major, I was able to utilize the public health program planning skills and other knowledge to plan, implement, and evaluate programs through these experiences. Ultimately, this experience allowed me to explore different areas of public health and has led me to focus my career on women's health and preventative practice. My presentation will discuss the key insights gained from this experience and how they have shaped me professionally and personally.

### **Byrd, Destiny**

**Mentor(s) -- Mrs. Caroline Dunn, Ms. Alycia Boutte, Dr. Gabrielle Turner-McGrievy**

#### **A Qualitative Examination of Experiences using mHealth/eHealth for Weight-Loss**

Background: Current estimates are that 69% of US adults are classified as overweight or obese. eHealth/mHealth have potential for significant impact as rates of smartphone use remain high, including using technology to access health information. eHealth/mHealth may provide low cost, effective, accessible, and scalable approaches to obesity treatment and prevention.

Objective: The purpose of this research is to qualitatively evaluate experiences of adults ( $\geq 18$  years) who used eHealth/mHealth to successfully facilitate weight-loss ( $\geq 2$ kg).

Methods: Twenty-one individuals were recruited to participate in semi-structured interviews about their weight-loss experience. Interviews were recorded and transcribed verbatim. NVivo software and a phenomenological approach were used to analyze interview transcriptions and to identify themes.

Results: Participants reported using tools to track behaviors including diet, physical activity, and sleep to facilitate weight-loss. Most participants learned about their tool through friends, family, and ads on TV/social media. Participants identified the most important functions of their tool as providing feedback, data, and accountability. Outcomes of tool use included increased physical activity, improved diet quality, weight-loss, and increased behavioral self-awareness. Participants identified competition, the desire to be healthy, and to lose weight as motivating factors for continued use of their tool. Most participants said tools helped keep them accountable through feedback and social support; however, some encountered barriers such as tracking fatigue and forgetfulness/inconsistent tracking. Many also suggested using several tools at once for optimal weight-loss and to improve health, instead of a single eHealth tool.

Conclusion: This study reveals that eHealth/mHealth tools can assist in behavior tracking that may lead to weight-loss. More research should be done to explore specific aspects of these tools that facilitate weight-loss and encourage continued use.

### **Byrne, Maggie**

**Mentor(s) -- Prof. Katie Hopkins**

#### **Go Greek; Peer Leadership through Sorority Recruitment**

Every woman who signs up for formal sorority recruitment is placed into a Pi Chi group that is led by two Pi Chi recruitment counselors. Pi Chis are junior and senior women who are members of one of the 12 Panhellenic sorority organizations at the university, and have undergone extensive training in order to assist potential new sorority members (PNMs) throughout their recruitment process. A Pi Chi chooses to disaffiliate from their chapter during recruitment in order to offer the most unbiased advice possible. After serving as a Pi Chi myself during the 2016 recruitment season, I chose to take my experience one step further and serve as Head Pi Chi. In this position, I oversaw and trained over 120 sorority women and integrated them into their roles as Pi Chis. I was responsible for creating, planning, implementing, and instructing a 20-week-long training program, working alongside the Vice President of Recruitment to orchestrate and supervise formal recruitment for over 1900 PNMs. I ap-

plied for this position because I wanted to serve the Greek community and leave a lasting, recognizable impact on the University of South Carolina and its sorority recruitment counselors. I also wanted to show off to PNMs the University of South Carolina Greek community for exactly what it is: accepting, welcoming, and desirable for people from all different backgrounds, cultures, and upbringings. This experience has made a monumental impact on me. I was able to push myself as a leader and see my own sorority membership through a much wider lens. This experience provided unique opportunities to explore career fields, professional opportunities, and personal and professional networking. I am eager to use my experiences as Pi Chi and Head Pi Chi to continue pursuing my passions of community engagement and leadership of my peers.

**Caiello, Benjamin**

**Mentor(s) -- Dr. Jason Stewart**

**CST Influences AND1 Function in General DNA replication**

DNA replication is an essential step in the life cycle of all cells. In human cells, errors or failures during replication can lead to disease, cell death, or cancer. Replication can be initiated from hundreds of thousands of origins in the human genome, but only a small fraction of the origins are actually fired to form the replication forks that copy the genome. The remaining unused origins (“dormant origins”) are only needed if nearby replication forks stall or fail to completely replicate the DNA. CTC1-STN1-TEN1 or CST is a three protein complex that is important for DNA replication and telomere maintenance. It is known to interact with replication factors such as polymerase alpha and the MCM2-7 helicase. Knockdown of the STN1 subunit in human cancer cells has been shown to delay dormant origin firing after stalled replication. One potential factor that CST may interact with to help fire dormant origins is AND1—a central component of the replisome that interacts with polymerase alpha, the helicase, and a variety of other factors. To examine the potential interaction between CST and AND1, this experiment used Western blotting and Immunofluorescence to study STN1 knockdown and CST overexpressing cells. Other important and related replication factors were also blotted for. In both STN1 knockdown and OE CST cells there was a reduced level of AND1 bound to the chromatin, indicating that CST plays a role in AND1 localization to DNA. This may be the result of CST recruiting AND1 directly to the chromatin, or through an indirect pathway. Our current studies examine whether there is a direct interaction between CST and AND1 that may explain the partial loss of AND1 on the chromatin and whether this loss is specific to certain types of DNA sequences or replication origins.

**Calatayud, Brittney**

**Mentor(s) -- Dr. Dawn Wilson**

**Associations of Perceived Parent and Adolescent Stress and Resilience on Adolescent Obesity**

The number of adolescents suffering from obesity has skyrocketed over the last twenty years. Obese adolescents are more likely to experience negative health outcomes in adulthood, such as diabetes and cardiovascular disease. African-American adolescents are disproportionately more likely to develop obesity compared to adolescents of other ethnic backgrounds. High levels of perceived stress among parents and adolescents could negatively impact the parent-child relationship and subsequently create an unhealthy environment in regard to health outcomes. However, parental factors such as education level and socioeconomic status could build family resilience and potentially counteract the effects of perceived stress in parents. The purpose of this study was to test associations between perceived parental stress, adolescent perceived stress, family resilience, and adolescent obesity. Parents and adolescents completed self-reported questionnaires to measure baseline perceived stress levels and background demographic information. Participating families were enrolled in the Families Improving Together (FIT) for Weight Loss trial, which is a randomized controlled trial testing the efficacy of a family-based weight loss intervention for African American adolescents and their parents. Data were collected from 232 adolescents (64.2 % female; Ages 11-16 years) and per-

ceived stress was collected from validated self-reported surveys. Adolescent and parent body mass index (BMI) were measured for all of the participants at baseline. Overall, females had higher levels of perceived stress than their male counterparts. Correlation matrices also revealed that adolescent perceived stress was significantly associated with higher BMI scores in their parents ( $r=0.21$ ;  $p<0.05$ ). With respect to weight-related outcomes, parent and adolescent BMI were significantly correlated indicating that parents of higher BMIs also had adolescents with higher BMIs ( $r=0.40$ ;  $p<0.05$ ). Lastly, lower parental perceived stress was significantly associated with higher income levels ( $r=-0.23$ ;  $p<0.05$ ). The findings from this study suggest that perceived stress levels of adolescents and parents are both important to consider and can play a role in understanding weight-related outcomes in underserved African American families.

### **Canty, Erika**

**Mentor(s) -- Prof. Anna Oswald-Hensley**

#### **We All Have a Part to Play**

We All Have a Part to Play

OSP Representative - An Opportunity Scholars representative is a role that has helped students such as myself, who are new and not quite sure what to do when they step foot on campus. It is that light in the dark that says, we know how you feel and someone is here to help. As a representative you may help a fellow student with classroom work, questions on professors and “what if” situations. Being a representative allows a student the opportunity to participate in community service projects, as well as cultural activities. The most fulfilling part about being an Opportunity Scholars Representative is the help that was given to me, which enabled me transition into my role as a student and has allowed me to extend the same help to new and current students.

Work Study Student- The opportunity to be in the work study program as a switchboard operator for the University of South Carolina Sumter campus, has allowed me to get to know the members of the campus team, whom work behind the scenes. This experience will help a student see how much coordination and dedication the entire staff puts in to make sure the students have exactly what they need to be a part of this college community. I take pride in the fact that I played a small part in this process. I think everyone has a role to play including the switchboard operator.”

### **Cartier, Amy**

**Mentor(s) -- Dr. John Jensen**

#### **Analyzing the feasibility of a central warehouse strategy**

A team of five students and a professor are teaming up with Continental Tire to explore the possibility of creating a centralized inventory network to potentially optimize inventory levels. Through the collection and analysis of data, the team is gaining knowledge of Continental’s current inventory state, and identifying opportunities for improvement without having to completely rework the existing network. The results will drastically improve Continental’s inventory levels for innately complex raw materials that are unique to the automotive tire industry. To delve into the underlying reasons why the inventory levels are higher than ideal, the team has conducted research with current employees of Continental to map out the buying process of the five different materials, and contrast the differences between them. The raw materials of the tires are procured from all over the world, ranging from products with several month lead times, to products that only require a few days. With the variability that stems from these products, the inventory levels suffer subsequently. The volatility of these commodities is the underlying reason behind the potential need for a centralized warehouse.

### **Cassidy, Devon**

**Mentor(s) -- Dr. Jeff Twiss**

#### **Stoichiometry of HuD to KHSRP: A key determinant for “go and stop” signaling in axon growth**

Development of the nervous system follows a sequential pattern of gene expression in a precise spa-

tiotemporal manner. There are a number of transcriptional and post-transcriptional mechanisms that control these elaborate gene networks. Of particular importance is the mechanism that modulates mRNA stability, since expression of many neuronal genes is controlled by changes in rates of mRNA decay. HuD and KHSRP, two AU-rich elements (ARE) RNA binding proteins, exert opposite effects on mRNA stability, with HuD stabilizing and KHSRP destabilizing bound mRNA. Ongoing work from our lab implicates these HuD and KHSRP interactions with target mRNAs for regulating rates of axon outgrowth and dendritic spine formation. HuD is highly expressed in early development, while KHSRP expression is low early and rises later as HuD levels fall. Thus, we are asking if this switch from HuD to KHSRP predominance signals the neuron to stop growing its axon and form a synapse. If so, does this stop signal correlate with a fall in axonal levels of target mRNA shared by HuD and KHSRP. The ratio of HuD to KHSRP in developing neurons is critical for controlling Gap-43 and Cdc42 mRNA levels, which are in turn critical factors for axon growth. Uncovering the precise timing for the switch of HuD:KHSRP stoichiometry in developing neurons will bring new knowledge for how mRNA-protein interactions impact normal and pathological brain development.

**Castaldo, Marissa**

**Mentor(s) -- Dr. Krystal Werfel**

**Working with ELLA: Finding a Passion for the Hearing Loss Population**

For the past year and a half I have been an undergraduate research assistant in the Written Language Lab at University of South Carolina's Speech and Hearing research center. This opportunity has taught me a lot about the field of speech-language pathology and about research. I have done a variety of different tasks to assist in the lab. While there are multiple research projects going on I have been focusing on one in particular. It is called Early Language and Literacy Acquisition in Children with Hearing Loss (ELLA). The majority of my work on this project is to analyze language of children with hearing loss by evaluating and coding 12 minute language samples. I used Brown's Grammatical Morphemes to code the language samples. Most recently, I have been trained in the administration of standardized tests for children that also evaluate their language acquisition and literacy skills. This position has taught me a lot about speech and language in children with and without hearing loss. Additionally, it taught me that this is the career path I would like to pursue. As an undergraduate at USC I am not able to take many classes related to speech pathology so this position has showed me what many of my classes cannot. I plan to use this research position to gain a better understanding of the field of speech-language pathology and to help determine the populations I would like to work with one day.

**Cates, Caroline**

**Mentor(s) -- Dr. Samuel McQuillin**

**Mental Health in Antarctica**

Antarctica is one of the least understood areas on the planet and one of the most volatile. As the landscape slowly morphs due to climate change, scientists are frantically measuring, testing, and observing as much as they can during this critical time in its history. Research with this focus has many implications for the future of science and humanity, such as how people can survive in extreme circumstances and environments on, for all intents and purposes, the edge of our world. Over winter break 2017-2018, I traveled for two weeks to Antarctica with a team conducting ecological research. For my individual research project, I am collecting, synthesizing, and analyzing observational and qualitative data on mental health in Antarctica from the perspective of research scientists doing field-work in the area. Through interviews and surveys, I am studying the effects of isolation on mood and feelings of connectedness during the Austral summer months (i.e. December, January, and February). Current findings emphasize the role of extreme darkness during the winter months as the main source of mood disturbances and fluctuations among this population; however, data during the extreme daylight of the summer months could support or discredit this assumption. If summer mental

health reports show similar trends to winter reports, daylight may not be as important as other factors, such as isolation.

**Cave, Catherine**

**Mentor(s) -- Dr. Kenneth Roberts**

**An LC/MS Assay for the Quantification of Analytes in the DAD-Catalyzed Reaction**

Oxidation of 2,4'-dihydroxyacetophenone (DHA) by the enzyme 2,4'-dihydroxyacetophenone dioxygenase (DAD) produces benzoic acid and formic acid in the presence of oxygen. The mechanism for this reaction is currently unknown. The DAD reaction is unique in that it cleaves a carbon-carbon bond of the alkyl group of the aromatic ring of DHA, instead of directly on the ring as seen in the intradiol and extradiol dioxygenases. To further investigate the kinetics of DAD, a simple, efficient assay using liquid chromatography-mass spectrometry (LC/MS) needs to be developed. Successful LC/MS assays to quantify analytes require four elements: a rapid and effective quench of the reaction catalyzed by DAD; an efficient separation of analytes by HPLC; strong detection of these analytes by ESI-MS; and an appropriate internal standard for quantitation by mass spectrometry. The LC/MS assay is expected to significantly expand the detection limit of analytes in the reaction catalyzed by DAD, improving both our understanding of the kinetic parameters of DAD and our ability to detect reaction components including UV-inactive analytes and trace products of the reaction.

**Cazales, Frank**

**Mentor(s) -- Dr. Kasia Pawelek**

**Mathematical model for an outbreak of West Nile Virus including control strategies and seasonality - an ongoing study**

According to the Centers for Disease Control and Prevention there was a total of 47 states that reported West Nile Virus activity in 2017. There has been 2,002 cases in humans with 67% developing a neuroinvasive disease. WNV is a vector-borne pathogen aimed for bird-mosquito-bird cycle throughout small to large regional areas, with humans, horses, and birds as incidental hosts. The primary mosquito species associated with underground stormwater systems and are primary vectors of WNV in the continental United States are the Culex pipiens complex. In this study, we designed a mathematical model with seasonality that considers natural factors impacting the Culex pipiens complex populations to introduce the seasonality. We expanded on our previous models to include bird and human populations as well as migration of mosquitoes, adulticides and catch basin treatments. The focus of this ongoing study is to design a mathematical model that takes into account various stages associated with the spread of the disease to model the outbreak and control of WNV. Our model predictions show the populations of mosquitoes throughout the seasons on the surface and underground, impact of various control strategies, and a scenario of WNV outbreak. Our model predicts that treatment of catch basins and adulticides significantly lower the mosquito populations and subsequently the risk of WNV outbreak.

**Cecchi, Curtis**

**Mentor(s) -- Dr. Johannes Stratmann**

**Modeling Plant Response to Multiple Stressors: MAP-Kinase levels in Response to Salt and Wounding**

As sessile organisms, plants cannot respond to factors in their environment in the same manner as motile animals. They are rooted to the spot where they germinated from seed and must persist throughout their entire life in that location. Rapidly changing biotic and abiotic factors in their environments can challenge plants throughout their lives. Some of these factors include herbivory, drought, soil salinity, heat, and cold. In order to cope with these stresses plants respond by regulating the expression of protective genes. These responses are mediated through plant hormones such as jasmonic acid (JA) and abscisic acid (ABA) that signal types of stress. Plants must do this while prioritiz-

ing response programs that are most conducive to survival. The role of individual plant hormones in the regulation of specific stress responses has been well-studied, but less is understood about how plants orchestrate a response to multiple stressors that requires more than one hormone signal. In this study we looked at how tomato plants (Microtom variety) respond to wounding, combined with a treatment with a moderately high, but non-lethal salt concentration. It is known that tomato plants produce JA in response to wounding. In addition, wounding leads to phosphorylation (activation) of MAP-Kinase 1/2 (MAPK1/2) (wrong word), which activate transcription factors. These transcription factors regulate the expression of genes coding for protective plant proteins such as proteinase inhibitors, which prevent digestion in the insect gut, stunting the insect's growth. Similarly, in response to salt stress, ABA is produced, which results in the activation of transcription factors that upregulate genes involved in osmoregulation. We are investigating whether MAPK1/2 signal kinetics plays a role in the regulation of ABA and JA production in response to our combined treatments. If we stress tomato plants with wounding and salt solutions, then we expect to see a changed MAPK1/2 signal in plants under both stress conditions as compared to either stress on its own. Our results have shown that we do observe changes in MAPK1/2 when plants are subjected to both wounding and salt solution treatments. Results from MAPK1/2 experiments, along with ABA and JA ...

**Cederstrom, Collytte**

**Mentor(s) -- Dr. Adam Pazda**

### **Intrinsic Motivation and Reading Improvement with At-Risk Students**

According to the U.S. Department of Education, 21% of adults among the general population read below the fifth grade level, 64% of fourth graders cannot read at grade level, and 22% of eighth graders cannot read at grade level (NCES, 2014). The Nation's Report Card for 2015 stated that only 36% of 4th graders and only 34% of 8th graders across the nation can read proficiently at grade level. Reading failure can also be seen as a mental health concern because being able to learn and being able to succeed in the classroom alongside of one's peers are crucial aspects of emotional wellbeing (Berking et al., 2008). The Reading Orienteering Club (ROC), where I am currently interning, is set up much differently than the average classroom. It seeks to improve the reading, writing, spelling, and comprehension skills of at-risk students who are already failing in school. The ROC is a yearlong after school program which emphasizes cohesive interaction, hands-on workstations, and vowel clustering (Clanton-Harpine, 2013). The program stresses intrinsic (internal) motivation rather than extrinsic (giving rewards/prizes) in hopes that they find the motivation within themselves to read, especially as they complete hands on projects. For this research project, 25 students enrolled in the Reading Orienteering Club participated in a longitudinal study. Students' intrinsic motivation to read and reading comprehension was assessed at three different times throughout the course of 7 months. The data across three time periods was analyzed using multi-level modeling. Changes in reading comprehension and intrinsic motivation is modeled within individual students, and these changes are nested within different age groups. I hypothesized that students will rank reading higher on their preferred activity list as they spend more time in the ROC program. In addition, I hypothesized that students will spend more time reading, even when they have other activity options available. Finally, I hypothesized that students' reading ability will increase throughout the course of the program. Results for the project will be analyzed before April 20th.

**Chabot, Claire**

**Mentor(s) -- Dr. Doug Pittman**

### **The Universe Under a Microscope**

For many women diagnosed with ovarian cancer, their tumors are a direct result of mutations in DNA repair genes such as RAD51D. The RAD51D gene is essential for cell division, repairing DNA damage, and maintaining genome integrity. My research focuses on studying the localization of RAD51D and its connection to ovarian cancer. To study this correlation, I generated a fusion between RAD51D

and the GFP green fluorescence reporter protein allowing me to detect its cellular localization. When I first saw the cells fluoresce under a microscope I was blown away at how similar they looked to nebulas in space and how beautiful they were. With this art project, I want to spread awareness and understanding of how the genetics of ovarian cancer works as it is the fifth most prevalent cancer amongst women and, according to the American Cancer Society, women have a one in seventy-five chance of being diagnosed with ovarian cancer in their lifetime. I want to engage people in scientific research who may not be otherwise interested in it; to show others that there can be beauty in lab work and that it is not just statistics and pipetting. When examined closely enough we can see the universe everywhere, even under a microscope. Each piece in my work is etched on glass and has been named after historical or contemporary female scientists who I find extremely fascinating or have influenced me personally. I chose to do this not only to represent women in science but also to represent the female population that is heavily impacted by ovarian cancer.

**Chabot, Claire**

**Mentor(s) -- Dr. Douglas Pittman**

### **Cellular Localization of RAD51D**

Studies show that at least fifty percent of patients with high grade serous ovarian cancer have mutations in DNA repair genes. The protein encoded by the RAD51D gene is vital for the repair of DNA double strand breaks (DSBs) through the homologous recombination (HR) pathway. These mutations are associated with increased susceptibility to ovarian cancer and the RAD51D lysine substitutions display a high sensitivity to cell damage and with this came a decrease in cellular survival. Cells that do not express RAD51D are hypersensitive to DNA damaging agents, particularly DNA interstrand crosslinking (ICL) agents. Previous work in the Pittman laboratory identified a direct interaction between RAD51D and an E3 ubiquitin ligase, RNF138. RNF138 mediates ubiquitination of RAD51D, a modification that occurs at lysine residues. Lysine to arginine substitution were introduced at all thirteen lysine residues along RAD51D and these constructs were expressed in Rad51d-deficient mouse embryonic fibroblasts that were treated with the DNA ICL agent, mitomycin C. These mutants eventually lead to cell instability through damaged inter-strand cross-link repair. A potential mechanism for this increased sensitivity is disruption of nuclear localization of the RAD51D protein. By using a fluorescent tagged vector (EGFP) it can be observed whether or not these lysines are required for nuclear localization provides a potential target site to block RAD51D function and sensitize cells to chemotherapeutics. The goal of this project is to determine if substituting a lysine with an arginine at residue 235 or 298 will prevent nuclear localization of the RAD51D protein.

**Chamberlin, Sophia**

**Mentor(s) -- Dr. Jie Guo**

### **A Letter from Shizu: Gender Roles in Modern Japanese Society Through the Novel Kokoro**

Natsume Soseki is often considered to be the greatest modern writer. My research project focuses on his novel, Kokoro (1914). In this novel, the perspective is almost exclusively given to the male protagonists, leaving the main female character Shizu with a very limited presence. During the Meiji era (1868-1912), Japan was under a period of reformation. Women in this period were often marginalized and their position in society was trivial at best. In order to critique Kokoro, and examine the role of women during this time, this project offers a creative account of the events in the novel from Shizu's perspective. My research consists of three stages. First, I conducted initial research on Soseki and the novel. Next, I took a trip to Japan in order to gain a better understanding of the culture, and subsequently the novel and Shizu. While there, I visited the obelisk stationed at Soseki's birth place and talked with local people. These activities helped to put into perspective the significance his writing has had on Japan. Finally, after returning, I re-examined the character Shizu and the general themes of the novel based on my experiences from Japan, before beginning to create a short story from Shizu's perspective. I adopted the epistolary format, which is meant to mirror the one written by the character

“Sensei” from the novel. This format was chosen in order to stay true and relevant to the original text. Her letter examines the psyche of Japanese women, as well as gender and cultural questions present in the novel in relation to the time period. It is important in a global world to study and make an effort to understand other cultures. The goals of this presentation are to expand on and contribute to Japanese studies on campus, encourage Japanese-related studies, and creative projects within the research field.

**Chernick, Madeleine**

**Mentor(s) -- Prof. Rico Reed**

**Madeleine Chernick - Professional and Civic Engagement Abstract**

During Summer 2017, I worked for Under Armour as a Global Merchandise Planning Intern. Throughout my internship, I honed my skills in many areas including, planning merchandise sales strategies for future seasons, owning analyses on various merchandise, and most importantly, leading a team as a Captain of the Under Armour Summer League Annual Sample Sale. As the Captain of our annual sample sale, which took place over five days, I was responsible for helping to raise 1.3 million dollars for local charity. In this role, I managed 30 interns throughout the week and the cash flow process. As a leader of the cash flow, I communicated with my team about our daily sales goals, trained my team to ring up customers and make returns, and oversaw over 20 cash wraps while ensuring the operation ran smoothly throughout the day. I was driven to become a Captain because I had a strong desire to apply my leadership skills in a real-life, fast-paced setting. After completing a comprehensive leadership course on my Semester at Sea study abroad program, I felt prepared to turn the leadership theories and strategies I studied into action. From this experience, I learned how to deal with stressful situations, how to delegate effectively, and how to build trust amongst my team. I also discovered that my strengths in leading others include building relationships with my employees, managing a team with diverse ideas and viewpoints, and recognizing team members for achieving their goals. Leading others effectively is an imperative skill to possess, and will be valuable in many aspects of my life, both personally and professionally. I am grateful that I had the opportunity to exercise my leadership skills as the Captain of the Annual Sample Sale and set myself up for future success as a leader in the merchandising field with Under Armour.

**Cherry, Wesley**

**Mentor(s) -- Dr. Srihari Nelakuditi**

**Drone Detection**

Using Software Defined Radio to detect the presence of drones through the WiFi signal that drones use to communicate with the user.

**Childers, Rayana**

**Mentor(s) -- Prof. Anna Oswald-Hensley**

**Pieces of leadership**

Ambassador

During the summer of 2016, I volunteered my time to USC Sumter as an ambassador. As an ambassador, I took incoming students and their parents around the campus, answering any questions they had and promoted our campus and facilities. I decided to take this position in hopes of becoming a better speaker in front of strangers. Throughout the many different personalities of groups, I learned that I can speak easily in front of a crowd that is relaxed, than a crowd that is stoic and non-responsive. This new information showed that it was not just my nerves, but also my brains response to different behaviors of crowds. The implication of this knowledge, gave me the chance to try and change unresponsive crowds, some would become interactive, while others would stay indifferent and that was okay. I still became a better speaker in front of strangers through these interactions. I would want others to try and read responses of groups in an attempt to learn about the group as well as them-

selves and how they interact with different types of crowds. I may or may not become an ambassador for my new school, but I am glad I gave myself this experience and broadened my horizons.

#### Opportunity Scholars Program (OSP) Mentor

Throughout the 2017-2018 school year, I was given 16 freshmen students to guide through their first year. As a mentor, I was to check in on them and if they need help I was to try my hardest to fulfil that request. I became a mentor at first, because I had a mentor who rarely talked to me but I stayed for the friendships. I learned that not everyone wants help, as they see it as a weakness and wish to be an independent individual, but some people need all the help that they can get. This led to me treating each person individually to their needs. It was significant that I learned this, to understand not everyone wants help like I did with my own peer mentor. I want others to learn how to handle each person individually and not as a group, like I tried to do. I will finish this semester out as an OSP peer mentor and pass on my torch to the next person who wishes to lead others.

#### **Childs, Brianna**

**Mentor(s) -- Dr. Alyssa Robillard**

#### **Returning Home Healthy: A Qualitative Analysis of Recently Incarcerated Individuals**

##### Background:

At least 95% of prisoners will return home to their communities (Hughes & Wilson, 2018). These communities are often low-income and resource poor—and prisoners face gaps in continuity of health care (Wallace, et al., 2016). As formerly incarcerated individuals re-enter the community, immediate risks include infectious diseases (Greifinger, 2007), however, chronic illnesses and are linkages to health care are also important. Given the high rates of incarceration and the disproportionate impact on communities of color, more information is needed to better understand the health care transition gap during reentry and how that gap contributes to inequitable health.

##### Methods:

Individual, private, and anonymous interviews have been conducted with formerly incarcerated individuals (N=10 to date) who have been released from prison in the last five years. Recruitment was accomplished through word of mouth, and the distribution of flyers at bus stations, transitional houses, and homeless shelters. Interviews were conducted in a private room, in a public library using an interview guide, and were audio recorded. Participants were asked to share their health-related experiences during reentry. Content analysis of transcribed data was conducted to find common themes.

##### Results:

Preliminary analysis has revealed some common themes. One is the difficulty of applying for health insurance, which stems from the inability to pay for coverage or uncertainty about the application process. Another is the difficulty of finding employment due to previous incarceration, impacting the ability to pay for medical services/treatment, including medication. Also, many participants expressed difficulty managing chronic diseases without proper access to medication. When chronic conditions were present, there weren't linkages to resources or a systematic process for participants to know how/where to go to access care and/or medication.

##### Conclusions:

The interviews emphasized the lack of resources and guidance regarding reentry. Many participants felt that they did not have the resources to take care of their health. The interviews suggest that health is multi-sectional; many other factors affect participants' health and wellbeing, including employment and housing. The stress of having to handle things with no support was expressed as a burden.

#### **Ciambotti, Michala**

**Mentor(s) -- Ms. Maegan Gudridge**

**Community Relations at BlueCross BlueShield of South Carolina**

During the spring semester of my senior year, I interned at BlueCross BlueShield of South Carolina in the communications department. BlueCross BlueShield is a health insurance company that serves the South Carolina community, and my role was with the community relations team. I helped process sponsorship requests, write executive summaries for the CEO, and plan employee volunteer events. I am helping to organize a corporate day of service, which will take place next year. I wanted to work at BlueCross to understand how a large corporation works and to gain experience with internal relations. My past internship experiences have been for boutique public relations agencies, so all of the communication was done externally, and the process for doing work was much different. During my internship, I had the chance to sit down with executives from each communications area, such as media relations and social media, to hear their insight. I learned about overall communications strategies and tactics, how to execute media relations, what it takes to plan events and coordinate with many people, and how to create content for social media and the website. In addition, I learned about how to carry out internal relations through channels such as employee emails and an intranet site. Mainly, I learned that I want the company I work for to have positive corporate values. BlueCross gives back to virtually every event and nonprofit in the community, and they do it because of corporate social responsibility, not because of selfish motivations. I learned that large companies have an obligation to provide support for the community, and can truly make a difference in the lives of community members. In the future, I want to work for a company that has similar values as BlueCross. By having employee giving programs and events, it shows that the company cares about its employees and its community. I am impressed by how willing employees are to volunteer, and I have realized how rewarding it is to work with nonprofits.

**Ciarlone, Max**

**Mentor(s) -- Dr. Conor Harrison**

**An Evaluation of Environmental Education Programs in Columbia and the Caribbean**

Environmental education is a vital tool to teach kids, and through them their parents and community, about the importance of environmental stewardship. Kids undergo a mix of inside the class room lectures as well as outside the classroom experiences to create a more fully informed students. The Caribbean is of particular interest to this subject as they have a heightened need to combat climate change in order to prevent sea level rise which would greatly endanger the island nations. Since the Kyoto Protocol, most nations across the globe have see a need for more environmental education, including the US. Our national parks, state parks, and other initiatives like the Green Ribbon School program all offer formal and informal educational programs. With any program with objectives, an evaluation of the success should be conducted too. However we see more often than not very poor evaluations and analysis of these programs. I wanted to help some environmental education programs conduct such evaluation and offer advice in order to improve the benefits of them.

**Cichowicz, Ryan**

**Mentor(s) -- Dr. Bihter Padak, Mrs. Nazli Asgari**

**Influence of CO<sub>2</sub> diluent on NO<sub>x</sub> formation in syngas premixed flames at elevated pressures**

Synthetic gas or syngas is a fuel source that primarily consists of H<sub>2</sub> and CO and is produced by the gasification of coal or other fossil fuels. Due to this wide flexibility of production, syngas is an excellent choice to meet the future energy requirements. One of the most important factors that needs to be investigated further is the formation of pollutants, particularly NO<sub>x</sub> (NO and NO<sub>2</sub>) during combustion. Previous studies have mainly focused on obtaining total NO<sub>x</sub> specially at atmospheric conditions. This study investigated the speciation of NO<sub>x</sub> into its individual components for premixed syngas flames in a high-pressure burner facility as the pressure is increased from 1 to 7 atm in presence of diluent. The fuel consisted of a H<sub>2</sub>/CO ratio of 1 and an equivalence ratio of 0.5, and was combusted in a flat flame burner operating with lean, premixed syngas/air mixtures for the duration of the experiments. Finding the effect of elevated pressures will better represent the industrial applications

of syngas. The results concluded that at higher pressures lower concentrations of both NO and NO<sub>2</sub> were produced. The effect of diluting the fuel with CO<sub>2</sub> was studied as adding inert gasses could affect the temperature of the flame as well as the amount of NO and NO<sub>2</sub>. Temperature measurements were also taken to understand the mechanisms under which the NO<sub>x</sub> formed. The concentrations were measured using FTIR spectroscopy and used to develop a vertical profile above the burner. The overall results of these experiments will help to find out the NO-NO<sub>2</sub> reaction pathways and validate kinetic models for NO<sub>x</sub> formation during syngas combustion.

**Clapp, Matthew**

**Mentor(s) -- Dr. Kyle Dunovan, Dr. Catalina Vich, Dr. Timothy Verstynen, Dr. Jonathan Rubin**  
**Dopaminergic changes in striatal pathway competition modify specific decision parameters**

Mammals selecting actions in noisy contexts quickly adapt to unexpected outcomes to better resolve uncertainty in future decisions. Such feedback-based changes in behavior rely on plasticity within cortico-basal-ganglia-thalamic (CBGT) networks, driven by dopaminergic (DA) modulation of cortical inputs to the direct (D) and indirect (I) pathways of the striatum. DA error signals favor the D pathway over the I pathway for rewarding actions, with the opposite tendency for aversive ones, effectively encoding the values of alternative actions. It remains unclear how changes in action value influence the mechanisms of the action selection process itself. Here we use a biologically plausible spiking model of CBGT networks to illustrate (1) how feedback-driven DA signals modify the strength of D and I pathways in accordance with a simple reinforcement learning model and (2) how asymmetries in D/I efficacy resulting from the learning process impact the accumulation of evidence for alternative actions. Simulations of corticostriatal synapses showed that DA feedback leads to asymmetrical weights in the D and I pathways within a given action channel and the ratio of these weights ( $w_D/w_I$ ) effectively encodes the action's expected value ( $Q$ ). We then simulated the full CBGT network in the context of a simple 2-choice value-based decision task under different weighting schemes for cortical inputs to the D and I pathways (high, medium, and low  $w_D/w_I$ ) for one of the action channels. The simulated response times from these simulations were fit with two variants of a drift-diffusion model (DDM), leaving either the drift-rate or the boundary height free to vary with  $w_D/w_I$  ratio. As  $w_D/w_I$  increases, the speed of information accumulation in the decision process also increases, providing a direct mapping between network-level properties of CBGT systems and cognitive decision processes.

**Clark, Anna**

**Mentor(s) -- Dr. Lara Ducate**

**Stacking to Make a Difference**

Since the beginning of the Spring 2018 semester I have been completing an internship at a therapy office in Blythewood, South Carolina. I first got involved at the clinic because it was a degree requirement, I needed more experience for my resume, and for clinical hours for graduate school. I had no idea how much I would learn from this internship and how I would begin to incorporate things I learned into my daily living and into improving daily living for others. While I have enjoyed all things I have learned thus far, the most rewarding part of my internship was being responsible for performing what we called "cup therapy" with the patients. It is essentially a way to work with cups, such as cup stacking, to try and help to improve things such as hand-eye coordination, sequencing skills, patterning skills, gross motor skills, fine motor development, visual development, etc. I was responsible for overseeing this form of therapy. There are many ways to use cups to challenge the patients which is what I found so awesome. Who knew cups could be so useful if one just thought outside of the box? Being an Exercise Science major, I am huge on improving physical fitness. Physical fitness being the capability to perform daily activities of living without pain. All the courses I have taken at the University of South Carolina have had some concept that focused on physical fitness. I feel that cup therapy is a way to improve physical fitness for all ages. I also feel that if cup therapy is started young and continued throughout life then a person will be able to achieve optimal physical fitness throughout their life.

**Clarke, Taylor****Mentor(s) -- Dr. Charles Pierce****Global Learning; Global Service**

In fulfillment of my International Business major, I studied abroad for the spring semester of my Junior year, from January to June 2017. I studied International Business at Tilburg University in Tilburg, Netherlands. During this time, I was able to learn much about other cultures through immersion and by building personal relationships, as well as learn new, foreign languages and travel to many countries. While I did this in fulfillment of my major, I also did it to challenge myself to gain a deeper understanding of the world.

During my time abroad I learned how vast and different the world is, both through the international friends I made, the places I went, and the things I did. I learned much about other cultures and how to be culturally sensitive. This impacted me by expanding my worldview.

Since going abroad, I have looked at the world through a different lens and have become more open to the world around me. I would like to build a career around helping those in developing countries through policy and economic development.

I want others to know that they, too, can study abroad with the opportunities provided to them at USC and have a rich, cultural experience.

Finally, I am applying the knowledge that I learned abroad to work in developing countries as a Peace Corps volunteer in Cameroon.

**Coble, Anne Marie****Mentor(s) -- Dr. Ann Ramsdell****Effect of High Fat Diet on Mouse Mammary Glands**

A high fat diet in human females significantly increases the risk of breast cancer. Additionally, there are left-right differences in certain aspects of breast cancer. Little is known about the effects of a high fat diet on the growth and morphology of mammary glands with respect to laterality. Using a mouse model, we aim to determine the left versus right effects of a high fat diet on mammary ductal growth. To investigate this, we administered a high fat diet to FVB/N mice (N = 7) and obtained their left and right thoracic mammary glands at four weeks of age. We then performed morphometric analysis using ImageJ software to quantify various morphological parameters of ductal network growth, including the number of terminal end buds (TEBs) and branch points (BPs). The number of TEBs and BPs were compared between left and right mammary glands using a paired Student's t-test. We found no significant left-right differences in the number of TEBs ( $p = 0.284$ ) or BPs ( $p = 0.682$ ). Additional measures of ductal growth are needed to gain a greater understanding of the asymmetric effects of a high fat diet. Future directions include determining the left-right differential effects of a high fat diet at a later time point such as six weeks of age, as well as determining the left-right differences in the total areas of the ductal network. Our findings will contribute to the understanding of breast cancer with respect to laterality.

**Cocuzza, Taylor****Mentor(s) -- Ms. Sarah Gay****Turning a Passion into a Career Path within the Field of Physical Therapy**

Over the last year, I volunteered and interned at The Sigurd Center (TSC). The Sigurd Center is an Orthopedic and Neurological Rehabilitation Clinic. It offers physical and occupational therapy for a wide array of injuries such as neurological, amputee, spinal cord, lumbar, pulmonary, vertigo cervical,

and orthopedic. While interning at TSC, I assisted the therapists with providing treatment for patients, writing progress notes, and performing everyday duties of the office. As an exercise science major, this internship provided me with hands-on experience in a clinical setting that is related to my field of interest: neurological rehabilitation. I had the opportunity to execute therapeutic exercise for patients and collaborate with therapists all while learning the application of the principles of rehabilitation amongst a wide array of disabled populations. My passion for helping others as well as my career goals of becoming either an occupational therapist or a physical therapist motivated me to pursue this opportunity. Integrating myself into an outpatient clinic, I acquired the knowledge, as well as various skills that allowed me to not only work with patients independently, but also provide me with a job while I take a gap year following undergrad. Overall, this internship had a tremendous impact on my passion for rehabilitation as well as gaining insight as to what demographics I'd like to work with, what type of therapy setting, in addition to my own idea of who I'd like to be as a professional in the future. Through this experience, I have hopes to obtain a Doctoral degree in physical therapy and specialize in neurological rehabilitation within adult populations.

**Cogan, Christopher**

**Mentor(s) -- Dr. Richard Hoppmann**

**Ultrasound as a tool to teach undergraduate students cardiac anatomy and physiology.**

Ultrasound is being introduced more into education curriculums. The purpose of this study was to collect evidence objectively on whether or not ultrasound enables students to learn cardiac anatomy and physiology. In this study, 89 undergraduate students took a pretest to determine their background knowledge of cardiac anatomy and physiology. Following, the students watched a short lecture on cardiac anatomy and physiology, as well as how to interpret an ultrasound image. Finally, the students took a posttest to determine improvement in their knowledge. The students were also asked about their experience. The mean pretest and posttest score was 4.43 of 10 (44.3%) and 8.51 of 10 (85.1%) respectively. A t-test determined that mean difference was significant at  $p < 0.0001$ . The feedback by the students was positive about the ultrasound demonstration. Eighty percent of the students thought that the ultrasound demonstration helped them understand cardiac anatomy and physiology to a greater extent. Ultrasound introduced into education can indeed help undergraduate students learn cardiac anatomy and physiology.

**Cohen, Katherine**

**Mentor(s) -- Dr. Jessica Green**

**Examining mirror neuron functionality in individuals with severe depressive tendencies using electroencephalogram**

The Mirror Neuron System (MNS) is a network of neurons that respond equally when an individual performs an action and when an individual observes someone else perform the same action. It is a neurophysiological mechanism that allows individuals to relate to the actions of others by "mirroring" their brain activity. Several studies have indicated that certain disorders may cause mirror neurons to stop functioning properly. The functioning of the MNS can be tested using an electroencephalogram (EEG), which records electrical activity in the brain. Deficiencies have been found in individuals with autism and bipolar disorder. This study seeks to determine whether similar deficiencies are found in individuals with depression. We use EEG data to compare mu wave suppression in individuals who exhibit severe depressive tendencies and individuals who exhibit little to no depressive tendencies during a series of motor and cognitive tasks.

**Colalancia, Maria**

**Mentor(s) -- Mr. Ryan Lloyd**

**Fashion For Change**

Over the summer, I held an internship position with Fiftytwo Showroom, a high-end fashion showroom

located in New York City. Obtaining an internship is a requirement for my major of Retailing with an emphasis in Fashion Merchandising, but obtaining an internship in fashion in New York City was a personal requirement of my own. Fiftytwo represents WRTW, MRTW, and Resort collections. They also hold the design studio for menswear designer Robert Geller. I had the opportunity to use the skills taught to me in my classes at USC on a daily basis through my internship. I would attend buying appointments for each division, taking notes on line sheets as the buyers went through viewing the collections. At the conclusion of each buying appointment, I would transfer the line sheets into the company's computer software and send copies to both the buyer and my supervisor. I would then routinely follow up with our clients about placing orders, which I would enter into our system with the agreed shipping terms, exclusivity agreements, and more. Across the three divisions, I managed millions of dollars in sales every day. I also was able to work closely with the various designers and their collections through sample coordination and boutique merchandising. This internship opened my eyes to different opportunities within the fashion industry and confirmed my decision to pursue a career in the fashion industry, working with inspired designers and sustainable collections.

**Cole, Breanna**

**Mentor(s) -- Dr. Shana Harrington, Dr. Susan Miale**

**Evaluating Clinical Pain Assessments for Children and Adolescents Diagnosed with Cancer**

In 2017, there were ~15,200 children and adolescents (birth-19 years) diagnosed with cancer in the U.S. With enhancements in current child cancer treatments, 83% of children diagnosed with cancer before age 20, survive at least 5 years. Given the improved survival rate, it is important to be familiar with the unique challenges faced during treatment of pediatric cancer. One such challenge is pain related to pediatric cancer diagnosis and treatment. Children and adolescents diagnosed with cancer are a unique population because they most likely have not experienced chronic or recurring pain. Pain in children and adolescents with cancer has been reported to be significant and debilitating both during and after treatment that affects the quality of life of not only the child, but the families as well. Currently we are unaware of any guidelines for recommending which pain assessment measure is most appropriate for this population. The purpose of this research was to identify evidence-based pain assessment measures used in children and adolescents diagnosed with cancer and rate them according to the Evaluation Database to Guide Effectiveness (EDGE) scale. The literature was systematically reviewed for published pain measures used in the pediatric oncology population. The EDGE rating scale was applied to determine clinical utility and ease of use for each measure. Only one of the 17 measures reviewed, the Wong-Baker FACES® Pain Rating Scale, is highly recommended. This measure has excellent psychometric properties and clinical utility for children aged 3-18. Three measures, Adolescent Pediatric Pain Tool (8-17 years), Oucher Pain Scale (3-12 years), and Pieces of Hurt Pain Assessment Tool/Poker Chip (4-13 years) are recommended for use within the pediatric cancer population. These measures have good psychometric properties and clinical utility. Clinicians and individuals can use the results from this study to help guide them when choosing an outcome to assess pain in children with cancer. We recommend further psychometric testing of pain measures in this population, particularly those that measure pain in infants and young children (birth – 3 years).

**Cole, August**

**Mentor(s) -- Dr. Morgan Stefik**

**Exploring the Phase Equilibrium of PEO-b-PHA**

Block copolymer derived self-assembled nanostructures are crucial to developments in energy conversion and storage devices. The goal of this research is to fabricate porous nanostructured materials from a custom-made polymer, poly(ethyleneoxide-block-hexylacrylate), (PEO-b-PHA). This amphiphilic polymer is often used in persistent micelle template (PMT) fabrication. PMT is a recently developed tool which allows independent tuning of each architectural dimension, pore diameter and wall-thick-

ness respectively. The major criteria of PMT fabrication is using of a very high  $\chi$  block copolymer, where  $\chi$  represents Flory-Huggins interfacial interaction between each chemically dissimilar block. Proposed PEO-b-PHA satisfies this condition and allows independent adjustments to wall-width and pore size enabling the kinetic entrapment process. However, this polymer is not commercially available and easy synthetic approach is in demand. Also, relatively little is known about the equilibrium phase behavior of this polymer. Therefore, this work aims to synthesize PEO-b-PHA in large scale and studying its equilibrium phase behavior. To further understand that, a series of PEO-b-PHA was synthesized with variations in volume fraction and total polymer chain length. Employing these synthesized polymers an equilibrium phase diagram was constructed. This poster will focus on the synthesis of PEO-b-PHA using two-step synthetic approach, stepwise esterification and atom-transfer radical polymerization respectively. Advanced characterization tools, proton nuclear magnetic resonance (<sup>1</sup>H NMR) and gel permeation chromatography (GPC) were used to characterize the polymer. Polymers molecular weight varied from 5,000-60,000 g/mol and 10% to 90% with respect to PHA volume fraction and were used to construct phase diagram. Equilibrated morphologies are studied using temperature dependent small angle X-ray scattering. This poster will highlight the scattering patterns of few equilibrated morphologies, for e.g., body centered cubic hexagonal, lamellar, and disordered.

### **Conlon, Christina**

**Mentor(s) -- Dr. Nicole Cavanagh**

#### **Meet Someone Where They Are**

In the spring of 2016 I took part in a service trip to the Greater Boston Area. The group I was part of was assigned to the town of Roslindale, a suburb approximately twenty minutes outside of Downtown Boston that has historically experienced poverty but is in the very early stages of gentrification. We were introduced to a single mother who has been living in relative poverty and was recently diagnosed with a serious illness. It was because of this illness that she has been unable to work and unable to afford to maintain her home that was falling apart. We were able to serve her and her daughter by removing mold from the bathroom, demolishing and rebuilding broken stairs, deep cleaning the home, and stocking their refrigerator full of food. I personally was able to spend time getting to know the mother and daughter. I was able to assess and understand their needs while also acknowledging their worth and dignity. My motivation behind this experience stemmed from a desire to serve and implement the social work ideals that I learned over my college career. I learned that when you “meet someone where they are” there is intentionality and understanding behind your actions of engaging the individual in need. This approach has changed the way I view community service because of the way it can positively impact and encourage an individual in need. Because of this insight, I now view community service as an opportunity to influence populations in need in a more meaningful and intentional way.

### **Connelly, Reeves**

**Mentor(s) -- Dr. Sarah Keeling**

#### **Engineering and the Community**

I will be presenting in order to receive Graduation with Leadership Distinction in Professional and Civic Engagement. My work as an intern at Kimley-Horn working with professionals doing tasks for transportation projects and class experiences here at USC inspired me to pursue GLD. I learned many different things in each of these settings, but here I will connect how each influenced the other by reflecting about what I found: Engineering has the potential to impact communities. Engineers make a difference for the public every day in their line of work and should strive to do more by giving back to the engineering and their local community.

### **Cook, Anna**

**Mentor(s) -- Dr. Rosemarie Booze**

## **Use of the Modified Hole Board Task in Examining Anxiolytic Behavior in HIV-1 Transgenic Rats Treated with Escitalopram**

HIV infection is a serious condition affecting over 1 million people in the US and more than 36 million people worldwide as of 2015. Despite the advent of combination antiretroviral therapy (cART), detrimental neurocognitive effects such as dementia and cognitive impairment are readily observed in HIV seropositive patients. Moreover, 30-60% of infected individuals develop clinical depression. Individuals suffering from comorbid HIV infection and clinical depression are roughly five times more likely to commit suicide than patients suffering from clinical depression alone. In studies with HIV-1 Transgenic rats, significant impairment in both serotonergic and dopaminergic function has been observed. These particular neurotransmitters have long been implicated in the pathogenesis of clinical depression. This study seeks to attenuate deficits in neurochemical function in HIV-1 transgenic rodents via treatment with the selective serotonin reuptake inhibitor, Escitalopram. A 2X2X2 factorial design is utilized to examine the effects of sex (male/female), drug treatment (Escitalopram/placebo), and genotype (HIV-1 Tg/F344 controls) upon anxiolytic/depressive behavior. The modified hole board task directly measures behavior related to anxiety and depressive behavior in rodents by gauging levels of exploration. A 16 hole custom hole board was placed into a standard 40cm<sup>3</sup> locomotor chamber. The number of nose pokes into holes (novel exploratory behavior) was recorded with photocells placed below the hole board. Total hole pokes were recorded by FlexField software (San Diego Instruments). Animals were habituated to the testing room for a period of ten minutes prior to each trial. Following habituation, animals were tested in the apparatus for an interval of ten minutes in the presence of infrared light and background noise. Testing occurred for seven consecutive days. The modified hole board provides a well -documented and flexible method of gauging anxiety/depressive behavior in rodents. Thus, the present study uses a modified hole board task to investigate the therapeutic efficacy of Escitalopram in reducing anxiety and depressive behavior in HIV-1 Transgenic rats.

### **Cook, Carson**

**Mentor(s) -- Ms. Sarah Gay**

#### **Leadership in Greek Community**

With over 25,500 undergraduate students at the University of South Carolina, Greek organizations serve as a niche community for 28% of the student population. Chapters all rooted in similar principles and ideals bring students together and challenge them to excel in academics, service, and leadership. My experience with the Greek community has not only given me a second home, but also better prepared me for life after university. Through my role as Vice President of Chapter Development in Tri Delta, I learnt the fundamental qualities of leadership including adaptability, empathy, and reliability. In my presentation I will discuss the evolution of not only myself, but also my chapter as a whole.

### **Cook, Haley**

**Mentor(s) -- Mr. Ryan Lloyd**

#### **Growth through Leadership**

For the last three semesters, I have had the privilege of working for the University of South Carolina as a Supplemental Instruction Leader. This role has allowed me to step out of comfort zone to become a better leader. Through this role I have developed a multitude of skills such as public speaking, time management, conflict resolution, collaboration, interpersonal etc. These skills have contributed to my ability to lead and mentor 612 undergraduate students, and will make me a more experienced leader once I enter the medical field. Along with enhancing these skills, this role has solidified my passion for teaching and mentoring others. Medical advancement relies on this premise of mentorship and teaching others to create successful physicians, treatments, and new technologies. This experience was invaluable and led to great personal and professional growth.

**Cooley, Jalesa**

**Mentor(s) -- Prof. Ernie Grigg**

**South Carolina With Purpose**

As part of the Public Relations Student Society of America's Bateman Competition, our team of five public relations students created the South Carolina branch of With Purpose, a youth-powered non-profit organization dedicated to finding safe and effective treatment options for children with cancer. Through our research, we decided the most effective and influential campaign would focus on the passage of the Childhood Cancer Survivorship, Treatment, Access and Research (STAR) Act. If approved, this bill could expand opportunities for childhood cancer research, enhance the quality of life for survivors and provide hope for those who have run low on options. We researched our target audiences, and planned our objectives, strategies and tactics for the campaign. We will execute from February 15th to March 15th and unite the voices of students across the Palmetto State through a full-scale communications campaign, including social media, media relations and government relations. Our campaign will have an impact on a national level and could change the lives of children with cancer and their families.

**Cooley, Jalesa**

**Mentor(s) -- Ms. Sarah Gay**

**Graduation with Leadership Distinction in Professional & Civic Engagement**

During the spring semester of my senior year I executed a full-scale public relations campaign for a real-world client. I was a part of a team of five girls and our client was With Purpose, a non-profit organization that advocates for childhood cancer research. During our execution phase I served as project manager and mainly delegated tasks to each of my team members. We established a state-wide chapter of our parent organization, referred to as South Carolina With Purpose, and set out to accomplish two goals: influencing our federal legislators to support the Childhood Cancer Survivorship, Treatment, Access and Research (STAR) Act and gaining brand ambassadors for our state. As a public relations student, this experience gave me an immense amount of real-world experience. I was able to research, plan, execute and evaluate the campaign, and I also was granted with a few pieces of published materials. Specifically, I had the opportunity to co-write an opinion article that was placed in the Post & Courier newspaper. Working through this experience really opened my eyes to the field of public relations due to the fact that I worked on the project from ideation to execution and really got to see the end results of my efforts. All of the brainstorming sessions and strategic planning really made my final semester worthwhile and confirmed to me that I was headed down the correct career path.

**Coombs, Stephanie**

**Mentor(s) -- Dr. William Jones**

**Research and Advocacy: The Importance of Implementing Research in Clinical-Community Settings and Advocacy for Researched Populations**

The purpose of this poster is to outline the importance of implementing research in clinical-community settings for the advocacy of stigmatized groups. The growing body of research that we now have regarding stigmatized groups has helped to shape the language and strategies that we currently use to advocate for the rights, privileges, and protections for these populations. The strategies that have become common practice in the clinical-community setting are referred to as evidence-based methods. These evidence-based methods have become so popular in the clinical-community setting because they have been thoroughly researched, and the results in the clinical-community setting have been identical to the results found in the research literature. Research is a powerful tool that helps to inform the methods and language that is used in advocacy and clinical-community settings. I have both used and conducted research that has contributed to the body of research regarding stigmatized groups. In working with children with mild learning disabilities and Attention Deficit Disorder I have

learned that new and inventive ways are essential for helping this population of students to gain a full and meaningful education. I have also done research on fear and cardiac responses in children with fragile x syndrome. This research helps to further the understanding of the physiological and psychological fear responses of children in the fragile x syndrome population. This research has given me a better understanding of this population and the necessity to advocate for those who cannot advocate for themselves or who are so severely stigmatized that they are considered to be unqualified to speak for their own advocacy.

**Cooper, Courtney**

**Mentor(s) -- Dr. Gabrielle Turner-McGrievy, Ms. Alicia Dahl**

**Passion for Public Health: A Pregnancy Study Investigating Meal Quality**

**BACKGROUND:** I aspire to have a career in women's health. During my junior year, I became interested in a PhD candidate's mobile health dissertation project targeting women's health promotion during a pivotal time, pregnancy. I began working as a Research Assistant on this dissertation project to recruit participants and facilitate intervention delivery tasks. I developed an independent research question exploring breakfast meal quality of participants in the intervention. According to MyPlate recommendations, a nutritionally adequate breakfast consists of five food groups (FG): fruits, vegetables, grains, protein, and dairy. I explored reported breakfast behaviors and the quality of breakfast meals among pregnant women using photo coding techniques.

**ACTIVITY:** The research team recruited pregnant women for the dissertation. Participants completed an online Rapid Eating Assessment (REAP-S) about meal intake during an average week. One cohort submitted a photo of their breakfast on five days which were independently coded by myself and another researcher using a scoring system from 1-5 (indicating the number of FG present). Independent samples t-tests and chi-square analyses were used to examine differences between between FG scores and reported breakfast behaviors across BMI groups.

**RESULTS:** Participants' (n=117) mean BMI was 26.3+5.26. Most women (n=87, 74.4%) reported they rarely/never skip breakfast, followed by sometimes (n=20, 17.1%) and usually/often (n=8, 6.8%). Of women who reported they sometimes or usually/often skip breakfast, most were overweight/obese (n=19, 67.9%, p=0.03). MyPlate FG scores for the breakfast photo cohort (n=21) were low (M=1.57+1.11). Lower FG scores were present among overweight/ obese women compared to normal weight women (1.07+1.16 versus 2.11+0.80, p=0.03).

**CONCLUSION:** Although most women reported eating breakfast regularly, FG quality was lower than MyPlate recommendations. Future public health efforts should address meal quality among pregnant women, emphasizing the consumption of well-balanced, healthy breakfasts. Beyond the study results, this experience helped me conceptualize best practices for conducting Public Health research and the importance of innovation. Furthermore, I enhanced my technical research skills and presented at a national conference in Fall 2017. I would recommend all Public Health students gain research experience, which has proved invaluable as I look forward to a career in Public Health.

**Cordes, Alexandra**

**Mentor(s) -- Dr. Dana DeHart**

**Sex Trafficking Victims Seeking Help in South Carolina: Service Provider Perspectives**

This qualitative study utilized interviews with 13 service providers at 9 domestic violence and sexual assault (DV/SA) agencies on the challenges faced by sex trafficking (ST) victims, the similarities and differences between the two trauma groups, and the challenges of service delivery to ST victims in South Carolina. Qualitative analyses were completed using MAXQDA software. We also used archival data from 13 life-history interviews with girls committed to a juvenile facility who also described

their involvement in the commercial sex trade (DeHart & Moran, 2015). The latter cases were used to identify additional service gaps not mentioned by providers. Based on analyses from the two sets of data, challenges faced by ST victims include obtaining safe housing, education and job skills, legal aid, and compassion from police officers. Agency challenges of service delivery include funding, providing housing, training staff, and professional boundary setting. The data implies that while DV/SA and ST victims share many similar traumas and needs, ST victims often require more breadth and depth of care and require more resources than most DV/SA agencies can spare given their current caseload.

**Cortese, Mary**

**Mentor(s) -- Dr. Scott White**

**Distribution of seafloor organisms near the flanks of the East Pacific Rise**

Scientists have been working for years to try and map the seafloor. Although more is known about the seafloor now than ever, little is known about where organisms live on the seafloor outside of hydrothermal vent systems. This study sought to look at the occurrence (where are they), abundance (how many are there), and diversity (what is there) of organisms near the flanks of the East Pacific Rise, a sea floor spreading ridge. Using lava morphology as a proxy for sea floor roughness, it was hypothesized that seafloor organisms would congregate around rougher patches of seafloor due to what we already know about hydrothermal vent systems. Data was collected using Alvin submersible video and bathymetry data from the support ship. A database was created of features and organism phylum that would be most commonly seen in this geographic location. The video footage from two separate Alvin tracks, a northern and southern track, was annotated using the created database. The annotations, geospatial coordinates, and the bathymetry data was compiled to create two GIS maps for comparison. Correlations will be reported for sediment cover, sea floor roughness, and topography related to the occurrence, abundance, and diversity of observed organisms.

**Courson, Harris**

**Mentor(s) -- Prof. Elise Lewis**

**Personal Development: Outsourced**

In my portfolio, you will find three key insights that are inspired by global practices and knowledge. The insights investigate language, community and progress and helped shape my understanding of how I can lead in a time desperate for realistic, focused leadership.

I chose to pursue Graduating with Leadership Distinction because it allows me to delve into growth experiences. For example, in my language key insight, I describe how my time abroad where I was uncomfortable with Spanish helped me empathize with the thousands of immigrants who come to America, face xenophobia and persevere. In the community key insight explore the importance of culture to an identity by examining “Las Fallas” , the premier Valencian festival that shuts down the city and builds community. Finally, I look into a Japanese concept I learned in class called “Kaizen”□, which means “constant improvement”. I discuss how all big results are built on many small improvements and that results are a sum of their means.

These are lessons I have learned from people outside the United States – therefore it is outsourced. All three key insights have led me to develop personally and have inspired me to use this acquired knowledge to lead. As a twenty-two year old, a realistic way for me to lead is to set up a scholarship fund for underprivileged children to go to the summer camp I went to that annually has international campers. This is a practical way for underprivileged students gain global knowledge directly from international people.

**Cowan, Hanson**

**Mentor(s) -- Ms. Stephanie Suarez**

**Perspectives on Hispanic Healthcare Through Volunteering at the Good Samaritan Clinic**

The Good Samaritan Clinic (GSC) of Columbia, founded in 2001, predominantly serves the Hispanic immigrant population in the SC Midlands. The GSC has a long-standing relationship with the University of South Carolina through the involvement of student volunteers and leadership of faculty.

Through the USC Leadership and Service Center, we partnered with the GSC as community service ambassadors to serve the clinic in a fuller, long term capacity. During our time at GSC, we helped implement the transition to an electronic medical record system, established relationships with community partners, and aided in the weekly operation of the clinics. In the process, we have directly participated in the organization of a medical clinic, encountered the challenges Hispanic patients face in accessing healthcare, and participated in the provision of culturally competent care.

As aspiring physicians, this experience shapes our perspective on healthcare for the immigrant community and other underserved populations. As the Hispanic population continues to grow in the US, the need for medical providers to better understand and serve these minorities becomes even more vital. Our experiences at the GSC gives us a unique perspective on these issues and better prepares us to face future health problems of these underserved communities.

**Cowan, Hanson**

**Mentor(s) -- Dr. Claudia Grillo, Dr. Lawrence Reagan**

**Insulin's Effect on Hippocampal Neuron Morphology**

Insulin has been found to play an important role in various brain regions, specifically the hippocampus, which is associated with learning and memory. The high density of insulin receptors found in the hippocampus suggests that insulin could be important to synaptic plasticity and cognitive function. Metabolic diseases, such as diabetes and obesity, are associated with insulin resistance that causes deleterious effects to the hippocampus. Previously, Grillo et al. developed a lentivirus vector that selectively downregulates insulin receptors. This lentivirus can be utilized to elicit insulin resistance in specific brain regions. In order to generate a model of hippocampal-specific insulin resistance, the lentivirus was injected into the hippocampus of rats. Previous studies from our lab demonstrated that hippocampal-specific insulin resistance does not affect body weight, body composition, adiposity or peripheral glucose homeostasis; nevertheless, hippocampal neuroplasticity was impaired leading to impairment of hippocampal-dependent spatial learning. In view of these observations, the goal of the current study was to examine the effects of hippocampal-specific insulin resistance on hippocampal morphological plasticity. Changes in hippocampal neuronal morphology were determined by the analysis of the hippocampal pyramidal neuron morphology by Golgi staining followed by a 3-D reconstruction. The preliminary 3-D reconstructions show simplification in the dendritic arborization, which suggests that hippocampal-specific insulin resistance induces dendritic atrophy, potentially leading to the impairment of synaptic plasticity and deficits in hippocampal-dependent learning. Ongoing quantitative analyses of the 3-D reconstructions are currently addressing the hypothesis that hippocampal insulin resistance is a key mediator of morphological plasticity and cognitive deficits independent of glycemic control.

**Coxwell, Courtney**

**Mentor(s) -- Dr. William Jones**

**Think, Act, Be: The Person USC Has Made Me**

When I walked onto the University of South Carolina campus four years ago, I was a small-minded individual with a limited impact on society. I was craving a change in scenery and to find something new and exciting about myself. The only way for me to make this large campus feel small, was to get involved in multiple things, in hopes of making friendships and find my voice. Not only have I found my voice, I have found my home and my passion. My classes, relationships, and experiences, have all been intertwined into making a holistically better version of myself. I have taken a backseat and

learned to think like a follower while acting as a team member. I have also taken charge and paved the way as a leader. Most importantly, I have given of my time and heart, and cared for others through service. These three things are what USC has taught me and what I have chosen to use as my life mantra; Think like a team member, act as a leader, and be a servant.

### **Coyle, Ramsey**

**Mentor(s) -- Ms. Carla Wall, Dr. Jane Roberts**

#### **Examining Sex Differences in Disorders Comorbid with Fragile X Syndrome**

Fragile X Syndrome (FXS) is a heritable genetic disorder arising from an excessive CGG triplet repeat on the long arm of the X chromosome (Mazzocco, 2000). FXS presents as a range of physical, behavioral, and intellectual abnormalities. As an X-linked disorder, it is much more prevalent in males than females, and males are much more severely affected on average. Children with FXS are also at risk for a number of other comorbid disorders. The present study aims to compare sex differences in two commonly occurring disorders, ADHD and ODD, in children with FXS. ADHD was divided into two subtypes: inattentive and hyperactive. These disorders are all characterized by externalizing behaviors and are more prevalent in males relative to females in the general population (Jamison, 2000, Linda Helen Munkvold, 2011). Given these trends, we expect to find a higher prevalence of all three diagnoses in males as compared to females in this FXS sample. Parents of 43 children with FXS were interviewed using the Preschool Age Psychiatric Assessment (PAPA), to assess presence of a disorder based on DSM-5 diagnostic symptoms. The independent variable was male or female, and the dependent was presence or absence of the particular disorder. The data for each of the three disorders will be analyzed using a Chi-Square test to evaluate whether there is a significant difference in prevalence between males and females. The findings from this research can inform and improve our understanding of sex differences in comorbid disorders in children with FXS, a heretofore understudied line of work.

### **Cromer, Carmen**

**Mentor(s) -- Dr. Lara Ducate, Dr. George Roy**

#### **Graduation with Leadership Distinction: Effective Education in Mathematics**

In 2015, the United States of America ranked near the bottom of thirty-five industrialized nations when it came to mathematics (Barshay, 2017). This is because in the United States we have created a culture of inpatient problem solving (Meyer, 2010). Students often perform well at a surface level, but if a problem asks for deeper thinking, the students will freeze. Standardized tests will more often than not test at a deeper level of thinking, so this would explain the poor performance of our students comparatively to the other industrialized countries.

We are not adequately preparing our learners for these tests with our inpatient problem solving. Is a problem really a problem if the answer or pathway to the answer is known right away? When does this happen in the real world? Mathematics at its core is about problem solving, so why do we teach it in a way that gives nothing but prescribed steps and processes? Where is the problem solving in that?

Through my time at Dutch Fork Middle School in conjunction with my time at the University of South Carolina, I believe that mathematics should be taught in a way that holds all learners to high expectations and promotes a culture of understanding instead of knowing through the use of high cognitive demand tasks and productive struggle. If mathematics were taught in that way, from kindergarten to university, we would see a mathematical revolution, and the United States of America would rank higher in mathematics education in the world.

### **Cronin, Amy**

**Mentor(s) -- Mrs. Theresa Harrison**

#### **AMY IN ITALY FALL 2017: Communication Commonalities Across Cultures**

I studied abroad in Florence, Italy during the fall 2017 semester to enhance my academic experience at the University of South Carolina. While in Florence, I studied at Florence University of the Arts and had the opportunity to take a variety of classes to compliment my major in public relations. I took “Cultural Introduction to Italy”, “Street Photography”, “Art, Food, Fashion and Wine: Creative Advertising of Italian Destinations” and “History of the Italian Renaissance.”

The first reason I went abroad was to experience a different culture and I chose Italy because it's somewhere I'd always dreamt of going. The second reason I went abroad was because as a journalism student, I was especially interested in studying commonalities in regards to communication techniques across different cultures. Studying abroad was the most valuable experience of my college career. It was a defining moment of independence and self-sufficiency. Furthermore, the experience reinforced ideas initiated in the classroom such as the importance of ethics, the importance of written communication, and the importance of self-confidence in virtually every aspect of life, but especially in the workplace.

I hope to inspire others to go abroad because it really is a unique learning experience. It teaches you about yourself and what's important to you. My study abroad experience was a fundamental part of my college experience. I believe it has played a significant role in preparing me to graduate and enter the workforce. The insights I was able to gain from studying abroad have truly shaped who I am and who I want to be as I enter this next phase of life.

**Crouse, Lauren**

**Mentor(s) -- Dr. Dawn K. Wilson, Dr. Allison Sweeney**

**Associations between Parental Support and Parental Values with Youth Body Mass Index in the Families Improving Together (FIT) for Weight Loss Trial**

Childhood obesity has been nationally recognized as a public health issue; yet, relatively few interventions have been successful at decreasing obesity among high-risk groups, such as African American youth. Although previous studies have examined the relationship between parental social support and youth health behaviors, little research has directly compared the unique effects of tangible versus emotional support. Furthermore, although previous research has found that parents' values shape their children's health behaviors, relatively little is known about which specific values are most critical for promoting a healthy body mass index (BMI), especially among underserved African American families. The present study uses data from the Families Improving Together (FIT) for Weight Loss Trial to determine the extent to which parental support and values relate to youth BMI. Project FIT is a randomized controlled trial testing the effectiveness of a motivational and family-based intervention for reducing adolescent BMI among overweight African American adolescents. The present study examined data from 232 adolescents in Project FIT (Mean Age= 12.83 years, 35.78% females). Adolescent height and weight were measured at baseline by trained staff and BMI scores were converted to BMI z-scores (z-BMI) using CDC growth reference curves. Parents completed a baseline questionnaire that measured the extent to which they provide tangible and emotional social support around diet and physical activity. Parents also completed a questionnaire assessing the importance of transmitting various values to their child; the values of independence, hard work, religion, and self-respect were analyzed in this study. A hierarchical linear regression was used to test whether parental tangible support, emotional support, and parental values were related to adolescent's baseline z-BMI. Parental marital status, parent age, household income, family size, child age, and child sex were included as covariates. Of the four core values examined, only self-respect was associated with a lower z-BMI ( $B = -0.18, p = 0.023$ ). Surprisingly, neither tangible nor emotional support was significantly associated with adolescent z-BMI. These results suggest that parental values may play an important role in guiding adolescent's health behaviors. Future research is needed to better understand how parental values shape adolescent health behaviors longitudinally.

**Cummings, Caroline**

**Mentor(s) -- Dr. Leah McClimans**

**A Systematic Review of Measuring Instruments for Use in the Evaluation of Clinical Ethics Services**

A Systematic Review of Measuring Instruments for Use in the Evaluation of Clinical Ethics Services

Abstract

Introduction

The provision of clinical ethics support is widespread across North America and Europe and is increasing in numbers. Since 1992, hospitals in the US have been required to have an established mechanism to deal with ethical issues. As clinical ethics has become increasingly important, clinical ethicists have recognized the need to evaluate their work, yet they have been slow to do so. In those cases where clinical ethics has been evaluated, researchers have failed to provide robust information on their research methods or outcome criteria. To address this problem, a systematic review was planned to be conducted to identify measuring instruments that could be used to evaluate clinical ethics outcomes.

Methods

The research mentor and student took an online course provided by the Johns Hopkins Bloomberg School of Public Health on systematic reviewing and meta-analysis. The course was six weeks long and taught the process of conducting a PRISMA protocolled systematic review. Then, following the steps learned from the class, review was developed and conducted.

Results

Not enough existing literature satisfied the inclusion criteria for the planned review. The course, however, did provide in-depth education on the process of performing a protocolled systematic review and meta-analysis. This education contributed to obtaining a summer research fellowship at Cincinnati Children's Hospital Medical Center.

Conclusions

Measuring tools are continuing to be developed and when more methods exist a systematic review will be useful in the field. The Magellan Apprentice Grant provided professional experience with presenting research findings at meetings with researchers in the field and networking opportunities. Additionally, because of the Johns Hopkins course, I was able to perform a systematic review at my position as a Cincinnati Children's Hospital Medical Center Undergraduate Research Fellow in the summer following the grant (Summer 2017).

**D'Agostino, Gabriel**

**Mentor(s) -- Dr. Thomas Makris, Ms. Courtney Wise**

**Ligand Access, Substrate-Binding, and Electronics in P450 NikQ**

Nonribosomal peptide synthetases (NRPSs) are multi-domain proteins responsible for the construction of natural products which often contain unique chemical moieties not found in peptides produced by ribosomal machinery. Many of these functional groups are installed by tailoring enzymes and bestow pharmacologically relevant activities. The didomain NRPS, NikP1, and cytochrome P450 hydroxylase NikQ, function in the biosynthesis of the clinically-employed antifungal NIKKOMYCIN.

NikQ utilizes a heme iron cofactor to install a hydroxyl group at the  $\beta$ -carbon of an L-histidine residue tethered to NikP1 (L-His-NikP1). The relative simplicity of the NRPS, along with the ability to monitor changes in the ligation and oxidation state of NikQ with the heme chromophore, renders this system an excellent model for studying the interactions between tailoring enzymes and NRPS substrates.

Previous work has revealed several interesting properties of NikQ that are atypical of most P450s, including a lack of change in optical spectra upon substrate binding, unusually low affinities for com-

mon P450 ligands, and an abnormally low redox potential. To investigate possible structural sources of these abnormalities, site-directed mutagenesis was utilized to substitute the residues at the I338 and I345 positions, which are proximal to the NikQ heme. Substrate-binding characteristics, reduction potentials, and binding properties of relevant ligands have been investigated via optical equilibrium binding titrations, rapid-mix stopped-flow, size exclusion chromatography, and spectroelectrochemistry. The results obtained from these experiments with the NikQ mutants and the wild-type enzyme will be contrasted, and the role of the proximal site in mediating NikQ electronics and binding events in the distal pocket will be discussed.

**Daley, Essence**

**Mentor(s) -- Dr. Brett Kloos, Mr. Douglas Archie**

**Effects of Social Integration on Recovery of Patients Transitioning to Independent Living**

For people with serious mental illness (SMI), the transition from clinical treatment settings to living independently within the community is challenging. Most treatment for SMI occurs away from the communities in which people live and primarily focus on symptom reduction rather than effective functioning and reintegration into the community. Ignoring the importance of social connections and community involvement, combined with the stigma attached to mental illness, can lead to negative outcomes following discharge such as isolation, anxiety, exacerbation of symptoms and recidivism. This project examines how social integration is an integral part of recovery from mental illness. Participants were residents of supported housing programs who used mental health services at the Columbia Area Mental Health Center (CAMHC). Participants completed self-assessments of interpersonal connections, sense of community, and neighborhood interactions to determine the impact on a subjective recovery scale. The role of gender norm attitudes as a modifier of perceived social integration during recovery is also considered. Implications of the study will assist in developing more effective interventions for mental health systems of care and enhancing the quality of life for people with mental illness.

**Daniels, Charles**

**Mentor(s) -- Dr. Jason Bakos**

**Generalized Hough Transform on the Tegra X2 Embedded SOC Architecture**

Real-time computer vision operations are becoming increasingly important for practical applications of autonomous vehicles such as drones and self-driving automobiles.

The Hough Transform is a tried and tested methodology for detecting lines (Hough Transform), circles (Circle Hough Transform), or arbitrary polygons (Generalized Hough Transform) which makes it uniquely suited for autonomous vehicle navigation as it can detect arbitrary traffic signs and similar markers that can be expressed as parametrized polygons. Existing computer vision libraries such as OpenCV and the up and coming OpenVX support both Hough and Circle Hough transforms already optimized for embedded GPU execution.

With this project, we present a Generalized Hough Transform implementation optimized specifically for the nVidia Tegra X2 SOC (the same platform used for the current year Tesla automobiles as of Feb. 2018) with the objective of achieving real-time performance, on the order of 720p (HD) at 30 frames per second.

**Davis, Nicole**

**Mentor(s) -- Dr. Hilary Lichterman**

**Finding Professional Engagement Through the Environment**

Tying my Environmental Studies major to my beyond the classroom experiences such as my various internships, was initially very daunting. At first I did not think I could find a relationship between the two in similar way as the research pathways or the global learning pathways could. After some reflection on my part, I remembered why I choose to reach out and look for experiences and professional

activities beyond my major in the first place; to better my professional background. By not limiting my future job prospects by only having a background in the environmental sciences, I pursued internships and experiences in political science, construction, customer service, teaching and human resources. In all of these, I can tie a specific concept learned throughout my academic career under the Environmental Studies degree such as the concept of a feedback loop, reflections on Climate Change as well as ideas from preservationist John Muir.

**Davis, Donna**

**Mentor(s) -- Dr. John Burrow**

**Dual sexual victimization of underage males by adult females**

Sexual assault is one of the commonly reported crimes in the United States. With the advent of the MeToo Movement, more and more reports of sexual assault and victimization are now receiving national attention. However, there seems to be a dearth of reporting with regards to the victimization of young males. The purpose of this research is to examine patterns among young males who have been victimized by older females. The data used in this research consists of all reported cases of sexual victimization of young males in California and Texas. Specific focus will be on teachers and other offenders who are in positions of power. The analysis will focus on demographic characteristics of these female offenders. Future research should endeavor to extend this exploratory analysis by examining court level factors that may impact sentencing outcomes for these female offenders.

**Dawson, Jared**

**Mentor(s) -- Dr. Traci Testerman**

**Identification and Characterization of Bacteria from Human Peritoneal Tumor**

My project aims to identify and characterize recently cultured bacteria from four human peritoneal tumors. These bacteria will be characterized to answer several important questions.

DNA Sequencing: The identities of the bacteria are currently unknown. Sequencing their DNA will reveal whether they are known or new species.

Interaction with mammalian cells: During carcinogenesis, host cells undergo several changes, such as increased growth, altered shape, and abnormal interactions with neighboring cells. Some bacteria, such as Helicobacter, can induce these changes, but interactions between these new strains and host cells have not been tested.

Biological properties of bacteria: Determining the properties of the bacteria will help to determine whether the bacteria are new species, are well-adapted to the tumor environment, and are able to resist commonly-used antibiotics.

**Day, Michaela**

**Mentor(s) -- Dr. Kristina Ramstad**

**Nest monitoring of American wood storks via remote cameras**

Abstract:

Wood stork populations in North America (WOST; *Mycteria americana*) are listed as Threatened under the Endangered Species Act and significant resources are put toward their conservation and management annually. Despite this attention, an accurate and time effective way of monitoring nest activity, parental care, and fledging success of WOST has not yet been developed. In this study, we are developing a protocol for remote camera monitoring of WOST nests and testing its accuracy relative to traditional manual monitoring with binoculars. We mounted nine cameras in trees from multiple distances to monitor a total of 23 WOST nests at Chew Mill Pond in Central Georgia during the 2017 nesting season. Six of nest monitored with cameras were also monitored with binoculars and six nests were monitored just with binoculars to control for the effects of activity around the cameras. If remote camera monitoring proves accurate, then our data will allow us to measure patterns of parental nest attendance and determine if they correlate with WOST fledging success. In addition, the

protocol developed would greatly increase the number of WOST nests that could be simultaneously monitored annually in the southeast U.S. and assist in furthering the studies of WOST nesting behavior.”

**Deal, Morgan**

**Mentor(s) -- Dr. Shan Qiao**

### **Perceptions and Impacts of HIV-Specific Criminal Laws**

Using the power of criminal law is a heavily debated strategy used to curb the HIV epidemic in the United States. HIV-specific criminal laws in South Carolina were introduced in 1988, during a time when advanced HIV treatment and prevention measures such as anti-retroviral therapy (ART) and pre-exposure prophylaxis (PrEP) were unavailable. The laws in South Carolina criminalize a person living with HIV (PLWH) not disclosing their status to a sex or needle-sharing partner, and donating bodily tissues or fluids. The laws also criminalize behaviors that carry negligible risk for transmission such as biting and spitting. Despite significant advances in HIV care, the HIV-specific criminal laws in the state have not been amended. Few studies have investigated how these laws have been implemented in South Carolina, or the level of awareness and knowledge of these laws. This study, which is still in progress, is one effort to comprehensively examine the implementation of HIV-specific criminal laws in South Carolina, assess their alignment with current evidence regarding HIV transmission risk, and provide potential policy implications in the adjustment of the laws so they can be the best vehicle to achieve their intended purpose. Through literature reviews, case studies and in-depth interviews, this study seeks to understand how these laws fit into a larger context of HIV care in the state. So far, the literature review has shown conflicting research of the knowledge and potential impacts of these laws, indicating that the current laws may be ineffective. Going forward, structured in-depth interviews with PLWH and other stakeholders will guide the formation of a survey for larger-scale dissemination, which will give us further insight about HIV-criminalization laws in the state.

**Dean, Alexa**

**Mentor(s) -- Dr. William Jones**

### **Inspiring the Next Generation of Marine Scientists in South Carolina and Beyond**

As a marine science major, many of us are naturally drawn to the pull of oceanographic research. I, on the other hand, have thoroughly enjoyed every second of my studies but figured out quickly that I was meant to share my knowledge and passion for the sea with others. I feel that the information I have gained through my coursework in the marine science program is too precious and important to be kept to oneself. I have dedicated my time here at the University of South Carolina to bringing the majesty of the ocean to students spread across the Midlands as well as in the state of Georgia through my time spent interning at the Georgia Aquarium. As a future environmental educator I feel that my experiences instructing a variety of different age groups and students from diverse backgrounds has prepared me to develop engaging, climate change and marine science curriculum to inspire all students.

**Del Río, Brandy**

**Mentor(s) -- Dr. Andrew Kunka, Ms. Ana Oswald-Hensley, Mr. Kris Weissman**

### **Bdelrio On the Ground**

Student Organization

As a University Student Ambassador, I was an integral part of welcoming incoming new students to the University of South Carolina Sumter. I gave tours of the university campus and also represented the university at different leadership conferences. Helping students become better acquainted with the school, showing them where to access different services on campus, as well as, helping get them situated on campus by helping them make their schedules for the semester, helped me become a more effective leader. Answering questions about the campus, allowed for my communication skills

to come to the forefront when leading different groups. This experience showed me and reinforced my already known strengths to myself. I was asked to become a Student Ambassador and felt that becoming an Ambassador would allow me to practice my various leadership talents. This has been a fulfilling experience.

#### Student Organization

Apeiron, is an organization that I revamped and implemented on the USC Sumter campus. I felt that that students needed a safe space to talk about issues that we were not talking about in our classes or even social circles. As President, I exercise my ability to help students have a civil conversation about hot button topics, that may be a bit sensitive. This organization was one that brought people from different backgrounds and various ideologies together to discuss, not argue. If a discussion gets a bit heated, I exercise my ability to calm and reign the discussion in to some accord, that everyone present can learn from. They are allowed to express their opinions about various topics, without repression or backlash from their peers.

I learned that people from different backgrounds can talk about topics that are a bit sensitive and not have the discussion escalate to shouting. This has reinforced that I am an effective leader and can get people comfortable enough to open up. I would like to use these various talents to, in the future, help individuals open up when I interview them with my English major or gather information about prospective news stories when I become a journalist.”

#### **Del Valle, Gabriella**

**Mentor(s) -- Dr. Dirk den Ouden**

#### **Vowel Formant Dispersion in Spontaneous and Repetitive Speech in Speakers with Apraxia of Speech and Aphasia**

This study explored the variance in vowel production among stroke survivors with apraxia of speech and/or aphasia. Apraxia of speech and aphasia often co-occur in individuals who have suffered from a stroke although apraxia of speech is considered a motor planning disorder whereas aphasia is a language disorder. The study aims to determine if speakers with apraxia of speech and/or aphasia have greater variance in their vowel production, as reflected in vowel formant dispersion, in spontaneous speech rather than repetitive speech. All participants were of ages 50 years and above; 12 participants had only aphasia, 12 had co-occurrence of apraxia and aphasia, and 12 had unimpaired speech and served as control participants. In order to promote spontaneous speech, participants looked at several paintings and were asked to describe what they saw. For the repetitive speech sample, a written stimulus was presented on a computer screen and the participant would read the word overtly. All speech samples were recorded with a headset microphone, at a sampling frequency rate of 44.1kHz. This study is still ongoing, but the speech samples will be analyzed and run through a script in PRAAT software to extract the vowel formant values. The spontaneous speech samples and the repetitive speech samples of participants with apraxia and/or aphasia will then be compared to one another to determine if there is more vowel formant dispersion in spontaneous speech than in repetitive speech. By closely analyzing these speech samples, the long-term goal for this study would be uncovering a more comprehensive view of speech production impairments which should result in better diagnostic and treatment options for individuals who have apraxia of speech and/or aphasia.

#### **DellaSala, Briana**

**Mentor(s) -- Dr. Daniel Freedman**

#### **Serving Trauma Survivors: The Impact of Graduation with Leadership Distinction in Professional & Civic Engagement**

Throughout my four years at the University of South Carolina (UofSC), I have been involved in higher education and student affairs-related experiences that include serving as a University 101 Peer Leader and an Undergraduate Teaching Assistant to an Introduction to Psychology course, and work-

ing with UofSC's Office of Undergraduate Admissions to recruit and communicate with prospective Gamecocks. Additionally, I have gained experience in the victim services field by conducting research and compiling a literature review on the effects that sexual assault has on female victims' romantic relationships and sexual experiences, interning at a domestic violence shelter near my home in the upstate of South Carolina, and volunteering for a local and comprehensive sexual assault services agency. The integration of these vastly different beyond the classroom experiences and my experiences within social science-related classrooms has ultimately led me to discover my passion for pursuing a career that is dedicated to serving trauma survivors. It has also allowed me to explore various theories that attempt to explain why interpersonal violence occurs, and the importance of networking and collaboration as they relate to being a competent helping professional. With the application of these key insights, I have developed a profound understanding of the complex needs of trauma survivors and am equipped to create a leadership plan that addresses the issue of interpersonal violence in South Carolina.

**DeLoughry, Emma**

**Mentor(s) -- Dr. Geoff Scott**

**An analysis of the pesticide and PCB levels in Different Life History Stages of the Atlantic Sharpnose Shark (*Rhizoprionodon terraenovae*) in Coastal South Carolina**

Sharks are top-level predators in coastal waters, which may accumulate high concentrations of Persistent Organic Pollutants (POPs), such as pesticides and Polychlorinated Biphenyls (PCBs). Very few studies have examined the differences of POPs levels between males and female during different life history stages, particularly in maternal transfer during pregnancy to pups, as this offloading of chemical contaminants is a natural route of both detoxification for the mother and pollutant exposure for the pup.

A total of 66 Atlantic sharpnose sharks (35 males and 31 females) were collected by using baited longlines off the coast of Georgetown, SC and were sexed (male versus female) and then divided into 3 age classes – pups, juveniles and adults (Harrie, 2002). All sharks were measured for total length, weight, and percent lipid, and levels of pesticides and PCBs were measured for each combination of sex and life history stage. A total of 5 pregnant females were collected and lipid/pesticide levels in 2 pups/pregnant female were also examined.

Results indicated that annual lipid levels in males were comparable to females as there were no significant differences between sex and life history stages. A total of 84% of male adult sharks had detectable pesticide levels for four pesticides (Mirex, Methoxychlor, 4,4'-DDE and Trans-nonachlor) and PCBs. Similarly adult females, 92%, had measurable levels of 3 pesticides (Mirex, Cis-nonachlor and 4,4' DDE) and PCBs but at much lower concentrations than males. There were also significant correlations between percent lipid and total pesticides in adult males ( $r^2=0.52$ ,  $p=0.02$ ) and females ( $r^2=0.56$ ,  $p=0.005$ ), and between the amount of lipid percent and the total PCBs for adult males ( $r^2=0.46$ ,  $p=0.02$ ), but slightly lower correlation in adult females ( $r^2=0.36$ ). Pups had much lower lipid levels than their mothers (19.05% pups versus 40.3% mothers) but much higher POPs levels than their mothers as 80% of the pups had detectable levels of pesticides (1,035 ng/g of lipid pups versus 501.4 ng/g of lipid mothers) and PCBs (9,161.2 ng/g of lipid pups versus 5,100.8 ng/g of lipid mothers) which was highly correlated with percent lipid ( $r^2=0.92$ ,  $p=0.0001$ ).

**Denner, Karlye**

**Mentor(s) -- Dr. Christopher Goodman**

**Diabetic Care in the Latino Community**

There is a large number of Latino Americans living in the greater Columbia area. Many of these people suffer from health issues based on risk conditions, risk factors, and lifestyle; one of these main issues is diabetes. To determine how we can better help these people, we distributed a survey to the patients at the Good Samaritan Clinic. With the results we receive, we are striving to engage the

patients more and focus on co-design; specifically we are focusing on improving the patient voice and helping them see both the problems and solutions in a way that can enhance their care experience. By surveying the patients at the Good Samaritan Clinic and having them reflect on the services they have received for their diabetes, we are able to see how we can continue to improve the quality of treatment we provide.

**Denney, Kirstyn**

**Mentor(s) -- Dr. William Jackson**

**Cloning an anti-HIV vif siRNA to prevent vif association with APOBEC3G**

The Human Immunodeficiency Virus (HIV-1) infects and destroys CD4+ T-lymphocytes which results in Acquired Immunodeficiency Syndrome (AIDS). HIV-1 expresses a gene known as vif, viral infectivity factor, which functions to ensure viral replication by blocking the function of apolipoprotein B mRNA editing enzyme-catalytic polypeptide-like 3G (A3G) using the ubiquitin-proteasome pathway (Rose et al. 2004). In the presence of vif A3G will be tagged with ubiquitin and degraded by proteasome. In the absence of vif, A3G will be packaged in the virion and cause hypermutation of the viral genome in the secondary cell. The use of a siRNA can inhibit the interaction between vif and A3G, allowing for hypermutation of the retroviral genome. The purpose of this study is to create an anti-vif siRNA that will target the sequence located at nucleotide 5111 (si5111) on the vif gene for degradation through the siRNA interference pathway. The si5111 was cloned into the shuttle vector, pSRNG, in order to acquire an H1 promoter for si5111. The H1.vifsi5111 cassette will be removed from pSRNG and inserted into pLGN in order to test for siRNA interference of vif.

**Desch, Rachel**

**Mentor(s) -- Ms. Alicia Dahl, Dr. Gabrielle Turner-McGrievy**

**Examining the Role of Social Support and Self-Efficacy Related to Healthy Eating During Pregnancy: A Mobile Health Approach**

Background: Fifty percent of pregnant women exceed recommendations for healthy gestational weight gain (GWG), which is modifiable through healthy eating (HE) and physical activity (PA). Social support and self-efficacy during pregnancy may impact women's HE practices. This mobile health study examines the effects of online group-based social teams as a strategy to improve psychosocial factors for HE among pregnant women.

Methods: Participants (n=113) used a mobile app to monitor weekly behavioral goals and communicate with teammates for 12 weeks. The intervention targeted HE/PA while the comparison condition targeted stress reduction and management (SRAM). Online surveys were administered at baseline (<20 weeks gestation) and upon completion of the 12-week intervention. Measures included the Social Support and Eating Habits Survey and the Eating Habits Confidence Survey to examine psychosocial factors related to HE. Individual engagement scores for completing weekly group-based behavioral goals were calculated. Descriptive statistics, t-tests, and regression analyses were conducted.

Results: HEPA participants (n=64) were more likely to experience higher levels of perceived social support from their teammates for HE (M=7.2+4.1 points out of 25) compared to the SRAM condition (n=49). (5.5+2.19, p=0.02). Self-efficacy related to HE did not differ between the HEPA (4.06+0.65) or SRAM conditions (3.7+0.74, p=0.89). A significant correlation was observed between individual engagement scores and self-efficacy for HE (r=0.30, p=0.045)

Conclusions: Participation in a group-based online intervention targeting HE/PA led to greater perceived social support for HE behaviors during pregnancy. Future mobile health interventions targeting GWG would benefit from including social support components to encourage HE.

**Devivo, Blake**

**Mentor(s) -- Dr. John Weidner, Dr. Charles Turick**

**Application of Electromicrobiology for In-situ Bioprocess Monitoring**

Bioconversion of feedstocks to fuels and chemicals offers significant economic and environmental advantages. For bioconversion efficiency to be cost-effective, bioprocesses need to operate at near optimum conditions with sufficient chemical, biochemical, and microbial monitoring. Bioprocess operational assessment is usually accomplished with periodic grab samples from bioreactors followed by laboratory analysis. This often presents a dilemma in determining how much data are enough for cost-effective and successful bioprocess operation. In-situ monitoring can be less expensive but is often problematic because of sensor fouling. Anaerobic bioconversion of waste organics to methane exemplifies the need for robust monitoring strategies in order to maintain balanced conditions and to avoid bioreactor under-performance or even failure. Over the last decade or so electrochemical techniques have been used to define extracellular electron transfer by microorganisms. This field of study, referred to as electromicrobiology, opens up new opportunities and techniques in bioprocess monitoring. For instance, voltammetric techniques provide precise information regarding extracellular electron transfer and electrochemical impedance spectroscopy offers a data rich platform for evaluation of microbial physiological status. In addition, voltammetric stripping is an established electrochemical technique used to clean electrodes in-situ. This creates the opportunity for in-situ, real time monitoring, thereby providing a cost-effective opportunity to monitor bioprocesses in real time with greater regularity. Application of electrochemical techniques for microbial analysis and bioprocess monitoring will be discussed in relation to bioprocess operation.

**Dickson, Lexus**

**Mentor(s) -- Mr. William Quinlan**

**Learning Aspects of Clinical Care through Writing Tutoring**

Since fall semester of my sophomore year, I have been working for the Student Success Center (SSC) as a Peer Writing and Communications (PWC) Tutor. The SSC is an office at the University of South Carolina that provides academic success services for free to university students. In addition to writing and communications tutoring, the SSC also offers course-specific tutoring, one-on-one study skill consultations, and research help. The PWC program provides tutoring to any student with an assignment that involves a written or presentation component, at any stage of the writing process, and coming in for any course. I initially became a PWC tutor because of my desire to help others with the writing process and students gain confidence in their writing. However, as a pre-medical student, working as a PWC tutor for three years allowed me to learn about aspects of patient care before I could implement these practices in a clinical setting. Because of the time constraints of a tutoring appointment, I learned how to triage writing and communication problems with limited information and develop strategies for determining higher-order and lower-order concerns. Furthermore, working as a tutor taught me how to deliver bad news to students and create action plans with them that are similar to treatment plans that physicians must make for their patients. Finally, I learned how to practice components of patient-centered care with students who required tutoring. Like patients, tutees come from all different backgrounds and with entirely different problems and skill sets; however, I learned how to personalize my sessions to fit students like physicians tailor their treatments to fit patients. Working in the PWC program therefore taught me valuable communication and management skills that will be helpful to my future career as a doctor.

**Dickson, Lexus**

**Mentor(s) -- Mr. Rico Reed**

**Discovering Social Determinants of Health and Advocacy through Volunteering at Planned Parenthood**

During the spring semester of my sophomore year, I volunteered with Columbia's Planned Parent-

hood clinic as a Health Center Advocacy Program (HCAP) volunteer. I decided to become involved with Planned Parenthood after the 2015 mass shooting of a Planned Parenthood clinic in Colorado Springs, because I was shocked by the violence that the organization's staff and patients had to face simply because they were trying to provide and pursue healthcare services. Because I grew up with many friends who struggled to access quality healthcare services and were negatively impacted by their struggles, I wanted to ensure that other individuals would be able to maintain their wellness. I decided to start volunteering with Planned Parenthood to ensure that these patients would be able to safely access healthcare. As an HCAP volunteer, I primarily talked with patients in the clinic about sharing their stories and advocating for Planned Parenthood. However, I also served as a clinic escort for patients entering the office for abortion services and canvassed in the Columbia community about syphilis prevention. Although I did not expect to learn much about health in this position, the patients' stories taught me about structural, cultural, and social aspects of health that I had never considered. I was also able to learn about the impact that policy, advocacy, and community health programs can have on individuals' well-being; the value of storytelling; and the importance of respecting others' stories. This experience made me a better activist because I am now able to recognize the impact of structural, social, political, and cultural factors on individuals' well-being and to better respect the backgrounds and stories of the individuals for which I am advocating. In the future, I would like to use the skills that I have learned from this experience to engage with communities to address their structural inequities and health concerns. I would also like to build other peoples' awareness of non-biological components of health and ensure that allies maintain respect for the groups or people for which they are advocating.

**Dickson, Lexus**

**Mentor(s) -- Dr. Laura Hein**

### **Retiring to the Closet: Southern LGBT Elders and Long Term Care Facilities**

Long term care (LTC) is a concern of older LGBT adults because of the risk of discrimination from care providers and other residents. Johnson et al. (2005) found that 73% of LGBT individuals in their study believed discrimination occurred in retirement facilities. However, prior studies on this topic have failed to attract large samples from rural southern areas and were primarily conducted before the United States Supreme Court legalized same-sex marriage in 2015. This study seeks to identify the perceptions and experiences of southern LGBT adults (aged 50 and older) have regarding LTC services and facilities. This study also seeks to address the insufficiencies in the current research on this topic.

This mixed methods study gathered perceptions and recommendations for LTC from LGBT older adults who live in the Southern US (NC, SC, GA, AL, MS, LA, FL). The study consists of a quantitative online survey (n=680) that gathered participants' demographic information; variables such as levels of support and levels of outness; perceptions of LTC services; and experiences with LTC. Additionally, qualitative data (n=12) collected from one-on-one interviews with participants who completed the survey was used to supplement and clarify the findings from the quantitative survey. The qualitative data was then used to determine participants' recommendations for improvements to LTC services.

We expect participants to perceive LTC services as potentially discriminatory towards LGBT people and to be reluctant to enter institutional LTC services. Based on previous literature, we also expect that those with higher levels of outness may be less fearful of entering or utilizing LTC and be more open about their identities in LTC settings. The findings from the survey and interviews will be used to create a policy brief that addresses recommendations for the perceived problems and experiences of LGBT older adults living in the South. Overall, the information gathered in this survey can be utilized to create safer, more welcoming spaces for older LGBT adults who need LTC services.

**Disbennett, Lauren**

**Mentor(s) -- Ms. Lisa Camp**

**Sustainability Abroad in South Africa**

While I was in South Africa, I learned drastically more through activities outside the classroom on a variety of field trips. One of my favorite trips was when we traveled for a weekend along South Africa's southwestern coast up the Garden Route. We hiked kilometers through Tsitsikamma national, climbed through the Congo cave system, and learn about and rode ostriches at an ostrich farm. Back in Cape Town, we went on some more local cultural excursions like a tour of the Langa Township. While in Langa we ate at Mzansi, a delicious authentic African family style restaurant in the heart of Langa that found success through microfinance loans and marketing through trip advisor and Facebook. Later in the trip we ventured to the northeastern part of South Africa to go on a Safari in Kruger National Park, and to explore Johannesburg. In Johannesburg we spent a day at the Apartheid museum, learning about the intense racial segmenting that South Africa had endured, and how it had developed one of the most progressive constitutions since 1996, centered around inclusion and non-discrimination, and an extensive bill of rights guaranteed to all citizens.

Through these experiences I learned that this collectivist culture had incorporated this underlying theme of sustainability into their society. The high value placed on nature and natural parks feeds into South Africans being more ecofriendly. Microfinance loans to individuals have a huge impact on the society, giving people more jobs and opportunities in poorer areas. The diverse population was mixing and working together, with feelings of progress and inclusion running across ethnic groups with goals of creating a better society. South Africans as a society understood that sustainability in the environment, economy, and cultural setting is essential to the success of a society.

My study abroad experience was more than just travel, it was a complete immersion into a new society and culture, becoming accustomed to and understanding new societal values. I knew I would love the food, safaris, and culture but I did not expect to develop a deep love and appreciation for a city that became my home.

**Dishart, Veronica**

**Mentor(s) -- Prof. Amber Fallucca**

**Turning Trauma into a Platform**

Children are the foundation of the future and when you can help to build them up then you can help to make the future better for others. Working with youth development and mentoring them through times of adversity has been a passion of mine since high school. These students have been put in situations where adults twice their age typically do not experience it and I had the privilege of being there for them through it all. Mentoring students is not just a learning experience for them however it's also an opportunity for me to be able to learn and grow. I experienced many of the situations the young adults I was mentoring had gone through and this taught me that it was possible to overcome adversity. Coming from mentoring young adults to being a student in the classroom the lessons I learned within both have been invaluable. Classes such as Journalism 333: Public Relations for Nonprofit Organizations helped as I eventually got an internship with the nonprofit organization, which drove my passion for service, Hugh O'Brian Youth Leadership. I will continue my volunteer experiences in the future with hopes to attend law school as well as continuing my own nonprofit organization with hopes to pass legislation. USC has helped to fuel my passion for community service and it will continue long after my time here.

**Dnistrian, Sarah**

**Mentor(s) -- Prof. Jay Pou**

**Sarah's Public Relations Experience**

As a student in the School of Journalism and Mass Communications, I have made it my mission

to have diverse and meaningful internships within the field of communications each summer of my undergraduate career. I have interned for nonprofit organizations, corporate companies and full-service agencies. Through this process, I have been able to identify a direction for my future career. In this presentation, I will highlight my most recent and significant internship at a global public relations agency, FleishmanHillard, in Dublin, Ireland. For seven weeks, I supported account work across all FleishmanHillard sectors, including brand marketing, sport, health and corporate. This experience was the first time I was able to see all that I had been studying as a public relations major put into practice. I was given the opportunity to draft an advertorial for the Dubai Duty Free Irish Derby, which was published in IMAGE Magazine Ireland. I composed multiple press releases, social media and photo captions for a variety of clients. I also engineered a “platform reach directory”, containing the monthly unique user rate, circulation and viewership for every major Irish newspaper, magazine, online news, radio station and television station, for internal use. Lastly, I planned, sourced and constructed media packages for local journalists and national media influencers. My time at Fleishman-Hillard confirmed that I made the right decision in studying public relations. I am eager to graduate in May and begin my career in public relations.

**Doan, Terry**

**Mentor(s) -- Mr. Michael Crowley**

**Changing Carolina Peer Leaders- An Experience that Paves a Way to a Future**

The University of South Carolina has a program for student health and health initiatives called Healthy Carolina. A peer leadership program that falls under Healthy Carolina’s umbrella is called Changing Carolina Peer Leaders. I am currently in this program and my experience thus far has molded me. One of my biggest roles as a Changing Carolina Peer Leader is the advocating for and education of various public health related topics to the university. Some of these topics included: mental health, sexual health, and sexual assault and violence. I not only worked as a team with faculty and other peer leaders to plan and implement tabling events, but also presented presentations of these topics to University 101 classrooms. The biggest reason for me to join this position was because of my deep passion to work with university students and to better the campus through various public health avenues. One of the biggest lessons I learned so far is the understanding of my own roles in a team and the different leadership styles and personalities that go into making a team work. Another lesson I learned, was understanding the social culture that surround people. Then how it can be a barrier to health and ways to understand and possibly overcome them. I will bring these lessons learned throughout my future academic and professional career. I plan to go into clinical psychology and return to a large university to provide counseling services and do programming for campus initiatives. Further understanding my role and my team, and the social atmosphere will assist me in advocating these issues.

**Dombroski, Sarah**

**Mentor(s) -- Mrs. Moryah Jackson**

**Guiding You Home**

For the past three years, I have spent the majority of my time volunteering and working at the Visitor Center as a University Ambassador. Through my roles as an ambassador, captain of campus visits, and presidential ambassador, I have explored the many facets of how to provide the best visit experience for all who come to see our university. I have given countless campus tours, trained rookies through the tour certification process, worked behind the scenes to coordinate appointments and information sessions for unique visit experiences, and worked on effective communication with visitors over the phone, through email, and in person at our Visitor Center. I was motivated to be a part of this organization because I wanted to help students in the way that I was helped, too. The visit experience is such a crucial part of deciding where to attend college, and I wanted to be a part of that for others. Being a university ambassador has taught me how no one person is the same, and that every student

has a different vision of what their four years will look like. My job is to weave them in to the student experience, so that they can see a place where they could belong. This role provided me with a way to share my college experience and passion for this university with others while showing students how the University of South Carolina could become their home, too.

**Dombroski, Sarah**

**Mentor(s) -- Dr. Krystal Werfel**

**Parent Training Program Focusing on Print Concept Knowledge in Preschool Aged Children with Hearing Loss**

Print concept knowledge aids in proficient literacy skills for children throughout language development. Basic concepts such as tracking print, pointing to print, and making comments about print, teach children that print is important, but also teaches children the basic skills of reading. Reading from left to right is something that is learned through storybook reading between children and a parent or caregiver. These basic skills build on top of each other which eventually lead to proficiency in literacy that allows children to perform successfully in an educational setting.

There is current research that suggests that there is a deficit in this conceptual print knowledge in preschool children with hearing loss in comparison to their peers with normal hearing and the same age. It is a common thing for parents or caregivers to read to their children at a young age to begin to teach their children the basic concepts of reading. Because this is a natural environment for children and their parents, it is suggested that optimal results in a study for print concept knowledge would involve an intervention study where parents are trained to practice these skills with their child during storybook reading.

With this being known, a project involving training videos for parents teaching them a new skill to practice each week with their child over the course of eight weeks should show an increase in print concept knowledge in children, specifically with hearing loss. This study aims to develop an eight-week parent training video program that helps parents teach their child with hearing loss about print concept knowledge during storybook reading. The overall goal of this study is to show that the eventual intervention aids in these emergent literacy skills. If the program is successful, then it can be used by parents all over to help their children gain print concept knowledge.

**Donovan, Laura**

**Mentor(s) -- Mr. Rico Reed**

**What Circumnavigating the Globe in 100 Days Taught Me About Business**

On January 5th, 2017, I embarked on a voyage around the world with Semester at Sea. Over the course of four months, I lived on a ship with 600 students, analyzing marketing and entrepreneurial trends in Japan, China, Vietnam, Myanmar, India, South Africa, Ghana, Morocco, and Germany. I took classes on the ship, which prepared me for the entrepreneurial and marketing environments in the countries we visited. During the week in port, I applied all that I had learned in the classroom through field classes, homestays, interactions with locals, and independent travel. Upon my return to the ship, I was given a chance to reflect on my experiences through academic discussions and projects. Having grown up with a love for learning about other cultures and a hunger for adventure, I knew I would get more out of this unique, globally comparative program than I would staying in one country for the entire semester. I returned to the United States with a new perspective of the world and a globally comparative mindset. In one hundred days, my definition of international business was turned upside down. I learned about the positive and negative impacts globalization has on different countries, particularly in the tourism and entrepreneurial sectors. I have returned a global advocate for responsible traveling and have a deeper understanding of how culture plays a part in conducting business in different markets. I hope to use the foundation I built with Semester at Sea to propel me into a successful international career, educate future students on respectful travel, and help give aspiring entrepreneurs in developing countries the tools to start their own ventures.

**Drobina, Emma**

**Mentor(s) -- Dr. Jenay Beer**

**“Pay Attention!” Developing the Social Behavior of a Responsive Robot Tutor**

Electronic tutoring agents, such as robots, have much potential to provide customized and engaging education to students. In math education specifically, robots have been successfully applied to tutor grade school students through customized, adaptive, and emotionally engaging interaction. However, much work is needed to fully understand how a robotic tutor can re-engage and maintain student participation during a tutoring session. Human tutors utilize both verbal and non-verbal strategies for engagement, to increase attention, motivation, and involvement. These strategies include personalized instruction, verbal encouragement, using gestures to maintain and direct attention, making eye contact, and speaking in a positive tone. Therefore, the goal of this study was to investigate effective and social strategies for a robotic tutor to provide students feedback, based on the students' math performance and emotional state. We simulated a robotic tutor utilizing 20 different tutoring strategies. Via Mechanical Turk, we showed participants video clips of our simulated robot. We asked participants to identify via multiple choice (1) the situation where the robots' behavior and strategy is most appropriate (e.g., a scenario where a student expresses frustration); and (2) the role the robot takes in relation to the student (e.g., the robot asks as a peer or instructor). Data collection is in progress. The findings from this study will inform developers on how to best apply social behavior and teaching strategies in an assistive robot tutor.

**Dublinski, Hannah**

**Mentor(s) -- Ms. Hilary Lichterman**

**Globally Educated and Globally Minded**

When applying to the International Business program at UofSC, one of the stipulations is that all students are required to study abroad for an entire semester. Never had a requirement felt like such an open door to opportunity, and before I knew it I was on a plane to Scotland for the Spring 2017 semester. For the next five months I traveled across 12 different countries, studied international business from a uniquely European perspective, and embraced being outside of my comfort zone as I grew exponentially as a more cultured, independent individual. Now that my college career is drawing to a close, I connect my experiences abroad with the international business courses I have taken as well as my time interning for multinational corporations such as Coca-Cola. Ultimately, from my time abroad, I have learned that placing yourself in situations that are out of your comfort zone and saying yes are often the opportunities that stimulate individual growth the most. Say yes to living in new places, experiencing new cultures, and opportunities to lead people. Being so open to new opportunity led me to say yes to a full-time position with Nestle in supply chain operations. I will move to a new city and apply my skillset gained from my international business education, experience in the workforce, and most importantly my open mindset gained from my time abroad in Scotland. Without such an experience, I doubt I would have had the confidence to seek out such an incredible adventure.

**Ducharme, Kaileigh**

**Mentor(s) -- Dr. Bridget Miller**

**A Semester in Scotland**

As I reflect on my time at the University of South Carolina, I recognize the many opportunities that have shaped my learning and perspective. One of the greatest opportunities my time here has given me is the opportunity to study a semester abroad at the University of Dundee in Dundee, Scotland. Growing up as a military child instilled a certain love for adventure and travel. By the age of ten I already had a leg up on most of my peers by getting the opportunity to live and travel across a lot of Europe and Asia. When I entered the University of South Carolina, I always knew I was going to study abroad, the only question left was to decide where to go. After extensive research of different pro-

grams and locations, I determined that Scotland would provide the opportunity to explore another part of the world and would present little to no language barrier. During my six months in Scotland, through my studies and travels, I learned the importance of being independent and adaptable. To be successful you need to be adaptable to situations and people. Plans change, people differ, and it is important to be flexible, and stand back and really evaluate what is important in moments and readjust accordingly. Studying abroad has also emphasized the importance of being independent. Through classes I learned it was my responsibility to ensure my own success. The same applied to experiences abroad. It was up to me to do and see what I wanted, in the way I wanted, with the people I wanted. While I love company, I am not afraid to be alone, I am not afraid to handle problems independently. My time at the University of South Carolina has given me the opportunity to further my traveling and has taught me valuable lessons I can take forward as I learn to adapt and transition to a new city and post-graduation life.

### **Duncan, Courtney**

**Mentor(s) -- Prof. James Henderson**

#### **What it Means to be Cocky**

This project is researching and creating a documentary about Cocky, the mascot at the University of South Carolina. The documentary showcases three main parts of who Cocky is to Carolina. First it highlights the impact that Cocky has on our community in Columbia and the outlying regions. Second, the people behind the suit, how they land in that sacred position, and what they do up until graduation to keep it a secret. Third, it marks the history of how Cocky came to be and the legacy that he has left behind in those who have been in the suit before.

Impact: Cocky is more than just a mascot; Staff, students, alumni, and locals are overjoyed with simply meeting Cocky or getting their picture with him. I plan on capturing this through sporting events, weddings, community outreach such as Cocky's Reading Express, Relay for Life, and more.

Behind the Suit: Becoming Cocky is a once in a lifetime honor and I will film what that is like. This shows what kind of training they go through, what their lives are like, how they keep the secrets and more. Per tradition, their identities would be kept a secret until they walk at graduation.

Legacy: We are the only Gamecocks in the nation and that makes us stand out. I plan to interview past Cockys including the people that first started the program, the people who were first in the suit, the people who have gone on to be professional mascots, and more.

### **Dunphy, Taylor**

**Mentor(s) -- Dr. Mohamad Azhar**

#### **The Role Of Endocardial-Produced Tgfbeta2 In Heart Development**

Background: Congenital heart defects are the most common defects presented at birth (8 out of 1,000 newborns in the US). Congenital heart defects are described as defects when the heart structure or blood vessels are abnormally formed during development. There are different types of heart defects, ranging from valves that do not work properly, causing leaking of blood through these valves, to septal defects, which is a hole in the wall separating two chambers of the heart and leads to mixing of oxygenated and non-oxygenated blood. Several mutations have been reported in human patients, notably, mutation in Tgfb2 protein, a multi-functional cytokine involved in epithelial-mesenchymal transformations during endocardial cushion (valve) formation, cardiac muscle development, and vascular remodeling. Although, it is a vital protein in heart development, the cell type specific role of Tgfb2 in heart development remains unknown

Research question: What is the role of endocardial produced Tgfb2 in heart development?

Material and methods: conditional deletion of Tgfb2 in the endocardium of mouse embryonic heart was generated in our lab. Histological analysis was performed to examine heart shape and structure in absence of this important protein in one cell type (endocardial cell lineage)

Results and Conclusion: our preliminary data show that loss of endocardial tgfb2 result in ventricular septal defect and defective valves formation. These results suggest that endocardial produced Tgfb2 is required for proper heart valve and septa formation.

**Dyckes, Ryan**

**Mentor(s) -- Mr. Ryan Lloyd**

**Ryan Dyckes' GLD Abstract**

During the spring semester of my junior year I studied abroad in Grenoble, France for six months. I had taken several French classes before embarking on this adventure, and I was obsessed with French culture and food. When I saw that one of USC's partner programs, AIFS, offered a French language and culture program in the French Alps, I knew that I had to go. I thought that this experience would allow me to see the world and try new things; while this was true and I enjoyed my time abroad, it was also difficult and pushed me to step outside of my comfort zone while challenging and changing my values and opinions. This experience allowed me to improve my French language level, travel to 40 cities and 9 countries around Europe and northern Africa, experience different cultures, and grow into a strong, independent woman who is ready to take on the world.

**Eanniello, Mary**

**Mentor(s) -- Mrs. Moryah Jackson**

**Mary Eanniello's GLD Experience: Professional and Civic Engagement**

My Name is Mary Eanniello, I am a senior hospitality management major at the University of South Carolina. I am working towards graduating with leadership distinction through the professional and civic engagement pathway. Over my past four years at USC, I have completed three internships in the event management field. Two of my internships were completed with a local wedding planner here in Columbia, South Carolina and one was completed in New York City a Bridal Salon, Gabriella New York. I have also taken courses focused on event management at USC as well in Florence, Italy during my time abroad. My experiences demonstrated that event management is a global industry that is constantly growing. The internships I have completed during my time at USC have provided me with real world experience and given me the confidence to pursue a career in event management. With my passion for organization, creativity, and customer service, event management is the ideal industry for my career.

**Easton, Mark**

**Mentor(s) -- Dr. John Jensen**

**Developed Activity Forecasting Model for Coca-Cola Bottling Company Consolidated**

CCBCC, headquartered in Charlotte, NC, has continued to expand over the past several years. The Equipment Services Department staffs and schedules over (x1000) employees in support of the repair, remanufacturing, installation and general maintenance of over 500,000 Cold Drink Equipment assets in the CCBCC territory. Currently there is no standard capacity model, process or tool to accurately plan and schedule the employees required to execute over 700,000 annual service activities.

Currently, CCBCC operates on a Man Power Model, provided by Coke North America approximately ten years ago, that inaccurately reflects current and projected staffing needs. The Man Power Model currently does not account for the individual characteristics of current and developing territories, such as: traffic, travel time, and population density. Though the system has been available for the last decade, it is not often used due to its complexity.

The combination of these issues has led to the inability to plan for optimal labor force levels. By studying and analyzing the current technician, fountain installation, and delivery process and work flow, we aim to provide improvement suggestions that look to analyze and predict staffing needs (daily, weekly,

and annually) based on historical and projected work. The scope of the model will include our front line staff of Service Technicians and Delivery/ Fountain Installers in specifically assigned regions.”

**Eberl, Brianna**

**Mentor(s) -- Dr. Troy Herter**

### **Influence Of Visuospatial Memory On Visual Search And Motor Learning**

Visual search, voluntary eye movements used to actively scan the visual environment for information, is a crucial component of many daily motor tasks. Visual search is normally modulated by the likelihood that objects will appear in certain visuospatial locations. We hypothesize that these anticipatory adaptations of visual search may contribute to improvements in motor performance (motor learning). We also know that many stroke survivors exhibit deficits in visual search efficacy and motor learning. We hypothesize that decreases in anticipatory adaptations of visual search may contribute to diminished motor learning in stroke survivors. The purpose of this study was to test these hypotheses by examining the extent to which manipulating the likelihood that objects will appear in certain visuospatial locations can induce improvements in visual search efficacy and motor performance in healthy adults and stroke survivors. We are collecting data from ten stroke survivors, ten healthy, young adults (18-30 years old), and ten healthy, older adults (age-matched with stroke survivors). Subjects will use an upper-limb robotic device to perform two variants of an Object Hit and Avoid task (OHA) within a virtual environment. In this task, 200 objects (geometric shapes) move towards the subjects, who are instructed to use virtual paddles attached to their hands to hit away two target shapes (n=100) while avoiding four distractor shapes (n=100). In one OHA variant (Uniform), targets and distractors are uniformly distributed across the virtual workspace. In the other OHA variant (Biased), targets are subtly biased to one side of the virtual workspace. Subjects will perform alternating blocks of Uniform and Biased OHA. We will use the robotic device and an integrated eye tracking system to quantify measures of Task Performance and Visual Search, as well as measures of Limb-Motor Control, Bimanual Coordination, and Eye-Hand Coordination. We will perform multiple regression analyses to test if impairments incorporating the biased visuospatial distribution into visual search significantly contribute to deficits in motor learning in stroke subjects compared to healthy adults. If successful, the knowledge gained from this study will be used to design new rehabilitation approaches aimed at improving functional outcomes by retraining visual search.

**Edrissi, Camron**

**Mentor(s) -- Dr. Hilary Lichterman**

### **Camron Edrissi -Professional and Civic Engagement Pathway of Graduation with Leadership Distinction**

My experiences at UofSC have provided the framework for my development professionally, personally, and hold great value as a representation of my growth. My involvement in the Medical Experience Academy (MedEx) at the Greenville School of Medicine provided leadership opportunities, team work training, and preparation for a career in the healthcare field. As one of my key experiences, this program set the foundation for my journey to become a physician as well as provided insight on making the most of all opportunities. Extending this mindset to other opportunities, I spent quality time learning to interact with patients and collaborate with healthcare professionals in my hands on volunteering for 2.5 years at the Richland Emergency Department. From chest compressions to easing anxious patients through traumatic situations encompassed real world experience of patient interactions through team work and leadership. My interpersonal growth in a healthcare setting has better prepared me to handle the obstacles facing the patient-doctor relationship. As these two beyond the classroom experiences have encompassed my professional growth, within the classroom provided the environment to learn the concepts that are applied in the healthcare setting. Studying Biochemistry and spending time in a hospital environment allowed knowledge to be fostered and applied in practice. I found that reflection is the only way to understand how growth has occurred. Reflecting

on connections and learning outcomes will unravel the qualities and skillset I harbored providing the basis of my presentation at Discover USC.

**Edwards, Vincent**

**Mentor(s) -- Dr. Cheryl Armstead**

**Emotions of the Heart: A Formative Study Investigating the Implications of Emotional Regulation and Childhood Adversity of Heart Rate Variability**

This is a preliminary study for research currently being conducted in USC's Health Equity Lab.

Introduction: The purpose of this study is to investigate the effects of childhood adversity as a moderator of associations between emotional regulation and vagal inhibition through heart rate variability (HRV) during stressor recovery in middle aged African Americans (AA's). Elderly AA's are the leading group of people suffering from vascular dementia. The implications of this neurological disease are poor cardiovascular health, poor emotional regulating abilities, and slow stress recovery. It was hypothesized that elderly AA's with slow heart rate variability recovery would have poor emotional regulating skills and that AA's with slow heart rate variability recovery would not have experienced childhood adversity (as defined by the childhood trauma questionnaire).

Methods: A secondary statistical analysis of the Midlife in the US Survey (MIDUS2) for this study. A gerontological sample of AA's greater than or equal to 65 years of age was analyzed from a group of 331 African American respondents (184 Female; 147 Male). The participants completed the MIDUS 2 National Survey, The Spielberger Trait Anxiety and Depression Questionnaires, and the Childhood Trauma Questionnaire. Participants also took part in a physiological experiment where they were presented with stressors (mental arithmetic followed by The Stroop Task) while their heart rate was monitored via electrocardiogram.

Results: After conducting a statistical analysis of the collected data via SPSS, a significant regression equation was found:  $(F(8,50)= 4.196, p<.001)$ , with an  $R^2$  of .306. Of the entire model, the childhood adversity and emotional regulation variables had the most significance of the entire model.

Discussion/Conclusion: Our initial hypothesis was supported by the data; lower positive levels of emotional regulation was associated with higher HRV correlating to slower stress recovery. However, higher positive levels of childhood adversity were associated with higher levels of HRV correlating to slower stress recovery. This result did not support our hypothesis that AA's with slow heart rate variability recovery would not have experienced childhood adversity. The results suggest that emotional dysregulation and childhood adversity contribute to slower recovery from stressors among elderly AA's

**Eicher, Emily -- Mentor(s) -- Dr. Ronit Elk**

**Bridging the Gap: The Role of Nurses in Facilitating Communication between Patients, Families and Physicians at the End of Life**

The African American culture finds importance in family involvement and religion in important decisions, such as those presenting themselves at the end of a person's life. When patients and their families are facing these issues, they look to physicians to provide comfort and reassurance. The purpose of this project is to investigate the current communication approaches utilized by physicians when discussing end of life care practices to African Americans, gaps that have resulted from such communication not backed by best practice research, and suggestions for potential improvement utilizing the nurse as a facilitator of communication and mediator of change for such discussions. The utilization of focus groups involving African American pastors, patients and caregivers will identify key inadequacies and areas requiring improvement regarding healthcare communication provided to African Americans at the end of life in the rural south. The use of questionnaires would prove beneficial to this project, as they will implore nurses regarding barriers to acquiring the role of facilitator, as well as, tools and resources that should be provided in order for the nurse to effectively take on this role. Ten nurses who provide end of life care in the rural south will be questioned to obtain this data.

This information will be presented in the following format: barriers to facilitation of the role, factors that would allow facilitation of the role, and suggestions of solutions that would close the communication gap, with nurses at the center.

**Eicher, Emily**

**Mentor(s) -- Dr. Stephanie Milling**

**Senior Nursing Capstone Experience - University Hospital ED, Augusta, GA**

This semester, I performed my clinical rotation requirement for the College of Nursing in the Emergency Department of the University Hospital in Augusta, GA. I was challenged daily, and found myself often overwhelmed. However, I am thankful for this opportunity, as I grew as a person, and as a nurse. I feel prepared for the challenges that await me in my future career, and cannot wait to face them head-on.

**Eison, Azaireion**

**Mentor(s) -- Dr. Randy Lowell**

**Azaireion J. Eison's Leadership Portfolio**

Since my freshman year I've been able to volunteer and help in many ways. The classes that I have chosen to take as electives have allowed me opportunities to participate in community service projects, such as the Alzheimer's project and children's church. All of these events played some type of role in giving back to the people of Union County. The Alzheimer's project consisted of a pageant and a walk to raise money and awareness for Alzheimer's disease. Before the walk, I raised \$100 to go towards the funding, and later was the pageant for which I raised \$96 more. The children's church program was an event for smaller kids between the ages of one and five, which was offered every Sunday from 9:45am until 12:00 noon. This program teaches kids about God and incorporates the learning fundamentals that school uses as well. By volunteering in these projects, I was able to help kids learn more and help raise awareness to find more ways to take on the Alzheimer's disease and one day find a cure. These projects taught me that there are many ways to help out in the community and that it doesn't always require money to do so, but most importantly your time and effort.

**Emerson, Natalie**

**Mentor(s) -- Dr. Dawn Wilson, Mrs. Lauren Law**

**Association between Dietary Behaviors and BMI in African American Adolescents**

Overweight and obese African American adolescents are at risk for developing chronic diseases, such as type 2 diabetes, hypertension, and heart disease. Dietary behaviors, such as low fruit and vegetable intake (FVI), high intake of sugar-sweetened beverage (SSB) and low frequency of family mealtimes (FFM), have been associated with greater risk of obesity and chronic disease. This study was part of the Families Improving Together (FIT) for Weight Loss Trial. Project FIT is a randomized controlled trial testing the efficacy of a family-based weight-loss program in overweight African American adolescents and their parents. The purpose of this study was to examine associations between FFM, FVI, and SSB intake with body mass index (z-BMI) in adolescents in Project FIT at baseline. To date, 232 adolescents aged 11 to 16 years have participated in the study (64.2% female, Mean Age = 12.4, SD = 1.8, Mean z-BMI = 2.1, SD = 0.5). Dietary data was assessed through validated self-reported surveys. We hypothesized that higher intake of SSB and lower FVI and FFM would be associated with higher adolescent z-BMI. A correlation matrix revealed that SSB, FVI, and FFM were not significantly associated with adolescent z-BMI (all p values=ns). However, there was a significant association between SSB and parent BMI ( $r=0.14$ ;  $p<0.05$ ), indicating that adolescents with parents who had higher BMI consumed more SSBs than adolescents with parents who had lower BMI values. There was also a significant association between SSB and adolescent sex ( $r=0.16$ ;  $p<0.05$ ). Males were more likely than females to consume a greater intake of SSB. For FFM, there was a significant association with adolescent age ( $r=-0.15$ ;  $p<0.05$ ), indicating that FFM was higher for younger adoles-

cents than older adolescents. Finally, FVI was significantly associated with parent educational level ( $r=0.27$ ;  $p<0.05$ ), indicating that those adolescents with parents of higher (vs. lower) educational attainment had higher FVI. With obesity becoming increasingly prevalent in school-aged children, future research should integrate strategies for increasing awareness of reducing SSB, and increasing FVI and FFM to reduce the risk of obesity and chronic diseases in African American adolescents.

### **Engebretson, Matthew**

**Mentor(s) -- Mr. Conner Black, Dr. Jane Roberts**

#### **The effect of gender on early markers of social anxiety in fragile X syndrome**

Fragile X syndrome (FXS) is monogenetic X-linked disorder effecting 1 in 3700 males and 1 in 6000 females. Typically, FXS is associated with intellectual disability and an increased prevalence of maladaptive behaviors (Cornish et al., 2013). Individuals with FXS have high comorbid rates of anxiety often diagnosed later in life. This comorbidity creates a unique opportunity to study early markers of anxiety in infants. In typically developing (TD) infant's early markers of anxiety are behavioral fear and dysregulated heartrate (i.e. respiratory sinus arrhythmia, RSA; Booker et al., 2013). Currently, no studies have researched physiological fear response in infants with FXS in response to a novel social situation. We hypothesize that infants with FXS would have atypical regulation during a novel situation compared to their TD peers. Specifically, sex is an important factor to look at when considering prognosis and management for children with FXS as it has shown to play a more physiological role in regulating heart rate. Although there is little neurodevelopmental information on girls with FXS, previous studies have shown that females are better at regulating RSA in stressful situations than males (Morales, S., et al., 2015). Due to the previous research, our second hypothesis is that there would be a sex difference in physiological regulation with females displaying more adaptive physiological regulation.

The current study included 23 infants with FXS (Male:  $n=15$ , chronological age  $M=13.01$  months,  $SD=1.02$ ) and 37 TD infants (Male:  $n=29$ , chronological age  $M=12.41$  months,  $SD=0.61$ ). RSA was measured during social situations via heart activity during a baseline period and Stranger Task of the LabTab. The baseline HR is recorded when the infant is calm watching an engaging movie. The stranger task is designed to invoke a fear response in infants by having a lab member dress up and kneel next to the child for two minutes with a neutral face. RSA reactivity was calculated by computing the difference between baseline and stranger. This research has the potential to provide insights into early physiological risk markers for social anxiety providing a template for future study.

### **Erickson, Chloe**

**Mentor(s) -- Dr. Nicole Fisk**

#### **The Media's Role in Exposing Business Fraud**

Commencing my research, I intended to delve into one of Wells Fargo's most recent scandals: account fraud. With time, however, I redirected my focus as more scandals surfaced the media due to the bank's inherent lack of morality. Instead of just analyzing Wells Fargo's improprieties through an ethical lens, I extended my search to incorporate how the impact of media- both popular press pieces and pop culture pieces- affect the public's interpretation of corruption. The press, which communicates to the public through media, historically has been delegated to serve as a watchdog of the government. Yet, this role as the fourth estate has expanded to incorporate regulation of the world of business as well. Not only does media inform the public on the operation of various businesses, it also holds these businesses accountable for their actions, especially if they behave in an unethical manner. The role of media seems particularly relevant in light of the Parkland students successfully urging businesses to distance themselves from the NRA in response to the recent shooting at their school. The ongoing boycott and controversies associated with Chick Fil A is another example of monitoring through media. While the company is not ashamed to sponsor anti-gay organizations due to their conservative views, people, including New York Councilman Daniel Dromm, are speaking out

and rallying against the popular fast food franchise in hopes of promoting acceptance. Regardless of the improprieties, media has allowed for the public to stay educated and combat unethical conduct that needs to be addressed.

**Ernst, Lauren**

**Mentor(s) -- Prof. Rico Reed**

**The Best of Both Worlds: My IBCE Experience**

In high school, I decided to come to the University of South Carolina because it had the #1 International Business program, including cohort programs, especially IBCE. I wanted to get a unique experimental learning experience, including extended time abroad. My decision to become a member of the IBCE program, while difficult, I still consider to be one of the best decisions that I have made in my life so far. Through three semesters and two summers of study abroad, including immersive Mandarin Chinese classes, I was able to learn more about a radically different culture and society while also learning how to live on my own thousands of miles away from my family and anything familiar. Through my social network in Hong Kong, I was able to gain international working experience at a startup while also starting my own business teaching English to people of all ages. Before my study abroad, I had spent a total of two weeks of my life outside of the United States – I wanted to expand my boundaries and knowledge base in order to make it possible for me to have a future international career. I gained so much more, as I grew personally in my independence and flexibility, qualities that I wanted to work on entering university. All this experience paid off, as I was able to land my “entry-level dream job” in a rotational program with an international rotation included, thus allowing me to receive diverse experience in different locations and positions. I am excited to begin my career for an international company and learn more about my intended career field, international operations. If I had not decided five years ago to apply for the IBCE program, I would never be able to say that I have achieved all that I have during my college career. I am grateful to the University of South Carolina and the Chinese University of Hong Kong for forming this partnership that allowed me to have such a significant, unique, and excellent college experience.

**Evans, Taylor**

**Mentor(s) -- Dr. Sarah Keeling**

**Integrated Communications Internship**

I began working as an integrated communications intern in the USC Office of Communications and Public Affairs in August of 2017. The USC Office of Communications and Public Affairs tells the university's story and maintains its brand. As an integrated communications intern, I am responsible for a variety of tasks that support the university's communication efforts. My duties include conducting research, compiling media lists, and writing news briefs, feature stories, and pitch letters. This internship has allowed me to practice writing and copy editing in Associated Press style, pitching journalists, conducting interviews, and using earned media software. I accepted the opportunity to intern in the Office of Communications and Public Affairs because I wanted to gain practical experience in communications. In this role, I have been able to apply concepts I've learned in my School of Journalism and Mass Communications courses to real-life situations. I have learned how to write different types of articles, how to collaborate with different departments within an organization, and the best practices for media relations. Through this internship, I was able to develop the communication skills necessary for my future career in public relations. This experience has confirmed my desire to work in the communications industry after graduation.

**Fassler, Carly**

**Mentor(s) -- Dr. Jerry Hilbish**

**Spatial variation in post-settlement survival and growth: Does success after settlement determine recruitment variation in the mussel *Mytilus edulis*?**

The populations of most marine species are interconnected by larval dispersal and subsequent recruitment into the adult population. Recruitment is typically highly variable in both space and time. The causes of erratic recruitment are not well understood but recruitment success is vital to the maintenance of adult populations. The recruitment depends upon larval settlement, dispersal, and post-settlement growth and survival and consequently variation in recruitment may depend upon success at any of these stages. We examined patterns of larval settlement and post-settlement growth and survival at several sites across a ~30 km stretch of coast-line in Southwest England. These data were used to evaluate whether spatial and temporal variation in settlement or the post-settlement growth and mortality have a greater influence on the subsequent recruitment of individuals that are prepared to enter the adult population. We tested the hypothesis that fine-scale variation in larval dispersal would generate variation in settlement patterns. We also hypothesized that there would be local patterns of growth and mortality following the settlement. Alternatively the processes controlling dispersal and those controlling post-settlement success may be operating at different spatial scales. We found evidence that variation in settlement and post-settlement growth and mortality occur at different spatial scales. There was high variation in settlement rates at different sites over very small spatial scales but similar rates of growth and mortality among sites. Our results indicate that processes controlling the delivery of larvae to the shore operate at fine space scales which are uncoupled from processes operating at much coarser spatial scales that regulate post-settlement success. We also demonstrate that post-larval growth rates tend to be greater later in the settlement season which may provide larvae that settle later in the season with a growth advantage.

**Fasulo, Bradley**

**Mentor(s) -- Dr. Johannes Stratmann, Ms. Claire Hann**

### **Downregulation of MAP Kinase Signaling Pathways by Protein Phosphatases in Response to UV-B Irradiation in Arabidopsis**

Plants are exposed to a wide variety of stressors. They have evolved to sense stress and transduce stress signals in order to activate a defense response against stressors. Mitogen-activated protein kinases (MAPKs) are proteins activated by stress receptors that propagate the signal to its target, i.e. a stress response gene. MAPKs are activated by phosphorylation in response to stress, and MAPK-inactivating protein phosphatases (MIPPs) deactivate activated MAPKs by dephosphorylating them, thus terminating the propagation of the stress signal. Using PCR, we created and verified the homozygosity of four triple-mutant MIPP knockout plant lines and one quadruple-mutant MIPP knockout plant line. In this study, we assessed the role of the four MIPPs in our mutant lines in Ultraviolet-B (UV-B) defense in the molecular biology model plant *Arabidopsis thaliana*. UV-B was chosen as a stressor due to its damaging potential and its presence in sunlight; it is a stressor that most plants are exposed to regularly. We hypothesized that the MIPP mutants would respond differently to UV-B radiation than our control plants, resulting in a higher or lower sensitivity.

First, in order to determine the effect of UV-B radiation on *Arabidopsis*, we examined the survivability of the mutant and wild type lines in response to high doses UV-B exposure. We then hypothesized that our mutant lines, lacking several MIPPs that would ordinarily aid in MAPK deactivation, would show prolonged MAPK activity. We used Western Blotting techniques to determine the activity of MAPK6, a target of the MIPPs in question. Lastly, we hypothesized that changes in the stress signal transduction in our mutant plant lines would result in altered MAPK-mediated gene expression. We used RT-PCR to determine the expression of the gene coding for chalcone synthase (CHS), an enzyme involved in the production of compounds important in UV-B defense.

**Faulkner, Alix**

**Mentor(s) -- Dr. Elena Farmaki, Dr. Hippokratis Kiaris, Dr. Ioulia Chatzistamou**

### **Crosstalk between fibroblasts and cancer cells involve the induction of endoplasmic reticulum stress**

Tumors are made up of cancer cells and stroma, which interact via soluble factors. In this study, we explored if the stromal and epithelial component of tumors induce endoplasmic reticulum (ER) stress by paracrine mechanisms. To that end we generated conditioned media from human HFFF2 human stromal fibroblasts or human MDA-MB-231 breast cancer cells and monitored their ability to induce ER stress. The resulting unfolded protein response (UPR) was recorded by qPCR assessment of the levels of chaperones BiP, GRP94 and PDI and of the ER stress-related transcription factor CHOP. In view of the fact that nutrient deprivation constitutes a common stimulus for UPR induction, glucose levels in the media were also recorded. Our analysis showed the induction in ER in both MDA-MB-231 and HFFF2 cells, but only when the media were conditioned by the stromal but not the cancer cells. Despite their ability to stimulate UPR, media from HFFF2 were unable activate the expression of CCL8 in the recipient cells. CCL8 is a chemokine that mediates the communication between HFFF2 and MDA-MB-231 and is considerably stimulated by the MDA-MB-231 derived media in fibroblasts. Analysis of glucose levels after two day of incubation showed a 20% drop in glucose within the HFFF2 fibroblasts' media, compared to that of MDAMB-321. These results show that soluble factors are being secreted from the fibroblasts and promote ER stress by paracrine mechanisms. The non-induction of the CCL8 gene by the HFFF2-derived media indicates that the UPR induction triggered by the HFFF2 media does not constitute a generalized, paracrine activation of the transcriptional program but a rather specific response. The analysis of the glucose levels indicates that it is possible that the lowered glucose levels in HFFF2 prior to treatment could be leading to the induction of ER stress related genes. Ongoing studies will address if glucose reduction represents the sole source of the activation of the UPR-stimulating program that operates in the fibroblasts. Knowing how the fibroblast and cancer cells interact and the effects this might have on ER stress is important for understanding the development of tumors.

\*Research supported by Magellan Scholar program.

**Faulkner, Sarah Louise**

**Mentor(s) -- Dr. Sue Heiney, Dr. Robin Estrada**

**The Therapeutic Role of Music In Grieving Adolescents and Young Adults**

Significance

Grief presents various opportunities for complications in the adolescent and young adult population, including developmental, mental, and behavioral health risks. Music offers dynamic opportunities to aid this population with their grief. While music has been widely used as an informal therapy for centuries, current researchers are beginning to explore its therapeutic effects in the health care setting. Although the research of music therapy is becoming more prevalent, there is a noticeable lack of literature regarding the role of music in the grief process.

Purpose:

To determine what elements of a song are found to be most helpful in promoting healthy grief in adolescents and young adults who experience the loss of a family member or friend.

Methods:

Qualitative interviews were conducted with 18-23 year-old participants who had lost a close friend or family member. Participants were recruited for the study through personal contacts and distributing the recruitment flyer through social media and on campus. This study received an exempt review from the University of South Carolina Institutional Review Board. Participation in the study was voluntary. In the interview, participants responded to open ended questions such as "How, if at all, did music help you cope with your grief? If no, what kind of music would help you now?" Interviews were tape recorded and will be transcribed for analysis. To date, fourteen interviews have been completed.

Results:

Qualitative analysis and the transitions theory will be used to analyze the transcripts from tape recorded interviews. The study is ongoing, and the results and conclusions are pending.

Implications:

The results from the analysis will be used to compose songs that reflect the music qualities identified by participants. My results may inform about the grief process in adolescents and young adults and provide direction to nurses working with these individuals.

**Faulkner, Sarah Louise**

**Mentor(s) -- Mrs. Lisa Camp**

**Reflections as a Senior Nursing Capstone Student**

As a senior nursing student, I am enrolled in a capstone course which includes a clinical component of almost 300 hours working with a preceptor nurse. For my capstone, I have been working on the Infants/Toddlers Unit at Palmetto Health Richland Children's Hospital. In general, I spend two 12-hour shifts per week in the hospital with my preceptor where I develop my critical thinking and technical nursing skills. This gives me hands-on experience and independence in the clinical setting to optimize my preparedness to enter the workforce as a new grad nurse.

Throughout this clinical experience, I found that my professional development reaches far beyond simply perfecting skills. I am learning that I must also focus on interprofessional communication, teamwork, and patient advocacy in order to be the best nurse I can be. I am learning that nursing is a multidimensional career that requires physical, emotional, and intellectual effort in order to be successful.

In the future, this clinical experience will continue to impact the way I approach my day-to-day job. I am learning lessons of how to use my skills to provide the best care for my patients, and that process will be career-long."

**Fay, Christian**

**Mentor(s) -- Dr. William Jackson**

**Using siRNAs to downregulate HIV-1 Tat expression and decrease viral production in siRNA-protected T lymphocyte populations**

The Human Immunodeficiency virus (HIV-1) acts to infect and destroy CD4 T Helper lymphocytes. The destruction of these cells leads to a gradual loss of immune competence and eventually, the Acquired Immunodeficiency Syndrome (AIDS). HIV-1 is a lentivirus that expresses a regulatory protein that acts to control transcription from the viral promoter/enhancer. HIV-1 Tat functions through binding to the viral trans-activating response element (TAR) which is a small hairpin RNA transcribed as the first 60 nucleotides of all HIV-1 mRNAs. The Tat/Tar association recruits the host PTEFb complex to phosphorylate the C-terminal domain of RNA polymerase II. This activity increases the enzyme's processivity and leads to upregulation of viral transcription. In the absence of Tat, viral transcription is inefficient and replication is inhibited. Our lab has designed and cloned four anti-Tat shRNAs, under the control of the RNA Polymerase III H1 promoter, into the retroviral vector pLGN. Recombinant viruses have been generated using each of these vectors and used to transduce Jurkat and HeLa cells. These cells are GFP positive indicating successful transduction of the recombinant provirus. Cellular genomic DNA will be analysed by PCR to verify integration and total RNA will be analysed for siRNA expression by RT-qPCR. The ability of these shRNAs to inhibit viral replication will be analysed in HIV-1 challenge tests using the HIV-1 genomic clone pNL.LucR.T2A, which express Renilla luciferase as a marker for virus replication.

**Fayyaz, Habiba**

**Mentor(s) -- Dr. Jim Fadel, Mr. Coleman Calva**

**Intranasal orexin-A administration increases neuronal activation of brain stem regions**

Cognitive decline associated with aging is characteristic of neurodegenerative and metabolic conditions, including Alzheimer's disease (AD) and diabetes. The orexin neuropeptide system serves as a key physiological integrator of homeostatic and cognitive function, with regulatory functions in appetite, wakefulness and arousal, and reward and stress systems. Degeneration of this system has been shown to significantly contribute to the development of narcolepsy, as well as other major neurological and psychiatric conditions. The goal of this study was to use immunohistochemistry staining to assess the therapeutic potential of intranasal orexin-A (inOX-A) administration through examination of changes in expression of neuronal markers in the brain stems of young and aged rats. Intranasal administration has the advantage of bypassing the blood brain barrier, minimizing systemic exposure, and rapid delivery of drugs to the brain, and clarifying its use for orexin could indicate a viable treatment method. Through comparison of changes in young and aged rats, this study also aimed to identify the strength of this treatment for age-related cognitive decline. In young rats, inOX-A administration contributed to greater expression of the neuronal activity marker, c-Fos, in the pedunculopontine tegmentum (PPTg) and dorsal raphe, regions involved with regulating REM sleep, wakefulness, and arousal. In aged rats, inOX-A administration increased activation of areas including the lateral region of the ventral tegmental area, which is involved in the mesolimbic reward pathway. Greater neuronal activation of select brain stem regions indicates a potentially therapeutic role for inOX-A in age-related cognitive decline.

**Fayyaz, Muhammad**

**Mentor(s) -- Dr. Erdem Sasmaz**

#### **Hydrogenating CO<sub>2</sub> to light olefins using a dual-bed catalyst system**

Propylene and ethylene are the most widely produced chemicals in today's petrochemical industry. While naphtha cracking is primarily employed for ethylene production, propylene is commonly recovered either from fluid catalytic cracking (FCC) or as a byproduct of naphtha cracking. Modern steam crackers heavily rely upon ethane-based feedstocks which tend to limit overall propylene recovery. With the steady increase in demand for propylene over the past two decades, it's become imperative to explore alternative, more efficient methods for its production. The goal of this research is to directly hydrogenate CO<sub>2</sub> in order to produce light olefins such as propylene. This study follows suit with recent developments in the field which have primarily focused on technologies that produce "on purpose" light olefins from feedstocks such as natural gas, biomass, and coal gasification. Hydrogenation of CO<sub>2</sub> is intended to be accomplished using a bifunctional catalyst system with active components for CO<sub>2</sub> to methanol conversion as well as C-C coupling to convert methanol to light olefins (MTO). This study will employ a Cu-Zn-Al (CZA) metallic oxide catalyst for the purposes of CO<sub>2</sub> to methanol conversion and a SAPO-34 molecular sieve will function as the MTO catalyst. The CZA precursor was prepared through a co-precipitation technique while the porous SAPO-34 was synthesized using a hydrothermal method. The dual-bed catalyst system will be tested in a reactor with an inlet H<sub>2</sub>/CO<sub>2</sub> stream and the effluent gas stream will be analyzed with gas chromatography to determine CO<sub>2</sub>, methanol, and olefin selectivities.

**Fennel, Mason**

**Mentor(s) -- Dr. Krishna Mandal, Mr. Cihan Oner**

#### **High Barrier Schottky Contacts for High-performance Silicon Carbide Based Radiation Detectors**

The purpose of this research is to identify whether metals such as nickel (Ni), platinum (Pt), titanium (Ti), and tungsten (W) will form Schottky contacts with n-type 4H silicon carbide (4H-SiC) epitaxial layer to improve resolution and nuclear detector performance. The importance of 4H-SiC is that it can make solid-state radiation detectors without a need for cryogenic cooling and can operate at high temperature and in high radiation background encountered in nuclear power plants. These radiation detectors are metal-semiconductor-metal (MSM) device structures. There are two types of metal

contacts formed with MSM devices – Ohmic and Schottky. Schottky contacts are ideal for radiation detection because they form a high barrier height in order to reduce background noise with increased resolution. To develop Schottky contacts, we have processed several n-type 4H-SiC epitaxial wafers grown on SiC bulk substrates. Wafers were then cleaned using standard RCA cleaning prior to contact deposition and tested using scanning electron microscopy (SEM) to determine if there are any unwanted surface defects. MSM devices were fabricated using 4H-SiC epilayers and various metals (Ni, Pt, Ti, W). Fabricated devices were evaluated as nuclear detectors by performing current-voltage (I-V) as well as capacitance-voltage (C-V) measurements. We have determined ideality factor and leakage current from I-V measurements and from C-V measurements we have determined barrier height and doping concentration. Deep level transient spectroscopy (DLTS) was performed to reveal defect levels known as trapping centers within the 4H-SiC detector material. Results have indicated that Ni forms Schottky contact with a barrier height of ~1.05 eV. A low leakage current was noticed at reverse bias of about -200V. In-detailed results of electrical properties including defect levels and nuclear radiation detection using isotopic radiation sources will be presented.

**Few, Tyler**

**Mentor(s) -- Mrs. Karen Patten**

**ITEC 564 Capstone Project: Linking Moot Alumni Association Members Through Global Mapping Technology**

Our client from the Moot Alumni Association, Christopher Campbell- Communications Team and Vienna Conferences Co-Organizer, was looking to find a team who could update their existing website to easily link members of the association. The idea was to create a user friendly, visual interactive global map for members to review and easily join. The goal of this map was to allow these members to view the map when traveling to places they are unfamiliar with and find other member's who may be in the area to link up. In order to link member information to the map, we would need access to the association's existing database to ensure all member information was adequately provided within the map. Through the use of modern technology, our team would find a way to link the association's members to the global map.

**Fineco, Rebecca**

**Mentor(s) -- Ms. Moryah Jackson**

**Rebecca Fineco's GLD Presentation focused on Professional and Civic Engagement**

My name is Rebecca Fineco and I am a senior hospitality management major graduating with a distinction in professional and civic engagement. Through my experiences as an RM, U101 peer leader, HRSM Ambassador and Study Abroad Peer leader I have been able to realize my passion for high education. As a leader at Carolina I have set the intention of helping other students make USC feel small and most importantly feel like home.

**Finn, Gordon**

**Mentor(s) -- Mr. Simon Tarr**

**Global Learning in Spain**

As part of the International Business major curriculum, I was required to study at a foreign learning institution for a period of no less than ten weeks. I decided to select the Colegio Universitario de Estudios Financieros in Madrid, Spain as my number one choice school and was accepted later in the process. The school is a sub-college of the University of Madrid and only holds less than 1300 students. For lodging, I stayed in an apartment in the center of Madrid with a Spanish landlord. It was an excellent experience to be able to live and have to speak Spanish on a daily basis to get food and navigate everyday life.

The majority of the classes were taught in English, yet the most rewarding ones were taught in Spanish. My personal favorite was my class on Spanish culture with one of the University of Madrid profes-

sors. In this class, we learned the things you wouldn't learn in a textbook about living in Spain, and it proved immensely helpful in our conversations with the other students as well as in our lives outside of school.

While Madrid served as an excellent home base, much of the actual study abroad experience was spent travelling away from the city. I was fortunate enough to be able to travel around to many of the beautiful cities in Spain using their high-speed AVE train network. Cities like Barcelona, Sevilla, Toledo, Segovia, and Granada were less than 2 hours away. Furthermore, I was able to travel to numerous countries throughout Europe, taking advantage of the discount airlines. I visited England, Ireland, Northern Ireland, Italy, Hungary, France, and Denmark.

Global learning, I have come to realize is something that cannot be taught in a classroom. One must be willing to go all in and immerse themselves in a foreign culture. One must be willing to take risks. Finally, one must be willing to travel as much as possible.

**Finnegan, Olivia**

**Mentor(s) -- Dr. Toni Torres-McGehee, Ms. Samantha Weber**

**Hormonal Contraceptives and Depression and Anxiety in Female Collegiate Student-Athletes**

Olivia L. Finnegan, Samantha R. Weber, Toni M. Torres-McGehee. University of South Carolina, Columbia, SC

Introduction: The overall objective of this project is to identify any relationships between oral contraceptive use and the symptoms of anxiety and depression in female collegiate student-athletes. Current research shows a significant trend between oral contraceptive use and antidepressant use. Women are also significantly more likely to have anxiety and depression than males. Specifically in the population of this study, female student-athletes have a greater mental health risk than their male counterparts. There is currently little research analyzing the prevalence of depression and anxiety in female collegiate student-athletes taking hormonal contraceptives. This is important to opening the conversation on mental health and specifically giving a voice to female student-athletes who are struggling with mental health disorders. This could potentially help mental health professionals treat this population and also help women understand the importance of choosing the right birth control for them. I hypothesized that females taking oral contraceptives would have a higher prevalence of anxiety and depression. When analyzing specific pill types, I hypothesized that women taking an estrogen-based oral contraceptive would have a higher likelihood of depression.

Methods: A cross sectional study design was used. Collegiate female athletes (n~150) were recruited from local HBCUs, NCAA Division I Institutions, to participate in an online survey. Participants were asked to complete demographic information (e.g., age, academic status, gender, sport, etc), Beck Depression Inventory and Beck Anxiety Inventory, and questions regarding the types of birth control. Independent variables are gender, sport type, and academic status. Dependent variables are risk for depression, anxiety, and birth control type. Cross tabulations and chi square analyses examined the relationship and distribution between independent and dependent variables.

Results: Results will be presented at Discovery Day USC. Data is currently being collected.

Conclusion: TBD

**Finnegan, Olivia**

**Mentor(s) -- Ms. Chrissy Strow**

**Graduation with Leadership Distinction: The Significance of Being a Group Fitness Instructor at USC**

Growing up with a passion for sports and fitness I discovered an opportunity to train to become a group fitness instructor here at USC. Being a fitness instructor has changed my life and pushed me in many different ways. From over 5 nationally accredited certifications to being able to network at expos across the Southeast, it has really pushed me out of my comfort zone. In this job, I create my own classes, choreography, workouts and music playlists with the goal of safety and an effective workout. Throughout the class, I have to balance instructing and cueing the moves with adding modifications for those that can't complete the full movements and with progressions for those that have the capacity to work harder. I also have to inspire the student and faculty participants to work past their limits. My motivation for becoming a group fitness instructor came from an instructor at home. I would go to her cardio classes every week and I was so inspired by her enthusiastic attitude, her connection with all of the participants and her ability to always stay on the beat with our exercises. Having all eyes on me constantly took getting used to but I can now say that I'm comfortable in public speaking opportunities. Another huge thing that I've learned has been adaptability. Microphone batteries die, music and speakers cut off- but it's all about remaining positive and working towards the one goal of bringing people together for a workout. This experience has transformed me into a more confident, adaptable and motivating person. I've learned so many skills that I can transfer to any job in the future. As I'm looking ahead past graduation, I would love to continue teaching classes on the side. I want to become a registered yoga teacher and complete my 200 hours. Teaching yoga and these classes is such a rewarding experience and I wouldn't feel like myself if I didn't continue to teach throughout my professional life.

**Fisher, Savannah**

**Mentor(s) -- Dr. Denise Wellman**

**Gathering Communities in the Context of Historic Rutledge Chapel**

As a history major, my professors often ask me, Why does history matter? Surprisingly, my job has given me the answer. For three years I have worked as an Event Services Assistant at Russell House University Union. One aspect of my role is to serve as a coordinator for Historic Rutledge Chapel. Rutledge is the original campus building, where it all started. Students and alumni have gathered here for over two-hundred years. All events here are opportunities for members of the the Carolina community to gather, including the weddings and memorials I coordinate. The ostensible capacity of my role is to protect the historic location from inadvertent damage. More significantly, I work closely with community members as I assist them in navigating difficult and transformative events. My job has become the way that I lead my community.

Part of that leadership is to give the community context. I have applied the research skills I learned in my classes to investigate the history of Rutledge Chapel as the topic of my senior thesis. I have come to see how this place has continually facilitated unity and togetherness. I make it a point to share that knowledge with the students and alumni I work with. My goal is to make them feel the profound and comforting sense of shared experience and continuity which this place conveys, in order to cement our connections.

As these two aspects of my relationship with Rutledge converged, I came to see working here as a calling, rather than a job. I have come to see my professional requirements as secondary to my duty to foster my community. I hope to work my whole life helping people to engage with history, and understand it as something we participate in. The understanding I have come to is that history matters when it becomes accessible for the community that it tells the story of, when it becomes something they can gather around, and when it is a shared experience that can be the point of departure for celebrating differences.

**Fitzpatrick, Maggie**

**Mentor(s) -- Dr. Roozbeh Behroozmand**

**Effects of high definition transcranial direct current stimulation (HD-tDCS) on motor reaction**

## **time during speech production and hand movement**

The goal of this project was to investigate the effects of high definition transcranial direct current stimulation (HD-tDCS) on speech and hand movements reaction times. A total of 30 right-handed young healthy adults who were native speaker of English participated in this study. Participants were randomly assigned into two groups (n=15) to either receive Cathodal HD-tDCS over the brain areas of the left motor cortex (experimental group) or receive sham stimulation (control group) while performing a speech and hand motor reaction time task. We predicted that HD-tDCS would lead to faster speech and hand movement, as indexed by decreased measure of reaction time, and would potentially modulate the underlying neural bases of motor mechanisms in the human brain. We investigated the effects of HD-tDCS on neural mechanisms of speech and hand movement by measuring brain activity using the electroencephalography (EEG) technique and extracting event-related potential (ERP) responses during the motor reaction time task. The combination of behavioral and neural measures allowed us to explore how changes in neural plasticity following brain stimulation can lead to improved speech and hand motor performance. Our findings indicated that the Cathodal stimulation modulated neural activities over bilateral frontal and parietal electrodes in response to speech production and hand movement. Further analyses revealed that ERP activities over frontal and parietal electrodes emerged earlier for cathodal vs. sham stimulation. Our findings suggests that cathodal stimulation over left ventral motor cortex enhance underlying neural mechanisms that drive speech production and hand movement.

**Flanders, Michael**

**Mentor(s) -- Dr. Karen Patten**

### **iIT Capstone Project: Scholarships for Science and Math Students Through NOYCE Grant Website**

The USC Department of Education NOYCE Grant provides scholarships to students who want to teach science or math at needy schools within South Carolina. But how do students know about the scholarships? The goal of our capstone project was to update and add style to the existing Noyce Website - teachscienceandmath.org. The updates included new content, pictures, pages, and information plus techniques for students to more easily use the Website. Our poster presentation will show the improvements and how they help the NOYCE grant to meet its mission.

**Fleury, Alexandra**

**Mentor(s) -- Prof. Pam Bowers**

### **The Impressionists versus the Macchiaioli: Understanding the impact of Japonism on Western Painting**

The Impressionist movement is one of the most revolutionary painting movements in history. Their unique style focusing on painting out in the open and focusing on light, color and shadow dramatically sets them apart from their previous counterparts. Many of the most famous Impressionist painters were majorly influenced by Japonism, or Japanese culture and aesthetics. Around the same time period, a movement called the Macchiaioli, which closely resembled that of the Impressionist, started in Italy. This movement used a lot of the same stylistic concepts, however, it did not gain the international recognition that Impressionism did. For my research I was inspired to understand the impact of Japonism on the Impressionists by comparing them to the Macchiaioli, in an attempt to comprehend whether Japonism helped the Impressionist movement proliferate. I received the Magellan grant to go to France and Italy where I went to countless museums and exhibitions to study Impressionist and Macchiaioli paintings closely. I also went to the locations where the Impressionists painted to further understand the settings and inspirations behind their paintings. My goal was not only to research the history of the movements, but also to gain an understanding of the movements visually, by painting in their styles. Through academic research and interviews, I found that the Macchiaioli did not become as renowned as the Impressionist because of their location, rather than because of their painting

style. As part of my results, I also have several paintings and a few prints inspired by my travels I will be displaying during Discovery Day.

**Ford, Kayla**

**Mentor(s) -- Dr. Suzanne Swan**

**Computational Social Science: The Unfiltered Everyday Stories of Sexism in the Workplace**

Workplace discrimination based on race, color, religion, sex or national origin was banned by Title VII of the Civil Rights Act of 1964 and 1991. However, workplace sexual harassment charges have remained stable over the past few years. (Equal Employment Opportunity Commission, 2016). This research uses data collected from the Everyday Sexism Project, where around 600,000 users from all over the world described their sexist experiences in various aspects of their life. This research collects workplace specific stories from the project's website (<http://everydaysexism.com>). Using qualitative data analysis, sexist workplace experiences were consensus coded to reveal common themes discussed on the website. In times of massive data, it is difficult to manually analyze and organize huge unstructured text data; therefore, new customized text mining methods are necessary to disclose hidden semantic features. This research used powerful computational methods to efficiently collect thousands of experiences from the web and analyze the collected data. The analyses revealed that the most discussed topics on the everyday sexism website fit into topics related to direct harassment/ assault, gender harassment, discriminatory practices and policies, and disrespect. The data also revealed multiple subtopics, such as Normalizing sexism. One user wrote, "In work as a Police Officer and some male colleagues were discussing the proposed changes to the law to make sexism a hate crime... They all stated this was ridiculous and one commented that he might as well be locked up now." Another user wrote about having to endure sexual assault as a condition of work: "When I was a shot girl I was forever subjected to horrible comments and behavior from not only the customers but even the bouncers of the club who were supposed to be keeping me safe... I would feel constantly objectified but felt slightly better because of the good money I was making." These findings suggest that women experience a plethora of sexist behaviors in the workplace setting, despite legislation banning discrimination. Further research is needed to better understand mechanisms that promote gender inequality in the workplace.

**Fox, Michaela**

**Mentor(s) -- Ms. Allison Kretschmar**

**My Time in Valencia**

This past summer, I studied abroad in Valencia, Spain at the Polytechnic University of Valencia. I have been studying Spanish since elementary school and had always dreamed of one day traveling to Spain and immersing myself in the language and culture in order to achieve the academic, professional and personal goals I had set for myself. As a Spanish minor, I was proficient before studying abroad, but I wanted to become fluent. I pushed myself out of my comfort zone by staying with a house mom instead of in an apartment with other students, which helped me practice my Spanish language every day. I also had the opportunity to volunteer weekly at an elementary school teaching English, which has always been a dream of mine. In the future, I hope to pursue this further through various scholarships. During my time in Valencia, I discovered more about myself and what sort of life I want to pursue. I feel much more confident in my Spanish language skills as well as my competency of the Spanish culture, as I travelled throughout the country while there. I will always treasure the time I spent in Spain and the knowledge I gained while there.

**Fozdar, Heenali**

**Mentor(s) -- Ms. Julia Houston**

**Reducing Cancer Disparities through Identification of Linkages to Care Partners within GMaP R1N**

The National Cancer Institute (NCI) defines Cancer Health Disparities as “differences in cancer incidence, prevalence, morbidity, mortality, survivorship, burden of cancer, and screening rates that exist among specific population groups.” To reach their goals, the NCI’s Center to Reduce Cancer Health Disparities (CRCHD), initiated regional ‘hubs’ as a part of the Geographic Management of Cancer Health Disparities Program (GMaP) to enhance their capacity in disparities research, contribute to the next generation of researchers, and achieve measurable reduction in cancer health disparities across the U.S. There are six regional GMaP ‘hubs’ across the U.S which allows the initiative as a whole to “leverage the strengths of its people, programs, and resources to provide greater access to cancer information.

The GMaP Region 1 North (R1N) hub is based at the Markey Cancer Center in Lexington, Kentucky. R1N has partnered with Johns Hopkins University’s Sidney Kimmel Comprehensive Cancer Center, the University of South Carolina, and the University of Virginia Cancer Center to serve Delaware, Kentucky, West Virginia, Maryland, Maine, New Hampshire, Vermont, Virginia, and Washington, DC. The overall goal of GMaP R1N is to enhance the capacity of regional cancer centers, associated academic partners, community partners, and early stage investigators to contribute to the reduction of cancer health disparities in the region.

One strategy GMaP developed to reduce cancer health disparities and ultimately reduce cancer prevalence and incidence entirely was to identify preventative screening programs, or ‘linkages to care’, currently in place across our region and disseminate to key partners with the overall goal to reduce cancer rates in the GMaP coverage area. GMaP R1N compiled a comprehensive list of those who provide free and reduced cost screenings, specifically relating to prostate, colorectal, cervical, breast, and lung cancers. The linkages to care were relayed to regional partners, including cancer centers and National Outreach Network (NON) Community Health Educators (CHEs), with the goal of providing up to date information on screening for community members at risk for disparities in screening rates. GMaP R1N features these screening providers’ information on our website <http://gmapr1.com> as a navigation tool.”

**Fozdar, Heenali**

**Mentor(s) -- Ms. Katie Zimmerle**

**Graduating with Leadership Distinction in Professional and Civic Engagement: The Role of Student Leadership in Learning One’s True Self**

The Capstone Scholars Program at the University of South Carolina looks to create a community for students who strive to get the most out of their education, both inside and outside of the classroom. Taking on the role of a Capstone Assistant within the Capstone Scholars Program has allowed for my professional development and interpersonal engagement within the Capstone community. Capstone Assistants bridge the gap between students and Capstone staff while serving as role models to their peers and prospective students. Through my experience as a Capstone Assistant, I worked admission events, accurately input data, developed marketing materials, and even explored my own leadership styles. I learned how to communicate effectively over various mediums, tailored marketing materials to target populations, and interacted with diverse groups of people. Using what I know about my personal traits to better my performance, I learned how to challenge myself by stepping out of my comfort zone and taking on new responsibilities. My presentation will discuss the significance of this leadership role and how working with the Capstone Scholars Program has allowed me to dig deeper than the surface level to connect with students and better myself in the process.

**Frame, Mary**

**Mentor(s) -- Dr. Bree Yednock**

**Preliminary Analysis of Blue Carbon Stocks in Tidal Wetland Habitats in the Coos Estuary**

Blue Carbon refers to the carbon that is stored and sequestered within coastal and tidal wetland zones. Determining the amount of carbon that is stored in these ecosystems (i.e. blue carbon stocks) is important for understanding global carbon exchange and the potential for wetlands to be a significant source or sink of greenhouse gas emissions. The purpose of this study is to determine the range and variability in blue carbon stocks in four different wetland habitat types of the Coos Estuary: eelgrass, high and low marshes, and pastures. A field study was conducted to compare the aboveground vegetation, soil composition, and carbon content of these four habitat types. Vegetation species were used as criteria for defining wetland type. In the high marsh, *Carex lyngbyei* and *Agrostis stolonifera* dominates while in the low marsh *Distichlis spicata*, and *Sarcocornia perennis* are the most prevalent. Eelgrass sites are dominated by *Zostera marina* and pastures are largely covered in cut *Agrostis stolonifera*. Soil samples were collected from eight sites using a peat auger and a 625 cm<sup>2</sup> plot was used to collect vegetation. Soil samples were used to measure bulk density and the mass of aboveground vegetation samples were used to calculate megagrams of carbon per hectare. Overall, there is a significant difference between the mass of carbon stored in the vegetation at the different habitat types. Further analysis will be discussed in the poster. This research is important as it is the first comprehensive blue carbon assessment being done on the west coast.

**Frame, Mary**

**Mentor(s) -- Dr. Tammi Richardson, Dr. James Pinckney**

**Analysis of Benthic Microalgae Composition in Salt Pan and Marsh Sediments of North Inlet-Winyah Bay**

Students Engaged in Aquatic Sciences (SEAS) is an organization that allows undergraduate students, who have an interest in the oceans and the environment, the opportunity to conduct research on coastal and oceanic processes. This year, the project involved partnering with the University of South Carolina Baruch Marine Field Laboratory (BMFL) to determine microalgal community composition in the salt marshes and salt pans of North Inlet-Winyah Bay in Georgetown, South Carolina. Salt Pans are very saline areas within coastal wetlands where little to no vegetation growth occurs, and there have been few studies examining the microalgae population in these areas. Microalgae are an important part of these ecosystems as they undergo photosynthesis and are the base of the food web. In turn, they provide energy for all the trophic levels. For this study, sediment cores (n=180) were collected along transects in salt pans and marshes. Coordinates for each core were taken using a GPS. Sampling occurred during November, February, and March to determine if any seasonal variation of microalgal communities existed. The top 5 mm of the cores were analyzed in the lab using high-performance liquid chromatography (HPLC), to identify the algal makeup of the various sites. This study will provide us insight on how the microalgae compositions vary between marshes and salt pans and will also determine if microalgae communities experience seasonal variances. Final results are pending the final field work trip set to take place in late March.

**Freiter, Meaghan**

**Mentor(s) -- Dr. Morgan Adams**

**Analysis of Time in Therapeutic Range (TTR) and Antiplatelet Dose Correlation to GI Bleeding in Patients with Continuous Flow Left Ventricular Assist Device (LVAD) Support**

The purpose of this study is to determine whether time in therapeutic range (TTR) is predictive of GI bleeding in patients with LVADs. Our primary objectives include calculating each patient's total time in range (TTR) prior to a gastrointestinal (GI) bleed and identifying other modifiable risk factors for bleeding experienced by LVAD patients. This study will assess the appropriateness of the current standard of care including the INR range used to make warfarin adjustments and concomitant aspirin dosing. Modifiable risk factors will be correlated to frequency and severity of GI bleeding to identify changes that can be implemented to prevent this adverse effect in patients with LVADs.

This study has been submitted to the Palmetto Health IRB for approval. This retrospective chart re-

view will include data from all patients cared for by the LVAD clinic at the Palmetto Health Advanced Heart Health Center from January 1, 2015 to December 31, 2016. Patients will be excluded from the study if they do not have a defined INR goal or if they are not on warfarin at the time of the bleeding event. Data collected will include patient demographics, INR results, and aspirin dose. Date of implantation and date of bleed will be used to calculate TTR prior to bleeding event and time with LVAD prior to bleeding event. Severity of bleeds will be stratified by the hemoglobin levels, hospitalization requirement, transfusion requirement, and number of units transfused. The INR and aspirin dose will be correlated to the frequency and severity of GI bleed events.

This study will assess whether or not time in therapeutic range is predictive of GI bleeding in patients with LVAD support. The INR and aspirin dose will be correlated to the frequency and severity of GI bleed events. This could warrant future studies into other potential causes if patients are experiencing GI bleeding while maintained within the current acceptable INR range. Increased patient education, teaching, and INR monitoring may be implicated if the majority of GI bleeds occurred in patients that were not within the INR goal range.

**Frieden, Olivia**

**Mentor(s) -- Dr. Hilary Lichterman**

### **How My Summer in Ghana Shaped My Carolina Experience**

During the summer, I had the opportunity to travel to Senya-Beraku, Ghana to complete a two-month medical internship with Becky's Foundation. While in Ghana, my role was to assist the nurses and Physician Assistant in the clinic by taking vitals, drawing blood, working as a medical scribe, running lab tests, and assisting in the maternity ward. In addition, I also had the opportunity to utilize my Health Promotion, Education, and Behavior minor to help plan outreach efforts to educate the people in the village on the importance of family planning and malaria prevention. This experience opened my eyes in many ways and reaffirmed my desire to pursue a career as a Physician Assistant. I was exposed to diseases I had never seen before and inequities that completely changed my perspective. Working with a completely new culture posed challenges, but helped me grow in many ways as a leader. My presentation will discuss how my insights in Ghana have impacted me as a leader and continue to shape my experience as a Carolina student.

**Fryer, Lauren**

**Mentor(s) -- Dr. Robin Estrada**

### **Palliative care: Knowledge and perceptions of undergraduate nursing students**

**Background and Significance:** Palliative care is multidisciplinary care focused on relieving symptoms and pain intensity, as well as emotional and spiritual turmoil in patients suffering from a terminal illness. Despite its clear value, studies demonstrate healthcare professionals often feel uncomfortable or under-prepared in situations relating to palliative care. Because nurses are typically the healthcare professional with the most personal contact with the patient, it is imperative that nurses feel well-equipped to meet their patients' palliative needs. However, BSN curricula often lack specific palliative care content.

**Objective:** The purpose of this project was to examine USC upper division nursing students' knowledge, experiences, and perceptions of palliative care.

**Methods:** Junior and senior BSN students from USC Columbia, Lancaster, and Salkehatchie were surveyed using the Palliative Care Quiz for Nurses, a reliable and valid scale evaluating palliative care knowledge, and the Thanatophobia Scale, which allows respondents to rank their feelings and self-perceptions of palliative care. Follow-up interviews were conducted to explore student experiences in more depth.

**Results:** A total of 11 nursing students submitted completed surveys and 2 nursing students agreed to be interviewed. Surveys revealed a low to moderate knowledge of palliative care; the interviews revealed there is little educational coverage of palliative care, usually set in the context of older adult

care.

Conclusion: There is a need for more and earlier implementation of education on palliative care for nursing students.

Discussion and Future Directions: This formative data will be used to direct further evaluation of BSN palliative care education, as well as inform educational interventions designed to improve students' palliative care knowledge and clinical experiences. This work has the potential to not only affect nurses' comfort in delivering palliative care, but also enhance patient and family outcomes.

**Gardner, Kayla**

**Mentor(s) -- Mrs. Angela Amlin**

### **Synthesis and Evaluation of Hawaiian Monk Seal Education and Outreach Resources**

In the main Hawaiian Islands (MHI), monk seals have become a focal point for marine conservation, but also for controversy given their close proximity to human development, commerce, and recreational activities. The growing conservation and recovery needs of monk seals in the MHI call for a more extensive education and outreach program, and efforts that are better planned and coordinated. This project has the dual purpose of holistically evaluating current education and outreach efforts as well as developing a system to examine the effectiveness of these efforts. To accomplish this, an annotated database comprised of all NOAA Fisheries and partner education and outreach materials was developed and shared between partner agencies and nonprofit organizations. The materials submitted to this database were analyzed in order to identify gaps, redundancies, or inaccuracies. Furthermore, an evaluation system for both outreach and education programs was researched and drafted. In the future, this database will be expanded, and the evaluation system will be implemented. This project will result in a coordinated, strengthened education and outreach effort in an attempt to share information with the public that encourages Hawaiian monk seal conservation and human-seal coexistence.

**Gargiulo, Emma**

**Mentor(s) -- Ms. Lisa Camp**

### **Full Steam Ahead**

The University of South Carolina program of Sport and Entertainment Management provides students with the opportunity to complete two internships prior to their graduation. During this past summer, I worked as the Marketing & On-Air Promotions intern for The MLB Network in Secaucus, NJ. The MLB Network is the television destination for baseball fans featuring game telecasts, original programming, highlights, and insights from players and top sports analysts. As a Sport and Entertainment Management major, my internship provided me with first-hand experience in sports marketing and communication. I had the opportunity to run events, interview notable talent, and generate material for both on-air media and MLBN social accounts. However, I learned that marketing is way more than just ads and social media. A lot of what I did involved developing relationships with all thirty professional ball clubs, sponsors, and individuals MLB Network worked with. Its important to not only keep the current clients happy but make new ones and assure that everyone is happy with the content you are providing. I was able to adapt to the fast passed culture of sports. I learned how to be imaginative, organized, quick on my feet, and the ability to manage a project from start to finish. The nature of sports is constantly flowing and there are a lot of moving parts you are responsible to keep track of. Coming into this internship I expected to just be a number, just another guppy in the pond doing the grunt work. However, the reality was much different. The amount of freedom and independence I had and the trust my mentor had in me really got me excited about entering the workforce. Through situations such as this internship and organizations I am involved in on campus I have gained the knowledge of knowing my audience and breaking that fourth wall. Reaching out and utilizing all your resources to connect with people around you. I will use these skills going forward with everything I do both personally and professionally.

**Gaspar, Shelby****Mentor(s) -- Dr. Stefanie Keen****Impact of Trauma on Implicit Bias**

The purpose of this research is to assess students' attitudes toward individuals who may suffer from emotional and/or physical symptoms of trauma. We are also interested in whether students' trauma history will affect their implicit attitudes. The primary hypothesis of this study is that participants with an implicit bias related to the gender-based effects of trauma, will have more difficulty categorizing emotionally-valenced (compared to physically-valenced) words when associated with male identifiers versus female identifiers. The goal of this study is to add to the body of knowledge used to understand individuals' attitudes towards physical and emotional symptoms of trauma. In this study, participants completed an Implicit Association Test, followed by an extended Life Events Checklist and a Posttraumatic Stress Disorder Checklist with Criterion A. After conducting a paired samples t-test, results were non-significant, but indicated a trend that may become noteworthy upon further investigation,  $t(29) = -1.51$ ,  $p = .07$ . These findings support further research into the relationship between implicit bias and gender-based effects of trauma.

**Gaughan, Mary****Mentor(s) -- Dr. Jill Stewart****Neural Correlates of Stronger Arm Function after Stroke**

Following stroke, many individuals have weakness in one arm and hand. Some individuals need to rely more heavily on the stronger arm to perform everyday activities. The purpose of this study was to determine the correlation between movement ability in the stronger hand following stroke and both functional connectivity in the brain and structural integrity of white matter pathways. This study looks at the interhemispheric and intrahemispheric functional connectivity between the premotor cortex, supplementary motor area, primary motor cortex and primary sensory cortex. Fractional anisotropy (FA) was used to measure the structural integrity of two white motor pathways, the corticospinal tract and the corpus callosum. 63 individuals with left-hemisphere stroke performed arm function tests (the Box and Blocks test and grip strength) and underwent brain imaging (resting state functional MRI and diffusion tensor imaging). Statistical analysis was performed in SPSS, including tests for normality and correlations between the hand function scores and measures of brain functional connectivity and brain structural integrity. The number of blocks moved with the stronger hand correlated with higher interhemispheric resting state functional connectivity between primary motor, primary sensory, and premotor cortices ( $r > 0.381$ ,  $p < 0.002$ ) and structural integrity in the corpus callosum ( $r = 0.309$ ,  $p = 0.013$ ). Grip strength did not correlate with any of the brain measures, suggesting that it may not be sensitive to differences in brain status between individuals. These results are consistent with other studies that have shown that older individuals rely on interhemispheric connections via the corpus callosum to perform motor tasks more heavily than younger adults. These results provide important information about the neural correlates of movement in the stronger arm after stroke which may have implications for rehabilitation and function.

**Gertz, Zoe****Mentor(s) -- Prof. Jay Pou****Zoe's Leadership Experience**

"In a growth mindset, people believe that their most basic abilities can be developed through dedication and hard work — brains and talent are just the starting point. This view creates a love of learning and a resilience that is essential for great accomplishment," said psychologist, Carol Dweck. As a public relations student with plans to become a digital media strategist, I have integrated my passions for communications in professional and academic settings through my growth mindset. Local chapters of national nonprofit organizations decided to create new campaigns. This decision was driven by

problems related to a lack of funding. As a class we were asked to choose a client, research its previous campaigns and develop a semester-long social media campaign. Additional information from executives and surveys about organization awareness, marketing success and social media strategies were incorporated into our final campaign books. Through various methods of research and client meetings, my partner and I constructed a semester-long social media campaign to promote Ronald McDonald House Charities of Columbia, South Carolina's 12th Annual Red Shoe Run. We learned a great deal about the complexities, strengths and importance of working collaboratively in conjunction with our client to create something that was impactful on the community and RMHC. This project had a significant impact on the way my peers and I view what it means to build a media campaign for a nonprofit organization. This project's impact was invaluable. It provided hands on experience and effective collaboration while increasing awareness, event participation and social media following.

**Gigantino, Emily**

**Mentor(s) -- Dr. Daniel Freedeman**

**Life is made up of a series of choices**

I came to the University of South Carolina four years ago with very little direction. I was very skeptical about what I wanted to do with my future. In my freshman year I took the year to figure out what I wanted to do with the rest of my life. I tried a major that was not the best fit for me, I got involved in different areas of the school and I joined Greek life. I wanted to get involved on campus because I needed to step out of my comfort zone in order to find myself. Through all of these intriguing opportunities I had at the University of South Carolina I was able to discover my path of success. I learned how to truly become a leader in professional and civic situations through my hands on experiences. In my hands on experiences in being an Orientation Leader and a University 101 peer leader I was able to apply the different theories I learned in my psychology classes about learning behaviors to my various out of the classroom experiences. I was able to use my skills of being a leader and what I have learned in the classroom in order to find my path for the future.

**Gillman, Rebecca**

**Mentor(s) -- Prof. Nina Moreno**

**The Impact of Peer Leadership and Holistic Health**

I became heavily involved with Changing Carolina Peer Leader (CCPL) three years ago due to my passions for public health and holistic wellness, as well as an interest in opportunities for leadership. CCPL constitutes a diverse group of passionate undergraduate students who work to foster a healthier and happier campus environment here at USC. CCPL's education, outreach, and advocacy events incorporate various aspects of wellness relevant to college students, including general wellness, mental health, and sex and relationships, via peer-facilitated presentations and campus-wide awareness events and programming. As a two-year executive board member, serving as both the Historian and now the current Treasurer, I have had the privilege of providing mentorship to new members while receiving invaluable guidance and support from staff within Student Health Services. Additionally, I have gained valuable written and oral communication skills, and program planning and evaluation proficiencies. I have also gained insight as to the importance of sustainability of an organization to ensure its long-term success, which can often involve critical thinking, as well as flexibility and adaptability to best address and remediate specific problems. CCPL taught me the importance of health in context, in order to best address health problems holistically. This presentation will discuss specific insights gained through leadership experiences in CCPL, as well how direct peer leadership has impacted my future plans to serve as a Peace Corps Volunteer in Moldova as a Health Education Teacher, and further to pursue an MPH, likely in the field of Global Health and Environmental Sustainability.

**Gillman, Emily**

**Mentor(s) -- Ms. Sarah Gay**

## **Cupid Crew**

Did you know that over 15 million seniors in the United States are isolated, living alone? For many elderly individuals this is often a result of a loss of a spouse. During my internship at Lighthouse Hospice Group, I have had seen this problem first hand. Wish of a Lifetime, a nonprofit that grants wishes to deserving seniors. In an attempt to limit isolation, in the elderly population, Wish of a Lifetime conducts an annual event, on Valentines Day, "Cupid Crews", from all over the world, deliver roses to elderly communities. Unfortunately, Wish of a Lifetime did not have a registered Cupid Crew in the state of South Carolina. This needed to change! In response, I contacted Wish of a Lifetime immediately. After a few months of planning and finding funding, South Carolina successfully had a Cupid Crew! This past year on Valentines Day, six different retirement communities received a visit from The South Carolina Cupid Crew. To some, this may have been seen as an unconventional Valentines Day, but to me it was another way to express my love. While sharing my passion for the geriatric community, a group of around one hundred volunteers and I handed out around eight hundred roses to deserving seniors in the Columbia, South Carolina area. The day was full of wonderful stories, beautiful smiles, and an overwhelming amount of love. In coming years, I hope to continue this fulfilling tradition in South Carolina and eventually begin a Cupid Crew in my home state, Maryland.

## **Gilmore, Alachia**

**Mentor(s) -- Dr. Amber Fallucca**

### **Bridging the Gap**

During the spring break of my junior year I was granted the opportunity to travel to Riobamba, Ecuador with an organization called MEDLIFE. MEDLIFE is an international organization that sets up mobile clinics in Third World Countries to provide healthcare and education to those who lack the resources to obtain proper care. MEDLIFE raises money for medical equipment and medicine and donates money for basic household supplies such as toothpaste, toothbrushes, and antibacterial hand soap. Then they set up clinics in various regions in that country and assist local medical professionals to diagnose and treat patients. MEDLIFE seeks to educate the community on proper hygiene practices to prevent diseases in the future.

I always wanted to travel, and I love volunteering so when I learned about the opportunity to join MEDLIFE on this trip, I could not pass up that offer. MEDLIFE also constructs a donation website where you could raise money for the volunteer trip but also takes a half of the money raised to go towards the mobile clinic for medical supplies and equipment. I found most interesting that sexual health in Riobamba is nonexistent. The overall health in the community is predominantly healthy aside from some curable bacterial and fungal infections however, because of the stigma against women's health in Riobamba it is the number one killer of the women there. This bothered me because the goal of MEDLIFE is to educate and treat the whole population so, it wasn't fair to me that the males received the bulk of the care. This unsettling discovery inspired me to pursue Doctors Without Borders to continue to educate and treat everyone who lack the means to do so.

## **Goff, Tanisha**

**Mentor(s) -- Ms. Lisa Camp**

### **Equity in Education**

During spring semester, I completed an internship at the Cutler Jewish Day School in Richland County School District One. CJDS is accredited by the National Association of Education for Young Children and has served in the community for over twenty-five years. The four pillars CJDS is grounded upon are active nurturing, academic rigor, social justice, and Jewish life skills. I worked in a kindergarten class to deepen my understanding of culturally relevant pedagogy in the classroom. Additionally, I became aware of the necessary skills an effective and professional classroom teacher must obtain such as organization, passion, and instructing skills. As an Early Childhood Education major, this internship provided me with first-hand experience in working with underrepresented children. While

conducting my internship, I had the opportunity to implement integrated lesson plans, research educational theories, and evaluate assessments. Specifically, I supported the students in conducting a school-wide protest, after discussing the history of racism towards Jews and African-Americans. The kindergarteners formulated a list of changes they would like to see in their own school and community before carrying out the protest. I found that all children have the ability to succeed when given the proper resources and support. Overall from this experience I have made a commitment to promote equity and diversity in all educational settings using the skills I have obtained from the University of South Carolina. I look forward to working with marginalized groups of children in my future classroom and motivating them to utilize their full potential.

**Gonzales, Jack**

**Mentor(s) -- Dr. George Voulgaris, Mr. Douglas Cahl**

**Satellite calibration of HF radar for wave height extraction**

High Frequency (HF) Radars are widely used for remotely measuring surface ocean currents and, less frequently, wave heights over extended areas of the coastal ocean (>100km from the shore). These measurements are used for understanding coastal ocean dynamics, but also for supporting mission critical operations like search and rescue and pollutant / oil spill dispersion.

Wave height measurements from HF radars are limited because they require calibration with wave measurements in the radar coverage area. Typically, buoys are used for wave calibration, but they are expensive and time consuming to deploy. Additionally, a buoy only measures waves at a single point within the radar coverage area, biasing HF radar wave calibration to these specific buoy locations. However, satellites can observe the entire ocean, and data is freely available from agencies such as NASA. Although satellites can measure waves around the world, HF radar is still useful as satellites can only observe a narrow strip of the earth's surface at a time and only repeat the same path at 1-2 week intervals. HF radar can provide continuous observation over wide expanse of the coastal ocean, and at a finer spatial resolution than most satellites.

This study seeks to calibrate a USC-operated HF radar system installed in Long Bay, SC. For this calibration measurements of wave height using data from the NASA/CNES satellite Jason 2 are used. The calibration methodology is presented, as well as techniques for extracting waves from the HF radar. The accuracy of the satellite calibration method is assessed through a comparison of the calibrated HF radar wave height estimates against in-situ wave height measurements.”

**Good, Jessalin**

**Mentor(s) -- Dr. Adam Pazda**

**Red, threat, and race categorizations**

People with ambiguous group membership tend to be excluded from the in-group. If instance, racially-ambiguous (e.g., mixed-race) faces tend to be categorized as Black if the person doing the categorizing is White. This type of outgroup racial categorization is more prominent under threatening circumstances. We tested the hypothesis that the color red (which is symbolically linked with threat) would lead White (but not Black) participants to categorize ambiguous race faces as more likely to be Black. Implications of this research focus on the possibility that exposure to unrelated color stimuli can influence perceptions of race aside from skin color alone.

**Gore, Ariyana**

**Mentor(s) -- Prof. Lisa Camp**

**Progression Through Policy: How I Found my Passion Through Leadership**

This past year, I served as a member of the University of South Carolina's Student Congressional Advisory Board. As a board, we worked to connect our student body with our federal legislative pro-

cess as a way to share our unique perspective as students in hopes of bringing about dialogue and subsequent change in policy affecting college students nationally. After conducting a survey of over 500 students and doing intensive policy research we were able to meet with each member of South Carolina's delegation, the US Department of Education, the Senate Health, Education, Labor & Pensions Committee, and the Problem's Solvers Caucus to present our 40-page policy report. This year, we covered the topics of access and affordability, mental health and substance abuse, sexual assault and Title IX, and foreign language education. Serving as a member of this board came with a lot of pressure and responsibility, but in the end, became one of my most enriching experiences here at the University of South Carolina. Through this experience I was able to discover my passion. In the future, I hope to continue to envelop myself into a career embodying public service and advocating for our vulnerable populations. As a pursuant of Graduation with Leadership Distinction in Professional and Civic Engagement, I hope to share the experiences, insights, and lessons I have learned through my time on the Congressional Advisory Board.

**Gorman, Brendan**

**Mentor(s) -- Dr. William Jones**

**Confidence While Staying Humble**

Upon entering college, I had a very high perception of myself and how valuable I am. I am an Eagle Scout who held multiple leadership positions while in the Boy Scouts of America, and I was in the Woodwind Captain in my high school marching band for two years. My strong above-average academics carried over to college as I completed my first years achieving As and Bs without putting much strain on myself. All of these factors caused me to have a high outlook on my own value and ability which I thought would guarantee me job offers from any company that I applied to. My expectations were met with disappointment and a realization to be humble.

**Gray, Veronica**

**Mentor(s) -- Dr. Alice Leri**

**Islamic Finance in Spain and Superdiversity**

Islamic financial institutions within Europe have seen significant growth during the 21st century. The leader in IFI's in the west is the United Kingdom. It is curious that Spain, despite its history of Muslim dominance from 711-1492, lags so far behind its western counterparts when it comes to Islamic finance. Spain has long been a center for Muslim immigration, especially from its neighboring country, Morocco. Spain takes in the second highest influx of Moroccan immigrants in all of Europe (second to France). It is a wonder that businesses have not capitalized on this population and expanded Islamic financial institutions more heavily into this region.

During three months of research in Spain and two months of literature and web research in the United States, I began to formulate opinions of why this may be the case. First, it was important to obtain a better understanding of the Muslim/Moroccan population of the region. This was done primarily through participant observation, interviewing locals who identified as Muslim, and taking courses on the Society and Culture in Spain and Muslims in Spain. Additionally, I spent time researching immigration trends, unemployment rates, and GDP information for both Morocco and Spain. My time in Spain was primarily focused on finding out more about what I believed to be the causes for the lack of growth of Islamic finance in the region.

This research, however, turned into something different from what I expected. The more individuals I interviewed and the more in-depth my ethnographic study went, I realized that my preconceptions were not the reality. I began to discover that the Muslim identity was something much more complex than what I had previously hypothesized. In this presentation, I will go into detail on what I learned through my classes, interviews, and participant observation and how understanding super diversity is

the first step in analyzing the market for Islamic finance in Spain.

**Gray, Ciara**

**Mentor(s) -- Ms. Moryah Jackson**

**Ciara Gray's Community Service Pathway e-portfolio**

Merriam Webster defines community service as, "work that is done without pay to help people in a community." Dictionary.com defines community service as, "voluntary work intended to help people in a particular area," or as "unpaid work, intended to be of social use, that an offender is required to do instead of going to prison." None of these definitions mention the positive impact that community service has on the person donating their time to it. Missionaries, philanthropists, and every day do-gooders will tell you that helping others has several motivational benefits, including one very selfish one: it makes you feel good.

Throughout my time at the University of South Carolina, I have been involved in several community services projects, activities, and positions that have allowed me to grow as a person. My community experiences motivated me to pursue Graduation with Leadership Distinction in the Community Service pathway. My e-portfolio reflects on three key insights that I have taken away from my time during college.

My goal for this portfolio is to showcase a little bit of my personality along with the things I have accomplished during my four years of college. I also hope to inspire others who view my portfolio to get involved in their community by demonstrating how valuable service can be to the community, as well as to yourself.

**Gray, Gabrielle**

**Mentor(s) -- Dr. Adam Pazda**

**Effects of facial expression and coloration on electrodermal activity**

Facial expressions and facial coloration can provide cues to one's emotional state. For example, anger expressions consist of changes in facial musculature including a furrowed brows, narrowed eyes, flared nostrils, and exposed teeth. Angry states also involve increased blood flow to the face, leading to a reddened appearance. While expressions can be hidden (e.g., someone experiencing anger can maintain a neutral expression), facial coloration changes happen automatically. The present research investigates the degree to which physiological arousal is impacted by perceiving angry expressions, facial redness, and their interaction. Participants viewed a slideshow of numerous human faces that varied in expression (angry vs. neutral) and coloration (increased redness vs. neutral). We assessed changes in electrodermal activity as they viewed the slideshow. As perceiving anger should evoke changes in arousal states (to prepare for a fight or flight response), we predicted main effects for expression and coloration, such that angry faces and reddened faces would increase arousal. We also predicted an interaction, such that reddened angry faces would increase electrodermal responses more than either anger or redness in isolation. Results and implications for detecting subtle cues of emotional states are discussed.

**Greene, Sarah**

**Mentor(s) -- Dr. Ray Thompson**

**Establishing Muscular Endurance and Strength Ratios in Healthy Females**

The purpose of this study is to determine the relationship between muscular endurance and strength in the rectus femoris (quadricep muscle) and biceps femoris (hamstring muscle) in a healthy, non-injured, female population. Athletes are prone to ruptures of the anterior cruciate ligament (ACL), which is a stabilizing structure in the knee. Females are 2 to 4 times more likely to sustain an ACL injury than males depending on the sport, and approximately 70% of ACL injuries in females do not involve physical contact. Most ACL injuries occur during the later portion of games, when athletes are suspected of experiencing fatigue. Fatigue alters the timing of muscle activation and reduces maximal

force of a muscle, causing decreased control of body movements and increased risk of injury. Identifying modifiable risk factors for ACL injuries is crucial to practicing best injury prevention. We are particularly interested in investigating whether an abnormal ratio of quadriceps to hamstrings muscular endurance might destabilize the knee in a fatigued state. We are using accelerometer-based mechanomyography (aMMG) as a novel technique to induce fatigue in the rectus femoris and biceps femoris. Electrical muscle stimulation (EMS) at a low frequency and amplitude induces contractions of the rectus femoris and biceps femoris; during stimulation, an accelerometer taped to the muscle belly measures the acceleration of muscle contraction. The Endurance Index (EI) of each muscle will consist of the percent change in contraction acceleration over 3 bouts of a 5-minute stimulation period. We are using a Biodex isokinetic dynamometer to measure muscular strength via maximal voluntary concentric contractions. The strength measurement will consist of the highest peak torque values for both muscles. We hypothesize that the EI of the rectus femoris will approximate the EI of the biceps femoris, and the ratio of rectus femoris to biceps femoris strength will be proportional to the ratio of rectus femoris to biceps femoris EI in apparently healthy females. Future prospective studies can use the normative results of this project to predict athletes at increased risk of ACL injury and establish an appropriate return to play after rehabilitation.

### **Gregg, Brooklyn**

**Mentor(s) -- Mrs. Anna Oswald-Hensley**

#### **Fire Ant Brooklyn**

Peer Mentor

During the 2017-2018 school term I worked as a peer mentor at USC Sumter. Peer Mentors assist freshman with having a smooth transition from high school to college. I chose to become a peer mentor because the transition to college can be stressful. As a peer mentor, I'm able to help students feel more comfortable. Being a peer mentor allowed me to see the leader in myself. Peer Mentoring made a positive impact on my life, because it feels good knowing people look up to you. I want other people to know that they can make differences in other student's lives as well. Through this experience, I plan to continue this role by giving advice to those who study Nursing.

Work Study

Work studies provide college students the opportunity to work while in college. One of my achievements at USC Sumter, as a work study, is working as a receptionist. I learned how to multitask by answering phones and greeting incoming guest. My work study impacted me personally because it built my communication skills, and improved my time management skills. The significance of my work study was that I was the first person the guest would see when they walk into USC Sumter. Therefore, my appearance and my attitude not only mattered to my job but could impact someone else's day. In the future, I plan to use these skills in my future nursing career by making an impact in my patient's lives.

### **Gregory, Haley**

**Mentor(s) -- Dr. Natalia Shustova, Ms. Ekaterina Dolgoplova**

#### **Photophysical Properties of Photochromic molecules in a Confined Environment**

Photochromic materials are known for their ability to switch between two isomers when they are irradiated with different wavelengths of light. This property makes them viable materials for utilization in different "smart" materials (e.g. transition lenses) and sensors.

In our work, we focused on understanding the photophysical behavior of diarylethene-based compounds in different environments: solid state, solution, and confined environment of the rigid matrix (metal-organic framework). We extensively characterized prepared materials by UV-vis and diffuse reflectance spectroscopies. As a result, we showed that incorporation of diarylethene-based compounds inside porous framework can drastically change their photophysical properties, which can be utilized for the development of the next generation of sensing materials.

**Gribbs, Sophia**

**Mentor(s) -- Mr. Ryan Lloyd**

**Exploration of Business and Culture in a Globalized World**

By following my passion of travel and interests in communication and culture, I have made an effort to gain a wider perspective of the world. I decided to study abroad in high school, so when I discovered the Study Abroad Association I jumped at the chance to learn about opportunities available. While holding two leadership positions in this organization (marketing manager and president), I experienced great personal growth. I spent both semesters of my junior year abroad: fall semester in Florence, Italy and spring semester in Paris, France. Through my studies of marketing, management, and communication, I worked to gain a new business perspective and understand the implications of international business. Immersing myself in unfamiliar cultures forced me to employ critical thinking to solve problems. I honed my leadership skills, practiced the Italian and French languages and applied international class insights to real life situations. These experiences caused me to realize how immensely curious I am about globalization, current events and cross-cultural communication. This is valuable to me because my outlook on the world shifted significantly. I now understand the importance of travel to maintaining an open mind and understanding one's own ethnocentrism. With a curious mind and opportunities to grow, one can progress toward a stronger understanding of the surrounding environment. I plan to continue to educate myself and implement what I've learned from these experiences by applying my passions to my career. Furthermore, I hope that my next position will include work in an international business environment.

**Griebel, Laurhyn**

**Mentor(s) -- Dr. George Roy, Dr. Melissa Baker, Mrs. Pamela Adams, Mr. Andrew Newton**

**Emerging Professional as Middle School Math Teacher**

I have learned so much through the College of Education at USC. Being a middle level education major, I am able to really apply what I learned in the college classroom to a middle school classroom. I am completing my full-time internship at Fairfield Middle School teaching 8th grade math. Through this internship, I am building relationships with middle school students and exploring activities for teaching them. My math methods course (EDML 583) at USC gave me several resources and examples of high cognitive demand tasks that can be applied or modified to a middle school classroom. I learned online resources with ideas for lesson plans and activities that relate to certain mathematical topics, which I have used and implemented in my middle school classroom. My middle schoolers enjoyed them because it adds variety to the classroom. Lesson planning is a big thing for new and unexperienced teachers. We worked on lesson planning in numerous classes, and they all had different templates and expectations. There is not one correct way to write a lesson plan; it is unique to the individual teacher, how he/she prefers format it and what to include. In one class (EDTE 522), I had to create a unit plan, which spans over a period of time and includes multiple lesson plans, for what I could possibly teach. I had to create a unit plan during my internship for what I actually taught in the classroom during my two weeks of full-day teaching. I taught transformations, had to give a pre-test, assignments, and a summative assessment to track the progress of my students. While teaching, I have to practice classroom management strategies, teaching practices, and procedures for assessment, all of which have been discussed and explored in my USC educational classes. All of these strategies have been integral to my success and my students' success at Fairfield Middle School.

**Griffin, Jessica**

**Mentor(s) -- Prof. Anna Oswald- Hensley**

**Jessica's Juxtaposition**

During the spring semester of 2017, I was nominated to be a University Ambassador for U.S.C Sumter. As a University Ambassador, I am a representative of the University. I help give tours of the

campus throughout the summer for incoming students at S.O.A.R, which is a full day orientation for incoming students. I decided to become a University Ambassador because my older sister, was one when she attended college. I hoped that this opportunity would help me develop more social and leadership skills. As an, Ambassador, I learned interpersonal skills, through networking and how to project my voice. Being a University Ambassador helped me develop not only as a student, but also as a person. I can use this experience moving forward as a reference point for those future moments where I may be hesitant to meet new people and in moments where I may fear that my voice won't be heard. Using this experience, I can remind myself that I learned to project my voice to be heard and that meeting new people is a wonderful experience.

**Griffin, Christopher**

**Mentor(s) -- Dr. Kasia Pawelek**

**Overview of modeling the effects of behavior change, waning and imperfect vaccines on the spread of influenza**

Influenza is one of the major infectious diseases effecting humanity in the 21st century. The ability to predict the spread of the influenza virus using mathematical modeling allows us to examine various strategies that reduce the risk of the infection in the population. There are various ways a person can lower a possibility of becoming infected through seasonal vaccinations, altering behavior by avoiding crowded places, washing hands, and following other CDC recommendations. Often the public is not aware that the vaccine efficacy is never 100% and that protection is acquired approximately two weeks following immunization. We present two models, one with a waning vaccine and another with an imperfect vaccine. Both of the models include behavior change and information obtained from modeling within-host dynamics of influenza infections. We created a system of ordinary differential equations using parameters associated with the infectivity of the influenza virus and the progression of the disease inside a human body. Our results of the waning vaccine model showed that the epidemic peak was significantly lowered when public vaccination was performed up to two months past the onset of an epidemic. In our model with an imperfect vaccine we showed that when more than 75% of the vaccinated population is exposed to the influenza virus due to the failure of the vaccine, the epidemiological peak is approximately the same than if the vaccine was not administered under certain model assumptions. The highest epidemiological peak resulted when the vaccine completely failed and vaccinated individuals thought that they were protected against the influenza virus. We showed that incorporating behavior change in addition to vaccination significantly lowers and delays the epidemiological peak giving more time to develop control and prevention strategies. These studies provide more information on the potential impact of pharmaceutical and non-pharmaceutical interventions during an influenza epidemic.

**Griffith, Nicole**

**Mentor(s) -- Dr. Brandon Bookstaver**

**Pharmacist-Administered Penicillin Allergy Skin Testing**

Pharmacist-administered penicillin allergy skin testing

Introduction: Patients with a beta-lactam allergy often receive alternative antibiotic therapy leading to worse clinical outcomes, heightened risk of toxicity, and increased costs. Penicillin allergy skin testing (PAST) is a valuable antimicrobial stewardship tool to improve antibiotic utilization in penicillin-allergic patients. The purpose of this study is to evaluate the early clinical impact of a pharmacist-administered PAST service on an adult antimicrobial stewardship service.

Research Question or Hypothesis: What are the process and clinical outcomes of implementation of a pharmacist-provided penicillin allergy skin testing protocol in patients requiring antibiotics with a documented penicillin allergy?

Study Design: Data will be collected following the initiation of a pharmacist-delivered PAST protocol

at a tertiary care medical center. Patients admitted to any inpatient ward and requiring antimicrobial therapy will be evaluated by the Antimicrobial Stewardship and Support Team for PAST per protocol. All patients screened for possible PAST will be included in the process and patient outcome analyses. Methods: Patient-specific outcomes will include any change in antibiotic therapy, de-escalation of antibiotic therapy, and removal or modification of allergy profile. A complete PAST process evaluation of implementation, process efficiency, and projection of sustainability will be conducted. Using the above data, a cost-effective analysis will be completed. Patients will continue to be followed post-discharge to evaluate the impact of PAST on antibiotic use on subsequent admissions.

Results: Data collection ongoing.

Conclusion: Data collection ongoing.

## **Gross, Megan**

**Mentor(s) -- Prof. James H. Knapp**

### **A Structural Geologic Approach to Understanding Tectographic Origins of Early Life in Durham County, North Carolina: Part II**

Seilacher et al. (2000) claimed that *Vermiforma antiqua* specimens found along the banks of the South Fork of the Little River, Durham County, NC, were “tectographic” pseudo-fossils, that were downgraded from trace or body fossils. These convolute, worm-like features (25-30 cm along their long axes) observed on bedding planes of laminated volcanoclastic strata of the Late Neoproterozoic Hyco arc were proposed to be the result of bedding-plane flexural slip during Late Neoproterozoic Virgilina deformation. Reconstruction of the strain ellipsoid recorded in rocks of the Hyco Formation could be diagnostic as an independent test of this hypothesis. As part of an undergraduate research collaboration between the University of South Carolina and the North Carolina Geological Survey, oriented blocks of volcanoclastic conglomerates interbedded within the Hyco formation were sampled from two separate localities in the vicinity of the South Fork of the Little River during January 2018. These conglomerates contain cobble- to pebble-sized clasts of primarily intermediate to felsic volcanic material, which were likely deposited close to the associated volcanic centers of the Hyco arc. Bedding is typically indistinct, and overprinted by a strong, steeply-dipping cleavage. The oriented blocks were slabbed along three orthogonal planes to perform Rf-phi analyses of the clasts. These analyses are compared with similar, previously unpublished analyses from the overlying Aaron Formation (North Carolina State University; J. Hibbard, pers. comm.) to suggest that at both a regional and local scale, the resulting strain ellipsoids appear to be inconsistent in shape and orientation with a tectographic origin for the *V. antiqua* specimens.

## **Gross, Marissa**

**Mentor(s) -- Prof. Michelle Vierya**

### **The effects of sugar, caffeine and exercise on anxiety-like symptoms and short-term memory in rats.**

#### **Introduction**

The purpose of this study was to look at the effects of sugar, or sugar and caffeine consumption alone, or in combination with exercise on anxiety-like symptoms and short-term memory in rats. Both sugar and caffeine have been linked to increased anxiety-like behavior while exercise decreases anxiety-like behavior. Large amounts of sugar consumption have been correlated with detrimental effects on short term memory, while exercise has been reported to increase neurogenesis and therefore memory performance.

#### **Methods**

Thirty male Sprague-Dawley rats were used in this study. Rats were randomly placed into 6 groups containing 5 rats each. They were given 200ml daily of a sugar solution, sugar + caffeine solution, or water (control), and paired, or not paired, with exercise:

- Group 1 – sugar/no exercise
- Group 2 – sugar + exercise
- Group 3 – sugar + caffeine/no exercise
- Group 4 – sugar + caffeine + exercise
- Group 5 – exercise
- Group 6 – control

After 15 weeks the rats were put through a battery of behavioral exams including a fur-coat state and light-dark box to test for anxiety-like symptoms, and a novel object recognition task to test for short term memory.

## Results

Videos of the behavior sessions are still being analyzed however, we predict that the exercise groups will score higher on the memory tasks and show decreased anxiety-like symptoms compared to their dietary matched groups without exercise. The sugar and sugar + caffeine groups will do more poorly than the control on memory tasks and have increased anxiety-like behavior.”

## **Grout, Vanessa -- Mentor(s) -- Dr. Elizabeth Easley, Dr. Sarah Sellhorst, Dr. William Riner Relationship among screentime, body fat percentage, and measured physical activity in college student populations**

Purpose: To determine if there is a relationship among screen time, body fat percentage (BF%), and measured physical activity in traditional aged college students.

Methods: Anthropometric data were collected on 100 traditional aged college students (18-25y). BF% was measured using dual energy x-ray absorptiometry (GE Lunar iDXA). Average minutes per day (weekdays and weekend days) spent on screen time including computer and videogame use as well as television use were self-reported using an Activity Questionnaire. Time spent on televisions and computers/videogames were assessed separately. Moderate-to-vigorous physical activity (MVPA) was measured with use of accelerometers (Acti-Graph-GT3X, Pensacola, FL).

Results: Pearson correlational analyses were used to determine the association among screen time, body fat percentage, and physical activity. There were no statistically significant correlations between screen time and the following variables: body fat percentage ( $r = -0.50$ ,  $p = 0.619$ ), MVPA ( $r = -0.124$ ,  $p = 0.258$ ), and average steps ( $r = -0.154$ ,  $p = 0.176$ ) when evaluating the total group. However, male screen time to steps showed significant correlation ( $r = -0.450$ ,  $p = 0.010$ ) between weekend and weekday averages. Overall, there were no significant correlations among body fat percentage, average steps, BMI, and moderate to vigorous physical activity in either sex.

Discussion: The study emphasizes limitations on effective screen time monitoring due to the accuracy of self-report. It is also possible the questionnaire used may be out of date in regards to use of technology that is considered “screen-time”. Reporting of cell phone use was not included in this study.

Conclusion: This study did not take into account factors such as the impact of diet, lifestyle, and genetics. However, our study concludes that there is a minimal impact in males. Additional research is suggested to further our findings.

## **Guerin, Lindsey**

**Mentor(s) -- Dr. Jill Turner**

### **Defining the Role of Striatal Inflammatory Response During Nicotine Withdrawal**

Tobacco smoking is the principal cause of preventable death in the United States. Many smokers are aware of the health risk associated with tobacco use and often want to quit, but a high percentage fail in their quit attempts due dependence on nicotine. Nicotine is the psychoactive component of tobacco, and its absence during smoking cessation underlies the development of nicotine withdrawal phenotypes. Previous studies have linked increased inflammatory responses and consequential

oxidative load to a variety of neurological disorders; however, its possible link to nicotine withdrawal and associated behavioral symptoms is yet to be understood. To determine whether inflammatory responses in the striatum influence anxiety-like behavior during nicotine withdrawal, mice treated for two weeks with either saline or nicotine prior to withdrawal were injected intraperitoneally with either vehicle or 150mg/kg/day N-acetylcysteine (NAC), pre-withdrawal, during withdrawal, and post-withdrawal. Open field (OF) test and Marble-burying test (MB) were conducted on mice 30 minutes after receiving NAC injection on both the first and second post-withdrawal days. Following nicotine withdrawal, we saw an increase in expression in inflammatory response markers and ROS production in the nucleus accumbens (ventral striatum). Interestingly, this effect was attenuated by NAC treatment, which was used as an antioxidant tool. There was also an increase in expression of NADPH Oxidase 2 (Nox2) in the nucleus accumbens, and it was similarly reduced with NAC treatment. However, we did not see this effect in the dorsal striatum. Given that Nox2 is the major source of ROS production, it is possible that Nox2 may drive the increased production of ROS seen during nicotine withdrawal. Behaviorally, using OF and MB, we saw reduction of nicotine withdrawal-induced anxiolytic behavior following NAC administration. Overall, this evidence suggests that increased inflammatory responses may be the major driver of anxiety-like behavior during nicotine withdrawal.

**Guttman, Anne**

**Mentor(s) -- Dr. Ron Prinz**

**Triple P: Positive Parenting Program**

NIMH-supported clinical trial comparing online versus person-delivered family-based intervention for 3-7 year old children experiencing behavioral difficulties. The research focuses on outcomes, parent/consumer satisfaction, and cost-benefit considerations.

**Haas, Ashley**

**Mentor(s) -- Dr. Alan Waldman**

**Role of Homology and DNA Double-Strand Breaks in Genetic Recombination in Mammalian Cells**

As part of long-term studies of the mechanisms of genetic recombination and maintenance of genome stability in mammalian cells, we stably transfected thymidine kinase deficient mouse fibroblasts with DNA construct pKM1. Construct pKM1 harbored a herpes thymidine kinase (tk) gene rendered non-functional by insertion of an oligonucleotide containing the recognition site for endonuclease I-SceI. We refer to this latter tk sequence as the "recipient." The construct also contained a truncated "donor" tk sequence. The donor could potentially restore function to the recipient via recombination with the recipient, and such events could be provoked by induction of a double-strand break (DSB) at the I-SceI site in the recipient. Recombination events were recoverable by selection for tk-positive clones. The donor contained 33 clustered mismatches relative to the recipient, forming a localized segment of DNA sequence displaying about 20% divergence relative to the recipient. The mismatched segment was surrounded by regions of high homology. When the donor was aligned with the recipient in pKM1, the DSB site in the recipient aligned opposite the mismatched segment, allowing us to potentially capture recombinational repair events initiating between diverged sequences. Earlier work demonstrated that mammalian cells effectively avoid recombination between mismatched sequences. In work presented here, we have shown that by surrounding mismatches with high homology, suppression of DSB-induced recombination between diverged sequences was surprisingly overcome. We infer that these events were enabled by homologous pairing between sequences surrounding the site of the DSB. Our results challenge current recombination models by suggesting that the search for homology prior to recombination is not mediated by an invading DNA terminus and may actually be independent of DSB formation. In an extension of our studies, we used cell lines containing pKM1 to examine recombination occurring spontaneously without the deliberate induction of a DSB. Our goal was to understand the impact that a DSB might have on the nature of recombination in the immediate

vicinity of the break, with a particular emphasis on sensitivity to mismatches. Additional experiments examine the impact of a DSB positioned at a discrete distance from recombining sequences. Progress to date is reported.

**Haddon, Ethan**

**Mentor(s) -- Prof. Andrew Newton**

**Peer Leadership**

In the fall semester of my senior year (2017), I had the opportunity to serve as a University 101 Peer Leader on campus at the University of South Carolina. University 101 is a class that is designed to help first-year students at the University of South Carolina transition into life away from home and teach them how to take on the added responsibilities and stressors of college life. USC's University 101 program is seen as the national model of a freshman seminar and is widely regarded as one of the best tools for success when starting in college, and I am very proud to have been a part of the program. I was inspired to pursue this role because of my own experience as a freshman taking University 101. My University 101 class provided me with a great sense of community at USC right from the beginning, and my Peer Leader was excellent in her position. I learned a great deal and grew tremendously through taking University 101, and it made my transition to my new home in another state much easier. Serving as a Peer Leader came with many responsibilities, the most important of which was serving as a resource to the University 101 students. I made myself available to them for any questions they had about campus resources, life in Columbia, or how to deal with early challenges such as advising and registration. I also facilitated challenging discussions, such as one dealing with the consequences of alcohol and drug use and another about stereotypes. Building a community was another important part of my role, outside of the classroom I took a trip to the zoo with several of the students. My experience with my University 101 section will always be one of my proudest achievements as an undergrad. I know that the skills I learned as a Peer Leader and the growth I experienced will carry over into my career as a law student starting in the fall, and will shape how I perform there as well as who I am as an attorney further down the road.

**Hales, Justice**

**Mentor(s) -- Dr. Karen Patten**

**iIT Capstone Project: Identifying Educational Technology at USC's First Showcase**

USC hosted an Education Technology Showcase to display how various types of technology is being used "in and beyond" the classroom here at USC. The main purpose of this conference is to share experiences in how the USC community is using technology creatively and effectively. There will be vendor's as well as numerous demonstrations. Our student project team had the opportunity to be a part of the showcase, helping with planning, coordinating, and implementing different aspects of the showcase. We developed a mobile application used by the conference attendees. Our presentation describes the process.

**Hall, Katherine**

**Mentor(s) -- Dr. Zhengqing Fu**

**The role of ribosomal protein L12 in plant defense**

Ribosomal proteins play an essential role in systemic defense against non-host pathogens in plants, however little is known of how they do so and raises the question of whether RPL12s are involved in pathogen-induced systemic and basal resistance of other plant types and the exact function of RPs in relation to plant immunity. The initiation of SAR involves massive transcriptional reprogramming that relies on the function of transcription co-factor NPR1. It has been shown that NPR1 is a master regulator of systemic acquired resistance in plants. The upsurge of salicylic acid at the site of infection causes NPR1 to be degraded and HR to be induced, however the surrounding cells have less SA and thus more NPR1 is present in order to induce SAR for the whole plant. When infection occurs, NPR1,

which is usually located in the cytoplasm by disulfide bonds, is released into the nucleus where it acts as a co-factor to transcription factors in order to induce the production of defense related genes. It has already been shown in this lab that NPR1 interacts with RPL12 thus it can be hypothesized that based on their interaction, RPL12 plays a specific role in plant immunity. The function could be post-translational modification or possibly de novo protein synthesis in the cell. Since NPR1 is related to transcription factors, the RPs could be the other half of the equation that involves translational modification and successful downstream gene expression involved in plant immunity.

**Hall, Rachel**

**Mentor(s) -- Dr. Melissa Moss**

### **Understanding the role of chain flexibility in amyloid protein aggregation**

Alzheimer's disease (AD) affects 5.4 million Americans. Deposition of aggregated amyloid-beta ( $A\beta$ ) protein is a hallmark in the progression of AD. In order to better understand the role of  $A\beta$  in AD etiology, it is important to biophysically characterize the structure and function of the toxic proteins. This effect will be studied through the use of sequence mutations to glycine, a common amino acid found in amyloid proteins and theorized to enhance chain flexibility. Four mutations, L17G A21G, V18G E22G, G25A, and G25I were selected to either enhance chain flexibility or reduce it through the use of either a bulky (isoleucine) or more constrained (alanine) amino acid. To explore the role of chain flexibility in aggregation propensity and stability, SDS-PAGE and Western blot were utilized. Results indicate mutations convey SDS resistance to all tested mutants, a characteristic lacking in WT  $A\beta$  and all mutants with increased chain flexibility are more prone to aggregation. Mutants were also gridded and strained using uranyl acetate for transmission electron microscopy (TEM). Results indicate that increased flexibility results in longer fibrils with an enhanced mesh network while a reduction yields shorter less defined fibrils. Further research will involve additional characterization of mutants through atomic force microscopy (AFM) to better understand the function of  $A\beta$  in the pathogenesis of AD.

**Hannon, Ashley**

**Mentor(s) -- Dr. Sanjay Ahire**

### **McLeod Physician Associates: Patient Flow Time Improvement**

Our Capstone Team worked with Primary Care Associates consisting of 3 family practice physicians, 3 internists, and 1 nurse practitioner at McLeod Health in Florence, SC. Through multiple on-site visits, we shadowed patients, providers, and nurses to map the current state process. We then simulated the current state process using Process Model software to develop eight major kaizens and reduce both patient cycle and wait time. The goal of the project was to increase patient satisfaction by decreasing patient cycle time during appointments. This would increase the throughput of patients seen by each provider on a daily basis and lead to faster access for patients to providers.

**Harmon, Ashley**

**Mentor(s) -- Dr. George Roy**

### **Teaching the Middle School Child: What I Learned and Experienced**

During my time at the University of South Carolina, I have learned about education through two avenues: theory and practice. I became knowledgeable about relevant psychology and pedagogical theories through my coursework at the university, and this gave me a solid foundation for teaching a variety of middle school students. My practicum experiences gave my education another layer of depth, as I student taught with middle school students at Busbee Creative Arts Academy in Cayce, South Carolina. The internship gave me the opportunity to discover which theories and concepts work in a middle level classroom. From my experiences, I found out that every class of students is unique, and the theories and concepts that worked for one class, may not work for another. With this, I found that middle level students learn better when the learning experiences are obtainable, meaningful, exploratory, and authentic. Overall, my internship has shown me that theory and practice can

coincide with one another, so long as educators keep the students in the classes in mind. Moreover, my internship has given me the tools and skills to be a successful teacher who can collaborate with other education professionals, create effective lessons, and make a positive learning environment for students to learn. In the future, I aspire to teach many years of middle level students and to continue my education through a curriculum and instruction graduate program.

**Harris, Laura**

**Mentor(s) -- Ms. Theresa Harrison**

**How an Internship Changes Perspective**

In the summer of 2017 I spent 10 weeks in Kingsport, Tennessee working for Eastman Chemical Company as an intern in Specialty Plastics Execution. I was tasked with two larger projects, which including reviewing and optimizing inventory for two product families, as well as several smaller ones. I was also provided various opportunities for professional development. My end goal was to come up with a target stock number for these products, which was something I had learned to do in previous supply chain courses by using a formula. However, when diving into the project, I quickly found that just plugging numbers into a formula (like I had done in class) was not going to work for this real world issue. Eventually, I was able to reach my end goal of finding the target stock numbers, through a completely different method than I had originally expected. This helped me realize how different the concepts and theories I learn through my coursework can be in a real world setting, something that I would not have discovered without this internship experience. While I enjoyed my experience and work on the project, it also made me realize that the job that I was originally searching for right out of college, supply planning, might not actually be the right fit for me. Without this exposure to real world scenarios I would not have considered jumping into the entirely new field of Real Estate.

**Harris, Olivia**

**Mentor(s) -- Dr. Daniel Speiser, Mr. Luke Havens**

**Visual acuity of *Ancylomenes pedersoni* cleaner shrimp in increasingly turbid waters.**

Climate change is altering the context of many natural interactions between organisms. Many creatures, both aquatic and terrestrial, rely on signaling and cooperation in order to meet their ecological needs. These social interactions are built through communication mechanisms that have been evolutionarily tuned to these needs. As climate change alters the natural world these creatures live in, the fidelity of their communication could suffer, causing social interactions to degrade. The reef environment is a very social one for many species, like Pederson's cleaner shrimp, *Ancylomenes pedersoni*. These shrimp engage in symbiotic relationships with fish, called client fish, in which the shrimp cleans the fish of ectoparasites that are its major food source. These shrimp, with monochromatic vision and coarse spatial resolution, rely on broad visual cues from the client fish in order to engage in symbiotic cleaning behavior. One of the results of climate change is increased turbidity, which results in a loss of visual information in aquatic system. The aim of this project is to 1) use existing data to estimate the current levels of turbidity in the Caribbean, 2) use behavioral trials to determine the effect of increasing turbidity levels on the visual acuity of *Ancylomenes pedersoni* cleaner shrimp. An optomotor drum will be used to assess the visual acuity of *A. pedersoni* to differing levels of turbidity. The data from this research will be used to determine the visual acuity of *A. pedersoni* in response to increasing levels of turbidity, offering us important information about the possible effects on interspecific symbiotic relationships in the reef environment. As turbidity increases in reef conditions, we can use the results of this experiment to predict the effect that it might have on the interactions that are crucial for this species' success.

**Harris, Laura**

**Mentor(s) -- Dr. Sanjay Ahire**

**McLeod Regional Medical Center Capstone Project**

We undertook this Operations and Supply Chain Capstone Applied Research / Consulting Project at McLeod Health Regional Medical Center in Florence (SC) to improve the hospital's "patient rooms discharge cleaning turnaround time". Through primary data and historical data of 72,000 room cleaning history records for the last year, we analyzed the root causes of delays and excessive clean times. We developed and piloted an integer linear programming optimal staffing model, instrumental in shorter room turnarounds, higher patient satisfaction and higher staff morale. McLeod Health is currently implementing the optimal staffing policies.

**Harrison, Taylor**

**Mentor(s) -- Dr. Nina Moreno**

**Peer-Leadership and Professional Development through The Office of New Student Orientation**

Obtaining a leadership position was something at the top of my list when thinking about what I wanted to accomplish in my four years as an undergraduate student. "Resume boosters" were constantly mentioned by my professional mentors, and I wanted my experiences to be as competitive as possible before entering graduate school and the workforce. From January 2015 to January 2016, I was an Orientation Leader, and from January 2016 to January 2017, I was promoted to the position of a Team Leader in the Office of New Student Orientation at the University of South Carolina. These were wonderful opportunities that gave me the chance to interact with hundreds to thousands of people on a daily basis and enhanced my interpersonal skills both verbal and nonverbal. These positions within The Office of New Student Orientation ended up being more than "resume boosters" because they provided the resources for me to become culturally competent and socially sensitive. Because of the experiences these positions provided, I will be able to apply the skills and knowledge I learned into my future career and daily life as a young professional.

**Haskin, Hannah**

**Mentor(s) -- Mr. Rico Reed**

**Experiential Education: Making Miracles Happen at TTP**

During the fall of my senior year at the University of South Carolina, I was placed to complete my practicum with The Therapy Place (TTP) in Columbia, SC. TTP is a clinic that provides occupational, physical, and speech therapies to children with special needs. As an aspiring pediatric occupational therapist I could not have been more excited for this new endeavor. Through my role as a general clinic intern, I had the responsibility of assisting the therapists during their sessions. This allowed for me to get valuable hands-on pediatric experience. I observed the creative, individualized interventions for over fifty clients, with a wide variety of diagnoses such as Autism Spectrum Disorder, Sanfilippo Syndrome, and DiGeorge Syndrome. I learned that these individualized interventions sometimes are as simple as adjusting the grip of a utensil or can be as intense as constraint induced movement therapy. This internship proved to be very valuable in understanding the role of occupational therapists and the importance of inter professionalism with the physical and speech therapists, thus allowing for better whole patient care. I was able to affirm through this internship that occupational therapy is a career that I am very passionate about pursuing. This internship provided the knowledge I needed about the career of occupational therapy to solidify my decision of applying to get my Masters in Occupational Therapy. Within the next year I plan to enter a graduate program for occupational therapy and I know that the knowledge I obtained through my internship with TTP has helped me to be in the place I am now but I know also that it is knowledge that I will carry with me throughout my future career.

**Hatcher, Jr., Michael Troy**

**Mentor(s) -- Mr. Duncan Culbreth**

**Turning A Hall Into A Home: From Community Member to Campus Leader**

Two impactful leadership positions that I have held while at USC are as a University 101 Peer Leader

and Resident Mentor. University 101 Peer Leader is a position that allows juniors and seniors to mentor and educate first-year students on their transition from high school to college alongside a University co-instructor. Resident Mentors monitor residence halls to enforce USC Housing policies and aid in the transition to college. These positions included teaching lessons, creating positive dialogues, and inviting speakers to educate first-year students about resources. I was influenced to take on these roles based on the impact that my Peer Leader and Resident Mentor both had on me freshman year. I wanted to continue making a positive influence in the lives of others the way these two had on mine. From these experiences, I was able to grow as a facilitator and as a listener. I understood the needs of students/residents. I was able to handle more difficult conversations based on facts and rationality rather than intense opinions and/or emotions. I understood the importance of making sure multiple viewpoints were respected, not just my own. These experiences have allowed me to become a better-rounded individual and grow as a leader. An individual opinion is not the only one, and the proper way to resolve conflict is to allow all possible viewpoints to be presented so as to make an informed opinion. These are skills that will be extremely beneficial as I move forward to my intended career as a lawyer in order to mediate disputes and resolve issues.

### **Haynie, Anastasia**

**Mentor(s) -- Dr. Steve Rodney**

#### **Photometry of High Redshift Gravitationally Lensed Type Ia Supernovae**

Out of more than 1200 well-identified Type Ia Supernovae (SNIa), only ~10 have  $z > 1.5$ . Detection of these distant SNIa is improved by taking advantage of gravitational lensing; objects in the background of massive galaxy clusters become magnified and are therefore easier to find. Studying SNIa at high redshifts is the first step towards developing cosmological models that can describe dark energy in the early universe. SN Nebra ( $z \sim 1.75$ ), magnified by cluster Abell 1763, was discovered in observations during the RELICS project, which focused on fields of view that experience strong gravitational lensing effects. Recent work on Nebra has focused on improving photometry and building and fitting preliminary light curves.

### **Heath, Brandon**

**Mentor(s) -- Mrs. Laura Hughes**

#### **Gaining Confidence from Campus Leadership**

During my years here at the University of South Carolina I led as both a Resident Mentor (RM) and a University 101 Peer Leader. As an RM I influenced, mentored, and supervised residents of the residence halls. In my U101 Peer Leader role I was able to influence the lives of freshmen students in the classroom by giving them practical tips on how to navigate the newfound freedom that comes with college. In both roles I had the opportunity to push myself in order to make an impact in the lives of freshmen. This was important for me to do because I know that the first year of college can be a confusing and formative time. I wanted incoming students to love the university as much as I did, and the best way I could ensure that was to provide them with what I have found to be the most useful tools and resources. Through these experiences I gained confidence in myself. I realized that I had a lot of fear, and for valid reason, but I needed to break through those fears in order to help and lead others. I needed to become vulnerable in order to give them valuable world insight. I want everyone to see how much helping others can help you. Leadership can be difficult but we all have it inside of us in some way, we just need the confidence to share our experiences with others. These experiences have shown me that law school is going to be a stepping stone on the way to influencing others. I want to use my knowledge, experience, and confidence to give a voice to those that need one.

### **Heimke, Isabella**

**Mentor(s) -- Dr. Kathryn Luchok**

#### **Student identities and stressors affecting satisfaction with college life**

On college campuses, students are exposed to a variety of stressors ranging from mental health problems like anxiety and stress, to a lack of belonging. Not only do these stressors cause emotional distress, but they can influence students' satisfaction with their college experience. Individuals with lower stress levels tended to perform better than those with high stress levels. Certain ethnicities and minority identities are at increased risk for stressors, and thus may be experiencing lower satisfaction with their college campuses.

The purpose of this project is to identify how various identities of USC students—such as race/ethnicity, gender, and sexual orientation—and associated stress affect satisfaction with college life. This project will involve data analysis of a subset of items from the 2016 Campus Undergraduate Climate Survey. Demographic information provides the data on identities as the primary independent variable in a regression analysis that also includes a series of stressors such as anxiety, isolation, and depression which are measured by Likert scales based on agreement, neutral, and disagreement to each question. The outcome variable is a 9-item scale of overall campus satisfaction.

Additionally, qualitative narrative data will be used to help determine how stressors and identities are related. The results of this study will detect which identities among USC undergraduates are associated with an increased risk for stressors and a lower overall satisfaction with campus. I anticipate individuals with minority identities will face more stressors than students with majority identities and in turn will have lower overall satisfaction with the college campus.

Elucidating the relationship among these variables may inform future interventions to improve campus climate for all students.”

**Heinrich, Jessica**

**Mentor(s) -- Dr. Stephen Thompson**

**Effective Instructional Strategies in the Middle School Classroom**

I have spent my time at the University of South Carolina as a Middle Level Education major with concentrations in History and English. The final semester of this course of study requires a full time internship experience in the middle school. I have spent my time in the sixth grade classroom teaching the Ancient Civilizations curriculum. I have been delighted and challenged by a diverse group of students with varied needs. The school in which I am completing this full time internship receives the Title I classification. The socioeconomic demographic of the school allows me to apply knowledge concerning how external environments deeply impact student learning. Understanding how to meet all of these needs without neglecting any student has been a challenge; a challenge that I have been well prepared to meet through both my College of Education and History coursework. My students receive my best teaching via a combination of both my implementation of effective instructional strategies, as well as my content knowledge.

**Heins, Claire**

**Mentor(s) -- Mrs. Katie Strickland**

**Graduation with Leadership Distinction in Global Learning**

This presentation explores the impact of U.S. policies of isolationism on the cultural awareness of Americans. It also examines how this lack of awareness contrasts with the spreading soft power of the U.S. Through political science classes such as The Media and Foreign Policy, and International Relations in a Globalized World, my presentation is a comprehensive look at the xenophobic and ethnocentric community we, as Americans, have fostered. To do so, I examine the lessons and experiences I have learned through three separate study abroad trips. I spent one month in Rwanda, one month in Japan, and one semester in Scotland studying the relationship between these countries and the U.S. The conclusions I drew through my study abroad experiences have allowed me to create

insights about how we as a society can make changes to promote global awareness. I address issues of social media as a tool for global awareness, the lack of global classroom opportunities, the lack of public school education that focuses on the International Arena, and how travelers can be positive ambassadors for the people of other countries. As the most powerful country in the world it is our responsibility to be aware of how our foreign policies and attitudes impact others.

**Heinzen, Greer**

**Mentor(s) -- Prof. Elise Lewis**

**Student Nurse Internship at Palmetto Health Baptist**

In the summer of 2017, I had an internship through Palmetto Health where I shadowed a nursing preceptor full time for eight weeks. Nurses have always told me that you cannot learn how to be a nurse in school; you must be in the role to truly understand it. Thus, I was eager to have a peak at what it would be like to be an actual nurse during my internship. While on a Post-Surgical floor, I handled large and demanding patient loads, practiced basic nursing skills, and managed admissions and discharges every day. I used my clinical reasoning skills to make judgement calls on treatments and care plans. My preceptor allowed me to make decisions, even when they were wrong, in order for me to learn from them. In fact, I can easily say that I learned more in eight weeks than I had in the past year of nursing school because of the hands on approach that my internship had. This internship was extremely significant to me because across the country, we have a nursing shortage which stems from a lack of educators. I am thankful that my preceptor took the time to explain things to me and foster the future of nursing. I too want to share my knowledge by becoming a preceptor in the future to allow someone else the opportunity to grow the way I did. As the world of healthcare continues to evolve, you learn that being a nurse is being a lifelong student and teacher.

**Heiser, Jennifer**

**Mentor(s) -- Dr. Jil Stewart**

**Reliability of a measure of corticospinal integrity post-stroke**

The corticospinal tract is a descending neural pathway, and it is the primary pathway that carries motor function information from the brain to the spinal cord. When the corticospinal tract is affected by stroke, the information pathway can be disrupted, which contributes to motor deficits post-stroke. Diffusion tensor imaging (DTI) is an imaging tool that is based on diffusion characteristics of water molecules. Fractional anisotropy (FA), a measure of microstructural integrity derived from DTI, is often used for exploring the structural integrity of the human brain, and it can be used to detect corticospinal tract disruption after stroke. However, the reliability of FA over days has not been established. Therefore, the purpose of this study was to determine the reliability of FA in the corticospinal tract in individuals post-stroke. Fourteen individuals post-stroke (mean age:  $59.21 \pm 9.32$ ; mean months post-stroke:  $45.36 \pm 45.08$ ) completed two sessions of DTI four days apart. A sensorimotor area tract template of the corticospinal tract was used to define the tract. The tract template was transformed into each individual's brain space on each day and mean FA from the tract was extracted from both the lesioned and non-lesioned side. Reliability across days was determined using Pearson's correlation and intraclass correlation coefficient (ICC). Mean FA in the lesioned side on day 1 ( $0.42 \pm 0.03$ ) and day 4 ( $0.43 \pm 0.03$ ) were lower compared with mean FA in the non-lesioned side on day 1 ( $0.45 \pm 0.02$ ) and day 4 ( $0.45 \pm 0.02$ ), respectively ( $p < 0.01$ ). FA on day 1 and FA on day 4 correlated for both the lesioned side ( $r = 0.84$ ,  $p < 0.001$ ) and the non-lesioned side ( $r = 0.85$ ,  $p < 0.001$ ). The intraclass correlation coefficients indicated excellent reliability for FA in the lesioned side (ICC=0.83) and the non-lesioned side (ICC=0.85). The high reliability suggests that this measure of corticospinal tract integrity is stable over days. This data regarding stability of FA over days will help inform studies that investigate the effect of training or exercise on brain structure after stroke.

**Helgeson, Krystene**

## **Mentor(s) -- Dr. Lara Ducate**

### **GLD Professional and Civic Engagement: More than a Manager**

Many undergraduate students struggle with the thought of balancing school with employment, and some would find holding down a part time job through their college career daunting. During my undergraduate studies, I have held down a full-time job and several part time jobs while delicately balancing my home and school life. The most significant work experience that I have had was during my role as customer service manager at Hobby Lobby in Rock Hill, SC. While I was contemplating the endless possibilities of my major for undergraduate studies, I started applying to nearby jobs to help support my husband and myself. Little did I know that my walk-in job application would turn into a distinguished leadership role.

I was hired as a seasonal helped, stocking the shelves with newly received merchandise and displaying the new product strategically so it caught the shoppers' eyes. Having never worked retail before, I had started my journey feeling overwhelmed and out of my league. I quickly caught on to the retail world and within 7 weeks I was promoted to department manager of an entire department. I was responsible for inventory and merchandising products. After a few short months, I was placed into a more difficult department, then cross-trained in numerous others. My manager noticed my interest in helping others and complemented my detail-oriented disposition and offered me the customer service manager position. I supported and facilitated efficient front-end operations of a \$6 million store, monitored audits and inventory within departments, and trained employees in order to improve production. I also promoted sales by organizing merchandise into unique marketing displays.

While in this position, I learned more than the basics of retail management: I learned how to manage my time successfully, how to speak constructively and respectfully to coworkers and guests, the value of positive leadership and the importance of finishing what is initiated. After a few months in this position, I resumed school at USC as a junior, and continued in the customer service manager role until I began my senior year, and a new chapter of my employment path."

## **Helgeson, Krystene**

### **Mentor(s) -- Dr. Diane Ehlers**

#### **Examination of well-being, cognitive function, and physical activity in young versus old breast cancer survivors**

Research in breast cancer survivors (BCS) has documented a "well-being paradox," the phenomenon that objectively measured outcomes do not necessarily influence individuals' subjective well-being. Evidence suggests this paradox may be more salient in younger BCS, who report higher levels of depression, anxiety, and fatigue and lower health related quality of life (HRQL) versus older BCS. Further, this research has excluded important components of well-being, including cognitive function. Additional studies investigating age differences in and potential treatments for negative well-being outcomes are needed. The purpose of this study was to examine differences in well-being and cognition between younger (<60 years) BCS and older (>60 years) BCS, and if moderate-to-vigorous physical activity (MVPA) was differentially associated with well-being and cognition by age group.

BCS (N=300) completed questionnaires and cognitive tasks using an iPad application. Questionnaires assessed demographic and clinical characteristics of participants, depression, anxiety, fatigue, HRQL, and subjective memory impairment (SMI). Cognitive tasks assessed executive function (Flanker, Task-Switch, Trails B) and working memory (N-Back, Spatial Working Memory [SPWM]). Participants wore an accelerometer for seven days to estimate their daily MVPA. Independent t-tests and multiple linear regression were used to analyze the data.

Younger BCS (n=167) reported significantly greater anxiety ( $p<0.001$ ), depression ( $p=0.002$ ), and fatigue ( $p=0.005$ ); lower HRQL ( $p<0.001$ ); and greater memory impairment ( $p=0.01$ ) than older BCS (n=133). However, younger BCS performed faster on Task-Switch ( $p<0.001$ ), Trails B ( $p<0.001$ ),

N-Back ( $p=0.02$ ), and SPWM ( $p=0.002$ ) and recorded greater MVPA ( $p<0.001$ ). MVPA was associated with lower depression ( $\beta=-0.11$ ,  $p=0.05$ ), lower fatigue ( $\beta=0.22$ ,  $p<0.001$ ), greater HRQL ( $\beta=0.17$ ,  $p=0.002$ ), and faster Task-Switch ( $\beta=-0.16$ ,  $p=0.006$ ) performance. The benefits of MVPA on depression ( $\beta=0.18$ ,  $p=0.08$ ) and anxiety ( $\beta=0.19$ ,  $p=0.076$ ) were marginally greater for younger BCS. Despite better performance on cognitive tasks and greater MVPA, younger BCS reported lower well-being and greater SMI. Findings indicate MVPA may be associated with some well-being outcomes and may specifically benefit depression and anxiety in younger women. Additional research is needed to understand age differences in the “well-being paradox,” the role of MVPA in enhancing well-being in BCS, and the long-term impact of cancer on well-being in BCS diagnosed at a younger age.

**Hendricks, Robin**

**Mentor(s) -- Dr. Paula Feldman**

**Romantic Era Lyrics**

The Romantic Era in the British Isles and America featured poetry often set to music. Some of this music appeared in well-known publications, such as *The Scottish Minstrel*, *The Scots Musical Museum*, and *Irish Melodies*. The project, headed by Dr. Paula Feldman, C. Wallace Martin Professor of English, is being published in a website entitled “Romantic Era Lyrics,” that features sheet music, performance recordings, and biographies of the poets, composers, and publishers who created these Romantic era songs.

My role in this endeavor consists of compiling biographical information on these key figures, coordinating performance recordings with musicians and vocalists, and uploading digitized scores to the website. The poets, composers and publishers came from different backgrounds but lived in the same world of social change and political upheaval, which the website biographies highlight to give context to their works. This website will provide a more complete view of the Romantic Era by including all in one location the digitized musical scores for Romantic-era poetry, collected together for the first time, recordings of performances, and information about the artists and their social world. This material will allow students, professors, and scholars around the world to experience this poetry for the first time, in the form its initial audiences knew it and to understand its context in a fresh way.

**Hennes, Chuck**

**Mentor(s) -- Dr. Eugenia Broude**

**How does inhibition of Cyclin-Dependent Kinase 7 (CDK7) affect the growth of Breast Cancer cells?**

Cyclin-Dependent Kinase 7 (CDK7) is an important transcription regulating kinase. The novel drug THZ1, a covalent CDK7 inhibitor, has been shown to affect the growth and survival of a triple negative breast cancer (TNBC) cells. TNBC cancers do not require estrogen, progesterone, or HER2 for their survival. Bioinformatics metaanalyses have shown that high CDK7 levels are correlated with poor patient prognosis in TNBC and here we have shown the same correlation for other subtypes of breast cancer.

A panel of cells was seeded into three sets of two 96 well plates with various concentrations of THZ1. One set was seeded with HCC1937 triple-negative breast cancer cells, another set was seeded with BT549 triple-negative breast cancer cells, and the last set was seeded with HER2+ SKBR3 cells. Of the three sets of two, 1 plate in each set was treated for 2 days, and the other plate was left treated for 7 days with THZ1. All three cell lines had identical treatments with THZ1 and were ran in triplicate and tested for cell viability.

One treatment group was treated with THZ1 for 2 days and the other group was treated for 7 days

and provided very similar results between each cell line. All three cell lines showed varying degrees of inhibition depending on the concentration of THZ1 applied and the duration of treatment. Overall the inhibition of cell growth was consistently similar across all the cell types tested.

We found strong positive correlations between high CDK7 expression and worse relapse-free survival in TNBC and HER+ breast cancer cell lines. We showed similar inhibition of the growth of TNBC and HER2-positive cells using the CDK7 inhibitor THZ1. The inhibitor was effective in the two subtypes of breast cancer tested, with no apparent differences between TNBC and HER2-positive cells. We concluded that THZ1 does, in fact, inhibit cell growth of cells expressing high levels of CDK7, but it is not significantly more effective in triple negative breast cancer over HER2-positive breast cancer, which opens new therapeutic options for THZ1.

**Hepburn, James**

**Mentor(s) -- Ms. Jennifer Bess**

**Expand your Cultural, Linguistic and Academic Boundaries through the Gilman Scholarship**

The Benjamin S. Gilman Scholarship is offered by the US State Department to undergraduates to study abroad for a summer, semester or academic year who receive the Pell Grant to promote cultural, academic and linguistic exchange between the US and other countries. Combined with USC financial aid, it often covers the whole difference between a regular semester at home and a semester abroad. The program likes to support study abroad in non-traditional destinations for which there are few resources available to study abroad.

Jimmy Hepburn studied in Budapest, Hungary with the Budapest Semesters in Mathematics program in Spring 2017. There he not only learned a great deal of the language and culture but was academically challenged through the unique way mathematics is done and taught in Hungary. Outside the classroom, he visited other European countries, made local friends, joined talks and meetings of a civil-societal organization and remained in the summer to teach English and attend a two-week program on Central European affairs at a policy institute. His experience not only academically and culturally challenged him but also paved a way for a desired career in international affairs.

Allison Broschart studied in Lyon, France in Fall 2016 through the University Studies Abroad Consortium. Her program at l'Université Lumière Lyon 2 focused on the French language, and her host family provided her with countless opportunities to experience Lyonnaise culture. During her free time, she made friends with local French students and visited various other European countries in order to further expand her linguistic and cultural boundaries. Her time in Lyon helped improve her language skills, as well as increased her independence and her general belief in herself and her abilities.

Look into the Gilman Scholarship to see if it can offer you the opportunity to reap the cultural, linguistic, academic, vocational and character-building benefits of study abroad in ways that will exceed your expectations!

**Hepburn, James**

**Mentor(s) -- Dr. George McNulty**

**Some Fundamentals of Group Theory in Homotopy Type Theory**

In the early 20th century, certain crises in the study of the foundations of mathematics produced two major alternative bases for mathematics: set theory and type theory. Set theory in most cases is simpler to work with and so became the established way of doing mathematics. Whereas set theory relies upon first-order logic and allows almost any set of axioms, type theory rigidly categorizes mathematical objects from the start with many built-in rules while at the same time not assuming certain rules of classical logic, producing more constructive proofs. These characteristics lend type theory its advantage over set theory in computability and proof-verification, much needed in an age when mathematical proofs can number far too many pages for any human to read. What has long made type theory difficult to use, however, is the question of how to interpret its key notions. In recent years,

Vladimir Voevodsky and others have proposed interpreting type theory through seemingly disparate homotopy theory, a field in algebraic topology, by means of the univalence axiom. The axiom states that (extensional) equivalence between types can be viewed as homotopy equivalence, and thus allows the study of types to be analogous to the study of homotopy spaces. In addition to the computational and proof-theoretic advantages homotopy type theory has over set theory, it promises to be a new foundation for mathematics. In this paper, I introduce some of the fundamental notions of Per-Martin L\"of type theory and the homotopical interpretation of it in order to formalize some fundamental concepts of group theory. In particular, I define the axioms of a group and prove LaGrange's theorem in homotopy type theory. The paper serves as a taste of what homotopy type theory can do to the unfamiliar working mathematician in providing a basis for studying the ubiquitous mathematical structure of the group.

**Herbert, Austin**

**Mentor(s) -- Dr. Kristina Ramstad, Dr. Natalia Bayona, Dr. Stacey Lance, Dr. Larry Bryan**

### **Assessing genetic population structure of American wood storks**

American wood storks (WOST, *Mycteria americana*) are large, non-migratory birds native to the southeast US, the Caribbean, Central America, and South America. They are the only stork species that nests in North America and are federally protected as Threatened under the Endangered Species Act. WOST use thermals to soar such that air uplifting off of the surface of the earth allows them to travel distances over land, but infrequently over open water. Thus, gene flow is likely restricted between WOST colonies on opposite sides of the Caribbean Sea or the Gulf of Mexico. Several studies have tested for genetic population structure in WOST and concluded that they are panmictic and comprise a single population throughout their global range. All of these studies, however, suffered from severely limited sampling and low statistical power. In this study, we are using a powerful genomics approach to test for genetic differentiation among US WOST colonies and between WOST at their range extremes. Specifically, we are asking (1) Are WOST panmictic throughout their global range?, (2) What is the level of connectivity between WOST populations in Brazil and the US?, and (3) How many populations of WOST are there in the US? We sequenced reduced representation libraries of samples from US (n=19) and Brazil (n=20) using a modified approach called 3RAD and identified over 7600 loci that contain multiple single nucleotide polymorphisms (SNPs) in WOST. Baits are currently being designed to implement a RADcap approach to capture and sequence ~5000 independent SNPs simultaneously in 300 US and 300 Brazilian WOST. The resulting data will allow for the most powerful analysis of WOST genetic populations structure to date, which is critical for defining the proper scale of management for WOST and assessing the susceptibility of individual colonies to local extinction.

**Herbert, Emily**

**Mentor(s) -- Dr. James Carson**

### **The Effect of Lewis Lung Carcinoma on Protein Turnover in Female mouse**

Introduction: Cachexia is a complex wasting disorder characterized by an unintentional loss of body mass, with or without the loss of fat. Lewis Lung Carcinoma (LLC)-induced cachexia, is one pre-clinical model used to examine the progression of cachexia. This muscle wasting condition is characterized by reduced protein synthesis and increased degradation in the male mouse. However, LCC-induced cachexia's effect on protein turnover in the female mouse is unknown. Purpose: The purpose of this study was to determine protein turnover in female mice using a pre-clinical model of cancer cachexia. Methods: Twelve female C57BL/6 (B6) mice were randomized into either the control or LLC group. At 8 weeks of age, LLC cells were implanted into the flank of the female mouse. Mice were sacrificed at 12 weeks of age. Tibialis anterior muscle was immediately snap frozen and homogenized at a later date. Results: LLC induced cachexia in the female mouse, characterized by significant reduction in body mass when accounting for tumor size. The fasting glucose levels were found to be

higher in the LLC mice. Muscle mass and reproductive organs were significantly reduced. Protein synthesis was not altered by the LLC tumor. Discussion: Collectively, these results suggest that protein turnover in the female mouse following LLC implantation is disrupted. This is shown by increases in the protein degradation without changes in protein synthesis and autophagy-lysosome pathway. These findings are different than what is currently known in the male mouse and therefore deserves further investigation to determine the sex specific role of LLC-induced cachexia.

**Herold, Ashlyn**

**Mentor(s) -- Dr. Shana Harrington**

**Biophysical Agent Use in Individuals Diagnosed with Cancer: Is it Safe at Reducing Pain?**

Introduction

The purpose of this systematic review was to identify physical therapy biophysical modalities used on cancer survivors in order to describe the type of patients receiving modalities and the capacity in which they are used. This valuable information can direct future use of such agents to help reduce cancer related pain in a physical therapy setting.

Methods

PubMed database was used and articles were searched up to September 27, 2017. Studies were included if the participants had been diagnosed with cancer, a modality was used in rehabilitation and the study was published in English.

Results

A total of 1753 articles were screened on Pubmed database through the University of South Carolina. Fifty-eight full text articles were eligible for review. Three additional articles and one textbook from outside sources were also included. The four most common modalities reported in the literature were transcutaneous electrical nerve stimulation (TENS), biofeedback, low-level laser therapy (LLLT), and kinesiology tape (K-tape).

Discussion

Type of cancer, patient population, and whether the patient was undergoing active treatment or in remission varied. However, the modalities were most often studied in adults with breast, lung and bone cancer. Written and verbal questionnaires were generally used to report pain and patients frequently reported less cancer pain with modality use.

Conclusion

Based on our review, the use of a variety of biophysical modalities on cancer survivors is safe and useful in reducing pain. The most commonly reported agent was TENS, which the literature reported safe in rehabilitation for adults with cancer pain.”

**Herring, Brooks**

**Mentor(s) -- Dr. William Jones**

**Old war dog, new tricks: understanding the dynamic piece, and the puzzle around it.**

We, as a human race, are a puzzle. That puzzle, the picture it forms, the way its pieces fit, and the shape of each piece in it changes constantly. As individuals, we each form a dynamic piece to this puzzle. We too change and evoke change around us. Our everyday actions create ripples that radiate from us and affect those around us. To truly appreciate the beauty of the puzzle that is our world, we must understand how we fit in it, and how that fit will change throughout our lives. My journey at USC has taught me a great deal about myself as a piece of the puzzle, and about the puzzle itself. Being a Veteran inherently makes me different from my peers, but it doesn't have to mean I can't fit into the puzzle. As it turns out, I was fitting into the puzzle all along; just in different ways. I've conscious-

ly thrust myself into situations and groups where I knew I'd be different, and I've made changes in myself and encouraged changes in others, that I feel have ultimately made our Carolina puzzle a little tighter, more complete, and vibrant. Here, I have attempted to offer a very brief and truncated version of how my Carolina experience affected me, changed me, enlightened me, and encouraged me to advocate for my fellow Veterans and facilitate others' understanding of our grand, dynamic puzzle.

**Hesser, L. Ande**

**Mentor(s) -- Dr. Susan Wood, Mr. Brandon Muniz**

**Distinct differences in neuronal activation during stress predict enduring changes in corticotropin releasing factor in susceptible and resilient rats**

Exposure to social stress is universal, but differences in the way individuals cope can determine their susceptibility to developing stress-related disorders such as depression. The present study utilized repeated exposure to a resident-intruder paradigm of social defeat to determine whether the acute changes in neuronal activation during social stress predicted long-lasting changes in neuropeptide expression. These studies categorized individual differences in response to social defeat by measuring the latency to exhibit a supine posture in the presence of the aggressive resident. Active coping rats spent more time in upright postures and fighting back in the presence of a dominant resident rat than did passive coping rats that were quick to submit. Those defined to cope passively developed depressive-like behaviors which persisted long after the stress period, while active coping rats did not. This study evaluated neuronal activity as measured by cFos immunohistochemistry following a single exposure to stress and corticotropin releasing factor (CRF) in a separate subset of rats five days after repeated stress exposure. The central amygdala (CeA), basolateral amygdala (BLA), hippocampus, and locus coeruleus (LC) were investigated as dysfunction in these brain areas may contribute to depressive-like behavior in susceptible individuals. Importantly, these brain areas communicate stress signals to each other, with the CeA projecting to these regions to release CRF. The passive coping animals display greater increases in cFos markers of neuronal activity in response to the first exposure to social defeat in the CeA, BLA, and LC as compared to active coping individuals. Alternatively, the neuronal activation did not differ between coping groups in the hippocampus. CRF levels were also affected by stress when measured under resting conditions 5 days after the final social defeat exposure. CRF expression was increased in the CeA of passive coping rats, while levels in hippocampus were unaffected. Current studies are identifying whether the two other brain regions that exhibited distinct increases in neuronal activity in the passive coping subgroup (LC and BLA) also exhibit enduring changes in CRF. Our findings illuminate the neurochemical circuitry and enduring effects behind susceptibility to social stress-induced depressive-like behavior.

**Hetherington, Austin**

**Mentor(s) -- Dr. Jill Stewart**

**Scaling Anterior Deltoid Activation to Contralateral Reach Movement in a 3-Dimensional Paradigm**

Research in the field of motor behavior has revealed that stroke patients suffer from a lack of scaling in acceleration amplitude to reach target distance. This contrasts with the well-defined scaling seen in young healthy adults. The current state of research is tasked with providing a better understanding of motor cognitive deficits in stroke patients. Electromyography sensors placed on the upper-arm extensor muscles of healthy adults were used to gain an electrophysiologic perspective into this scaling phenomenon, specifically, to determine whether amplitude response of the anterior deltoid scales with reach distance. Six right-hand dominant, young adults reached with the right arm to contralateral targets in a 3-dimensional virtual environment. Each participant made 98 reaches to targets positioned 7, 14, and 21 cm away. EMG sensors were placed on the anterior, middle, and posterior deltoids, biceps and triceps brachii, as well as the upper trapezius. Electromagnetic sensors were used to provide arm position data, from which velocity and acceleration values could be derived. Results found

that target distance significantly affected movement distance ( $p < 0.05$ ) and movement time ( $p < 0.05$ ) for the reaches made. Furthermore, movement error (distance from the target to the end of the reach) was significantly affected by target distance ( $p < 0.05$ ). The electrophysiologic findings revealed that target distance had a significant effect on mean anterior deltoid activation during reach movement ( $p < 0.05$ ); however, this effect was not seen in either mean biceps or triceps muscle activations ( $p > 0.05$ ). These findings point to the anterior deltoid as being a major component in the scaling phenomenon known to exist in young, healthy adults between acceleration amplitude and target distance.

**Heugh, Rebecca**

**Mentor(s) -- Dr. Natalia Shustova, Ms. Allison Rice**

### **Corannulene-Based Hybrid Materials**

Metal-organic frameworks (MOFs) offer the unique opportunity for material engineering due to the almost limitless choices of metals or organic linkers. The first example of a crystalline corannulene-based material, which merges the intrinsic properties of MOFs and  $\pi$ -bowls was prepared. The photophysical and electrochemical properties of the first examples of corannulene-based MOFs have been investigated, highlighting the potential to move past solely synthetic studies of corannulene-based derivatives towards investigations of their properties. The corresponding novel corannulene-based derivatives are accessible on a gram scale, allowing for the comprehensive analysis of the prepared materials to be possible. The first example of a crystalline donor (corannulene)-acceptor material with a high ligand-to-ligand energy transfer efficiency was also explored. This work shows that it can be possible to extend MOF dimensionality through the  $\pi$ -bowl curvature, along with studies of corannulene-based material photophysics in the solid state, in which both facets could lead to advancements in optoelectronics. The prepared hybrid corannulene-based materials have undergone comprehensive characterization by single-crystal and powder X-ray diffraction, time-resolved photoluminescence, absolute quantum yield measurements, Fourier transformed infrared, UV-vis and fluorescence spectroscopies, thermogravimetric analysis, and cyclic voltammetry. Upon further advancement, these studies not only demonstrate the possibility to merge the intrinsic properties of  $\pi$ -bowls with the versatility of hierarchical scaffolds, but could also foreshadow the engineering of a novel class of corannulene-based hybrid materials.

**Higgins, Emma**

**Mentor(s) -- Ms. Maegan Gudridge**

### **Pushing the Boundaries of My Comfort Zone**

I studied abroad for the spring semester of my junior year, in Limerick, Ireland at the University of Limerick. After deciding to come to the University of South Carolina, a school that is only an hour from my hometown, I knew I needed to do something out of my comfort zone that allowed me to see the rest of the world. With beautiful scenery and deep culture, Ireland was a natural choice. I knew traveling abroad for an entire semester would allow me to challenge the boundaries of my safe home, as well as teach me things about Europe and its inhabitants. But, what I did not know was how much I would learn about myself. While engaging and absorbing Irish culture, I simultaneously gained personal growth and a love for exploration while traveling through Europe. I can now say that I will always agree to an invitation into a new culture, and that now I am perfectly comfortable boarding a train in a country that speaks a different language. I learned what was taught in my classes, but I also learned how to process and apply new experiences, how to interact with a city that is nothing like where I come from, and that mushy peas are not as bad as they sound. My five months abroad taught me to appreciate both the similarities and the differences found in the rest of the world. After pushing the limits of my comfort zone, I have developed a desire to push them even further.

**Hildebrand, Carly**

**Mentor(s) -- Mrs. Sarah Gay**

## **Transformational Health Care Incentives**

During my spring semester, I was able to work alongside a registered nurse at Lexington Medical Center (LMC). The LMC facility is a 438-bed hospital in West Columbia, South Carolina that employs staff of more than 6,500 health care professionals. This facility also sponsors numerous health fairs, on-site business health programs and trade shows in order to support the health of their community. As a Nursing major at the University of South Carolina, my opportunity at LMC has provided me with hands-on experience in medical surgical nursing. I had the opportunity to research the efficiency of the hospital's performance, present incentives to staff addressing unit-based issues, and learn valuable critical thinking skills. The literature I presented to the staff on the unit included information regarding the use of mutual support, patient education, and leadership skills in order to provide all patients at LMC with safe and comprehensive care. Participating in unit-based incentives has transformed my outlook on the profession of nursing. It has provided me with the knowledge that my future career and current efforts are not only important but also crucial to the efficiency of the health care system.

**Hill, Alyssa**

**Mentor(s) -- Dr. Melanie Palomares**

### **The Effects of Aerobic and Anaerobic Exercise on Short-Term Cognition**

Many studies have proven that moderate-intensity aerobic exercise has positive impacts on both short-term and long-term cognition. Studies have shown that there is a correlation between improved cognition and increased blood flow and oxygenation in the brain, which are both benefits of exercise. This study will examine the impacts of moderate-intensity aerobic exercise and high-intensity anaerobic exercise on short-term executive function. This study will have 3 groups: aerobic exercise, anaerobic exercise, and control (no exercise). While both high-intensity anaerobic and moderate-intensity aerobic exercise increase heart rate and blood flow, high-intensity anaerobic exercise also deprives the body of oxygen. Each group will perform a Go /No-Go task before and after their respective activity. We hypothesize that increased oxygenation will correlate with improved cognitive function, rather than exercise. Potential implications of our study will be discussed.

**Hill, Alexa**

**Mentor(s) -- Mrs. Sarah Gay**

### **How Summer Internships and Carolina Coursework Helped Me Build the Go-To Women's Media Brand on Campus**

Her Campus South Carolina has become the go-to resource for the undergraduate women at the University of South Carolina. However, if you asked students about the five-year-old organization three years ago, you probably would have gotten a curious stare and shoulder-shrug.

Three years ago, I probably would've given the same response too, until I switched from the business school to the school of journalism and mass communications. So, in an effort to prove to myself I hadn't just made the biggest mistake of my college career, I frantically searched for an outlet to engage creatively on campus. That outlet was HCSC.

After publishing my first few articles and becoming the first marketing and events director, I was elected as the president at the end of the spring 2018 semester. Since then, I've more than tripled our social media following, established a strong brand voice and created our annual women's networking and paneling event, In Her Shoes. My experience in the classroom, and beyond as an editorial and marketing intern, provided me with the skills and resources to make this transition happen.

Through our annual In Her Shoes women's networking event, I was able to go beyond just connecting students with local women media professionals and truly establish a local community of empowered

women. Now, as a graduating senior looking back on those last three years, I realize this organization has been more than a passion project for me, but my legacy as a women's empowerment activist on campus.

### **Hillsman, Hope**

**Mentor(s) -- Mrs. Anna Oswald-Hensley**

#### **Hopeful Future Leader**

Taking EDLP 520 was a life-changing, wonderful decision; it was recommended to me by Mrs. Anna Oswald-Hensley. Naturally, being the overachiever that I am, I wanted to graduate with leadership distinction, she explained that the class would prepare me for this goal. EDLP 520, was where I took on the role of a peer leader in Mrs. Oswald Hensley's University 101 class. This meant I had to lead the classroom in five or more activities created on my own. Of course, that was intimidating, not to mention the other aspects of the class like creating a dossier for a project grade. I gained confidence and experience taking this class that, I otherwise would have never inherited. Leadership did not necessarily come native to my personality, it was gained through experiences like such, where I was made to step out of my comfort zone. This will be great for my future teaching endeavors.

### **Hinckley, Sarah**

**Mentor(s) -- Ms. Theresa Harrison**

#### **Hands-on Experience in the Journalism Industry**

In the spring of 2017 and 2018, I worked with the South Carolina Press Association as an awards presentation designer and event photographer. The S.C. Press Association serves to strengthen the Palmetto State's newspaper industry, enhance public understanding of the role of newspapers, and protect basic freedoms of press, speech and the free flow of information while representing over 100 newspapers with a readership of 2.2 million. Each year they hold an awards presentation to recognize the best work from around the state that year. As a visual communications major at the University of South Carolina, my work with the S.C. Press Association provided me with first-hand experience and exposure in the field of journalism. I had the opportunity to further my skills with Adobe software such as InDesign and Photoshop with designing signage, an informational graphic, and presentations as well as gain experience in a fast-paced and deadline oriented environment. Through my work I was able to showcase some of the best page design, reporting, writing, and photography in the state. My role with the S.C. Press Association reaffirmed my decision to pursue work in the journalism industry and expand my skills as a photographer and designer. Through this experience I am confident in my ability to pursue a career in journalism and communications to create and disseminate ideas and events to the public.

### **Hoag, Jessica**

**Mentor(s) -- Dr. Magdalena Grudzinski-Hall**

#### **The Worth of a Mentor**

While growing up, I always had people I looked up to for guidance and leadership. As a young child, I hoped I could one day serve as a source of positivity and warmth as a role model to someone else. As a freshman at the University of South Carolina, I had the chance to become close with my peer leader thanks to University 101 Programs. A peer leader is an upperclassmen student that aids in the transition from high school to college for a group of freshman students. My peer leader became a confidant and someone to look up to during my freshman and sophomore years. Three years later, I applied and was selected to become a University 101 Peer Leader. During the fall semester of my senior year, I co-taught a class of nineteen business-major students and showed them how to make their time at Carolina great. As a mentor, I had the opportunity to coach, interact with and lead them to find their passions while succeeding within the classroom. Being a strong role model and mentor has always been something I have strived to do, but through University 101 Programs, I have successfully

turned that hope into a reality. After six months of getting to know these freshmen and seeing them mature, I am proud to see them on campus and hear about their numerous accomplishments. I believe that my mentors had a major influence on my life and I hope I have done the same by serving as a University 101 Peer Leader Program.

**Hodge, Stuart**

**Mentor(s) -- Dr. Mark Berg**

**New Statistical Methods for Analyzing Simulations of Materials and Its Application to an Ionic Liquid**

Chemists can create computer simulations of new materials that generate a time-series of a molecule's fluctuating properties. However, new statistical methods are needed to extract chemical information from these large data sets. This project introduces a new method of time-series analysis, which we call modal correlation functions, and tests it on a simulation of the local electric field in an ionic liquid. The chemical question is whether these new materials behave like supercooled liquids, for example, having either jump dynamics or rate heterogeneity. A previous analysis by multidimensional correlation functions saw features that were attributed to these characteristics. That interpretation predicted a non-Gaussian Green's function. From a matrix of modal correlation functions, we have fully reconstructed this Green's function. However, it is a complex, multivariable function that is difficult to visualize directly. Therefore, we have also created summary statistics that specifically test the Green's function for non-Gaussian behavior. These statistics were tested on the full reconstruction to prove they are numerically practical. The Green's function is found to be Gaussian at all times, a result inconsistent with either jump dynamics or rate heterogeneity. This ionic liquid does not have the characteristics of a supercooled liquid. The interpretation of the previous analysis must be revisited.

**Hollingsworth, Taylor**

**Mentor(s) -- Dr. Daniel Speiser**

**The Comparative Neuroanatomy of Scallops and their Relatives**

Mollusca, one of the most diverse invertebrate phyla, have varying sensory processing structures within their nervous systems. Generally, molluscs lack a single centralized brain and instead have clusters of nerve cell bodies called ganglia. Bivalve molluscs, which include well-known organisms like mussels, clams, and oysters, typically have simple cerebral ganglia that function as the main nerve center. Unlike many other bivalves, scallops have an ability to swim for short distances and a multitude of image-forming eyes along their mantle. In addition to a simple cerebral ganglion, scallops have an enlarged centralized nerve center known as the parietovisceral ganglion (PVG). The PVG is responsible for processing input from a diversity of sensory structures, including their dispersed visual system. Previous work with bay scallops, *Argopectan irradians*, has described their neuroanatomy, but there has been little comparative work with their closest bivalve relatives. The goal of this project is to compare the neuroanatomy of bivalves in the subclass pteriomorpha, which have varying sensory structures and swimming abilities; this was achieved by dissecting and comparing the PVG in *Argopectan irradians*, *Anomia simplex*, and *Ctenoides scaber*. It was hypothesized that these species would share a structurally similar PVG due to their similar sensory structures and phylogenetic relatedness. In comparison to *A. irradians*, the PVG of *A. simplex* is not bound within a sheath of connective tissue, is much larger in relation to body mass, and has a distinct and enlarged ventrocentral lobe. Similarly to *A. irradians*, the PVG of *C. scaber* is bound within a sheath of connective tissue, and has a defined ventrocentral lobe, however the lateral lobes thought to be responsible for processing vision appear to be reduced. Ongoing work includes immunolabeling sections of fixed PVG tissue to give a better understanding of the PVGs at a molecular level, which will allow new conclusions to be drawn about the relationships between species, and will provide insight into the evolution and sensory processing of the PVG across pteriomorpha.

**Hope, Marion**

**Mentor(s) -- Dr. Matt Childs**

**The Role of a Biomedical Technician in a Hospital**

Biomedical Technicians are responsible for preventative maintenance and fixing medical equipment in a hospital. While at Lexington Medical Center I trained under one of their technicians and learned the valuable role they provide for the hospital. As an intern, I followed my mentor to various parts of the hospital such as the ER and OR and learned how to fix telemetry transmitters, bedside monitors, perform preventative maintenance for defibrators and clean heater-cooler units. Without preventive maintenance on these medical instruments an ICU would be closed down if it did not have a bedside monitor, vitals for a patient could not be measured without telemetry, defibrators are used for emergencies in every part of the hospital and heater-cooler units are necessary equipment for heart surgery. This position helped me connect the knowledge I learned in the classroom and apply it to my work in the telemetry room when reading ECGs. In addition to learning how these devices worked and how to fix them, I learned the importance of working with a diverse cast of characters in terms of professions and ages. I was the youngest member of the Biomed team tasked with fixing equipment for doctors, nurses, physical therapists and people of various other professions. This internship provided vital training in how to interact with people who had more experience than I, but also learned how vital the services of a biomedical technician for doctors and nurses to provide quality health services. It was imperative that I work at the hospital to learn about one of the professions I could earn with my degree. Another reason I chose this internship was to make connections and help connect my peers to a potential career pathway. Moving forward from my internship I seek to use the knowledge I have gained in future service positions and connect my peers to Biomed program at Lexington Medical Center.

**Horlick, Sam**

**Mentor(s) -- Dr. Bihter Padak, Ms. Turna Barua**

**The performance of  $\text{CuMn}_2\text{O}_4$  oxygen carrier with and without the presence of sulfur dioxide in a chemical looping with oxygen uncoupling system**

In the past decade, the reduction of carbon dioxide ( $\text{CO}_2$ ) emissions has become a major focus in energy production research. One method of reducing the  $\text{CO}_2$  emissions is to separate it from the flue gas before it is released to the atmosphere, but this can be expensive.  $\text{CO}_2$  separation from nitrogen is inherently avoided in chemical looping with oxygen uncoupling (CLOU) systems by eliminating the use of air as an oxidizer. CLOU systems operate with two separate environments: the oxidation environment in the so-called air reactor, and the reduction/combustion environment in the fuel reactor. First, a metal-oxide (oxygen carrier) is fully oxidized by air in the air reactor. Next, it is moved to the fuel reactor where it releases oxygen for the combustion of fuel. The fuel and oxygen are mostly consumed, and  $\text{CO}_2$  and water are the primary emission gases from the fuel reactor. Due to water's relatively high boiling point, it can be easily condensed out of the flue gas stream, effectively separating  $\text{CO}_2$ .

This study focuses on the performance and characterization of oxygen carriers in a simulated coal combustion CLOU system. Copper-manganese oxide ( $\text{CuMn}_2\text{O}_4$ ) is used as an oxygen carrier to burn methane ( $\text{CH}_4$ ) in a fluidized bed reactor. Sulfur dioxide ( $\text{SO}_2$ ) can be introduced to the reactor to simulate coal combustion flue gas. To understand the effect of  $\text{SO}_2$ , the reactivity of the carrier in an  $\text{SO}_2$  environment is compared to the reactivity without  $\text{SO}_2$ . For the analysis of the carrier, thermogravimetric analysis (TGA) is used to quantify the oxygen uncoupling ability of the carrier. X-ray diffraction (XRD) is used to identify the structure of the carrier before use, after oxidation, and after reduction/combustion. Gas chromatography (GC) is used to observe the conversion of fuel in the reactor after various residence times by measuring the concentrations of reactant and product species. Fuel conversion data, as well as the characterization data, will provide an understanding of the

behavior of CuMn<sub>2</sub>O<sub>4</sub> in a simulated coal combustion CLOU system, and the effect of SO<sub>2</sub> on the oxygen carrier performance.

**Horstemey, Natalie**

**Mentor(s) -- Mr. Ryan Lloyd**

**Leading in Learning**

During the fall semester of 2017, I worked with Lexington 1 School District in a 16-week long internship at Saxe Gotha Elementary School (SGE) where I had hands-on experience with teaching Kindergarten students in a classroom. SGE is considered to be a "Title I School", meaning that financial assistance is given to the school due to the high percentages of children coming from low-income families, to help guarantee that all students are meeting the increasingly demanding state standards for South Carolina. As an Early Childhood Education major at the University of South Carolina, my internship provided me with a unique opportunity to explore the characteristics and responsibilities of the professional educator in a Title I setting and understand those of the educational leader in relation to establishing a positive and inclusive learning environment. With being able to participate in professional development activities alongside of having full responsibility of the classroom for two full weeks, I was able to apply my knowledge of culturally relevant teaching methods to create a comfortable learning environment for the diverse community of students that I worked with. Participating in this internship gave me great prospective of what philosophies and principles of teaching I want to carry into my own classroom, where I look forward to becoming an educational leader in my school where the community and culture of all my students is highly integrated within all parts of their educational experience.

**Howe, Alexandra**

**Mentor(s) -- Ms. Lisa Camp**

**Global Learning: Lost and Found Across Borders**

In the United States a disconnect across borders and a general feeling of inaccessibility of other cultures is detrimental to education and success moving forward. These feelings of inaccessibility are only increased by a lack of understanding of culture shock and how to work through it, and an ignorance to the laws, government regulations and social expectations of other nations. However, global learning is critical to receiving a well-rounded education and leads to benefits in every aspect of existence that students can't even begin to imagine. By studying abroad in Prague, not knowing a single person or speaking the language when I arrived, I have found that I am better able to relate to the international students I work with at the academic enrichment center. Even though my experience in Prague was only a semester long and courses were taught in my native language, the feelings of confusion, fear and frustration were still present. Knowing that these feels are normal, and will get better has allowed me to form a bond with my international students, for I have a more general idea of what they are going through and can relate to them in a way they might not be able to with their classmates and teammates. Paired with my work at the study abroad office, I am proposing a social media campaign hoping to highlight the longer-term benefit of studying abroad, and how it is accessible to all students with fear, not finances, being a key component in holding students back from perusing a global education.

**Howell, Christine**

**Mentor(s) -- Ms. Maegan Gudridge**

**Living With Purpose**

During the spring and summer of 2017, I worked as the Social Media and Community Outreach intern for With Purpose, a nonprofit dedicated to finding safe, effective treatment options for kids with cancer. As a public relations major at the University of South Carolina, this internship provided me with first-hand experience in digital media. My role within the organization was to create, plan, execute and

audit social media content across Facebook, Twitter and Instagram. I was responsible for creating a voice and tone for the organization's social media, developing content calendars, and marketing various events. Most notably, I created and implemented digital media plans for both the 2017 WP Kids Fun Run which raised over \$10,000, and the Lincoln Logs for Sam campaign, which broke the world record for the tallest Lincoln Log structure. Working with With Purpose reaffirmed my decision to pursue a degree in public relations and provided practical experience in the nonprofit sector. Through this experience, I was encouraged to seek full-time employment in the digital media field following my graduation in May 2018.

**Hungate, Natalie**

**Mentor(s) -- Dr. Elise Lewis**

**We Are as Alike as We Are Different: An International Perspective on the Lives We Live**

Over the course of my time at USC, I have completed study abroad programs for credit and served on volunteer abroad programs. I have studied abroad for credit three times, once on a Summer Program in Lutherstadt-Wittenberg, Germany at Martin Luther Universität Halle-Wittenberg, and once on a Semester Exchange in Bamberg, Germany at Otto-Friedrich-Universität Bamberg, along with completing a Maymester in Iceland. I have served abroad three times, working twice in optometry clinics in Misahuallí, Ecuador and in San Ramón, Costa Rica, along with working with homelessness in Toronto, Canada. I studied and served abroad, because as an International Studies and German Double Major, I wanted to learn more about other cultures and countries, and expand my understanding of the world in which I live. While abroad, I've had my ideas and beliefs challenged, stepped out of my comfort zone, learned to be more flexible, realized new perspectives and ways of life, and have become the person I am today. My study and volunteering abroad experiences have impacted who I am, through gaining insights in the specific areas of gender stereotypes and norms, community, and breaking from expectations. My time living, serving, and learning abroad helped me figure out that following graduation, I would like to go to graduate school abroad, work for the United States State Department, or work for an International Non-Profit, and to continue to help international relations and understanding around the globe. We are all human and we are all in this together.

**Hurley, Lauren**

**Mentor(s) -- Mr. Kendall Moore**

**Exploring Prevalence Rates and Behavioral Health Correlates of Cyberaggression and Cybervictimization among Adolescents and Young Adults**

With the growing use of social media and other electronic forms of technology, new ways to communicate have emerged. One public health issue which has received increasing attention involves 'cyberaggression'. The term cyberaggression has recently been defined as "intentional behavior aimed at harming another person or persons through communicative use of computers, cell phones, and other electronic devices, and perceived as aversive by the victim" (Schoffstall & Cohen, 2011). Although research has established links between cyberaggression and negative mental health outcomes, there remains a lack of investigation into overall prevalence rates and impact of cyberaggression and cybervictimization, specifically within older adolescents and young adults as the majority of previous research has focused on middle school youth. Therefore, the purpose of this study is to investigate prevalence rates and behavioral health correlates of cyberaggression and cybervictimization across demographic characteristics in a sample of college (n=462) and high school (n=200) students. I will specifically evaluate differences among race/ethnicity, sex, and age (i.e., high school and college students). I have several hypotheses concerning these research aims: 1) white students will engage in more acts of cyberaggression whereas non-white students will experience higher rates of cybervictimization, 2) females will endorse higher rates of both cyberaggression and cybervictimization, 3) high school students will engage in cyberaggression and experience cybervictimization at greater rates than college students, and 4) both cyberaggression and cybervictimization will show moder-

ate to strong correlations with behavioral health variables such as relational aggression and mental health difficulties. My research aims to fill a gap in the literature by evaluating these issues in both high school and college students as well as provide additional prevalence rate and behavioral health correlate information which can inform future research and clinical practice.

**Hutchinson, Angelica**

**Mentor(s) -- Dr. Dirk den Ouden**

**Automatic Separation of Vowels in Aphasic and Aparaxic Speakers**

Brain damage due to stroke can cause several problems in daily behaviors and functions. Linguistically speaking, two broad disorders known as aphasia and apraxia of speech can affect one's ability to communicate properly and efficiently. The separation and extraction of vowels and their formants are a very useful tool for the analyzation of speech from patients with these disorders. This acoustic analysis can be helpful in improving diagnostics. However, the usefulness of this tool is countered by the amount of time it takes to manually complete such separation and extraction. This inefficiency leads to the search for a better way to separate and extract vowels. For this project, automatic speech separation techniques Dartmouth Linguistic Automation (DARLA ) from Dartmouth University, Forced Alignment from North Carolina State University, and THEM from Dr. Haris Themistocleous (University of Gothenborg ) were used and compared to see which one(s) would work the best with both unimpaired and disordered speech. Speech samples from 7 unimpaired speakers ranging in age from 20 to 70 were analyzed using automatic separation techniques. Preliminary results showed that THEM was producing segmentation that matched human separation the closest, with DARLA close behind. From there DARLA and THEM, were used and compared to see which one would best match manual separation of speech samples from participants with aphasia and apraxia of speech .

**Huynh, Sammy**

**Mentor(s) -- Dr. George Handy**

**Servant Leading: How I Discovered My Purpose by Leading for Others**

My greatest contribution to the University of South Carolina has been serving as a member and leader of Alpha Epsilon Delta, a national pre-health professional honor society. Becoming a member of this on-campus organization was a pivotal point in my undergraduate pre-health journey and has provided me with a system of lifelong friends and mentors including our faculty advisor, Dr. George Handy. Through my role as Chapter President, I have been able to learn valuable lessons in collaboration, gain confidence in my leadership abilities, and have acquired a tremendous amount of knowledge to propel me into my professional goals in dentistry. Understanding the influence that being a member had on me, I strive to lead by serving others. Leading for others empowers members and develops leaders within the organization, multiplying the positive output of the organization. This is key to setting up for a successful future. The AED executive board consists of 16 board members and hosts a chapter size of 184 active pre-professional students. This past year alone, we kick-started a mentorship program called VITP to pair our members with medical students at the USC School of Medicine, organized a Physicians Mixer where we gathered health professionals from the Columbia area to mingle and network with our members, and pushed for record breaking philanthropic support for the Children's Miracle Network. My presentation will showcase the significance that serving as a leader has had on shaping me as an individual, the impact of servant leading, and the rewards of being involved with a professional organization.

**Hyduke, Noah**

**Mentor(s) -- Dr. Maksymilian Chruszcz, Ms. Brenda Kaping**

**Structural Studies of House Dust Mite Allergen Der p 2 -7A1 ScFv Antibody Complex**

Dust mite allergies occur in about 10-30% of the population in the USA and worldwide. Among dust mites, the two most important species, *Dermatophagoides farinae* and *Dermatophagoides pteronyss-*

sinus, are both sources of potent major allergens that elicit immunoglobulin E (IgE) mediated immune response in more than 85% of sensitized individuals. Dust mites are arthropods that thrive in warm, high humidity areas and feed on shed flakes of human skin. In households, dust mites are found almost everywhere including beds, carpets and other furniture. The fecal matter of house dust mites contains most of the mite allergens. It was shown that inhalation of these allergens is the primary cause, or one of the most important risk factors which leads to allergic diseases such as asthma, rhinitis and atopic dermatitis. More than 80% of people who are asthmatics are sensitized to, or allergic to, house dust mite allergens. Group 1 dust mite allergens (Der f 1 and Der p 1) are cysteine proteases and Group 2 (Der f 2 and Der p 2) belong to the Niemann Pick C2 family. Group 2 allergens are mimickers of Lymphocyte antigen 96 also known as MD2, a lipopolysaccharide binding protein associated with Toll-like Receptor 4 (TLR-4). To develop better allergy diagnostics and therapeutics, it is important to understand how these allergens interact with the host's immune system. Therefore, this research focuses on characterization of interactions between Group 2 dust mite allergen, Der p 2, and IgG-derived single chain variable fragment antibody 7A1 ScFv. An antigen-antibody complex was cloned and co-expressed in *Escherichia coli*. The complex was purified to very high purity using Immobilized Metal Affinity Chromatography and gel filtration. The complex was proved to be stable during freeze-thaw cycles, and X-ray crystallography will be used to determine the 3-D structural features of the complex. These structural studies will be used to identify important residues responsible for antigen-antibody interactions. The residues can be exploited the design of immunotherapy for asthma sufferers.

**Ibanez, Vania Grace**

**Mentor(s) -- Prof. Andrew Newton**

**Bringing Words To Life**

During the summer, I interned for the news station WCIV – the ABC affiliate – in Charleston, South Carolina. I was the only one of the five interns that was interested in becoming a producer, so I had the chance to have a full, hands-on experience with producing a live newscast. I sat down with every producer in the newsroom and learned different techniques from each person. As a journalism major, it gave me a lot of insight on how to approach putting a newscast together from a diverse perspective because an audience is always full of different people. In my JOUR 499 class, we learned the concept of universal appeal, and the experience I had producing for a real newscast helped me see why that concept is important. During the internship, I was also given multiple stories to write and put videos together on my own – of which some actually aired during the 5 p.m. and 5:30 p.m. newscasts. I have an interest in entertainment producing and television, so the producers let me produce an entire block based off my interests and aired some of them as well. Because of all the skills and qualities I developed in the two months I spent at WCIV, I had the opportunity to produce two intern broadcasts, featuring the other four interns. My experience there reaffirmed why I chose to pursue journalism and producing. Through this experience, I realized that the lessons I took away from my JOUR 471 and JOUR 499 classes made me a better worker and leader. Because of this, I hope to land a job in a top news market in the next few years and transition into entertainment journalism afterwards.

**Ingerson, Morgan**

**Mentor(s) -- Dr. Douglas Pittman**

**The Interaction Profile of RAD51D during Homologous Recombination**

Ovarian cancer is the 13th leading cause of cancer deaths in the United States. Genetic instability drives cancer development, which is enhanced when a cell is deficient in the homologous recombination pathway. Proteins involved in the homologous recombination pathway include BRCA1 and BRCA2, as well as the more recently identified RAD51D. This vital protein is a member of the RAD51 family, which consists of 6 paralogs: RAD51, RAD51B, RAD51C, RAD51D, XRCC2, and XRCC3. The goals of this project are to determine the regulation of RAD51D, how it is removed from DNA dam-

age sites, and the mechanisms this critical gene utilizes to repair double stranded DNA breaks. Protein interactions of RAD51D with RNF138, XRCC2, and RAD51C are of special interest. 1) RNF138 contains a RING finger domain, which stabilizes and promotes DNA damage repair and is the first of many proteins to be recruited to the site of damage. 2) XRCC2 contributes to DNA repair through its actions downstream of BRCA2 recruitment. 3) RAD51C acts as a key mediator, stabilizing DNA damage and protecting RAD51 from ubiquitin mediated degradation. Ubiquitination, the proposed mechanism of degradation of RAD51D, requires lysine residues, which was confirmed via a lysine null mutant, K0. Other lysine mutant combinations were created to determine the impact on degradation and protein interaction of RAD51D, these include K76R, K201R, K235R, and K298R. These lysine mutations of the RAD51D protein were incorporated into Yeast II Hybrid experiments, in which protein interactions of RNF138, RAD51C, and XRCC2 with RAD51D were measured by the expression of reporter genes. My data suggest that the lysine mutations of K235R and K298R do not disrupt protein interaction of RAD51D with RNF138, RAD51C, or XRCC2. Therefore, RAD51D exhibits interaction even in the presence of these lysine mutations, leaving future studies to discover the mechanism of degradation of RAD51D. The mechanism and degradation of RAD51D is of utmost importance due to its role during homologous recombination-mediated DNA repair, and thus ovarian cancer susceptibility. Ultimately, experiments such as this will drive pharmacogenomics research in creating a novel drug target for proteins involved in homologous recombination.

**Ingrassano, Alexandra**

**Mentor(s) -- Dr. Amber Fallucca**

**Balancing Feminism, Expression, and Politics**

Before studying at South Carolina, I would have never labeled myself a feminist. Taking POLI 352, Gender and Politics helped me understand my identity as a woman and what that means for me now in the work place and in the future. Coincidentally, my next two internships following this class were working for powerful women in politics; the first being Congresswoman Carolyn Maloney in New York City and the second being Drea Byars in South Carolina. I was able to observe the strategies these women use in order to communicate and be successful in the political world. I want more people to understand the unique challenges women are up against when they are in the public arena so that these biases can one day be erased. Working for Congresswoman Maloney and Drea has helped me to realize my own strengths and how I can apply them to a future career in communications.

**Inzirillo, Diana**

**Mentor(s) -- Dr. Daniel Freedman**

**Educating Learners from Kindergarten to College**

Throughout my student teaching internships and campus leadership experiences, I have gained a great deal of experience educating learners from kindergarten to college. My degree program has granted me experiences in various Early Childhood classrooms, including student teaching internships in third grade and kindergarten classrooms. Through my campus leadership positions, I have also received experience in higher education by supervising and training Pillars for Carolina staffs, serving as a resident mentor, and advising Student Government's Freshman Council. Through these experiences, I have noticed that teaching kindergarteners is actually not all so different from teaching college students. The reality is, no matter what age, we all need similar things in order to learn and grow. Through what I learned about providing both kindergarteners and college students with impactful learning experiences, as well as what I have noticed about my own learning experiences, I have realized that students need hands on experiences, positive mentorships, and differentiated instruction in order for them to have the most effective and impactful education experiences.

**Jacobsen, Natalie**

**Mentor(s) -- Dr. Lara Ducate**

## **A Reflection on My Semester in Athens**

This presentation is intended to fulfill my final requirement for graduating with Leadership Distinction in the Global Learning pathway. During my Junior year at South Carolina, I was lucky enough to study abroad at the Hellenic American College in Athens, Greece. My time in Greece and the other countries I visited taught me to think beyond the “American Bubble” □ I have known my whole life. In my E-portfolio, I tied the experiences and lessons learned in Athens back to concepts that I was taught here at USC and the expanded on the greater insights I’ve come to realize. My time abroad shifted my ideas about drug use, addiction and assimilation. The experience gave me valuable insight into what it means to be a global citizen, and a better leader.

**James, Judson**

**Mentor(s) -- Dr. Wendy Valerio, Dr. Jeremiah Shepherd**

### **Developing Audie, a Music Learning App**

With the introduction of technology in the classroom, it is possible to use serious games, games that are designed for education and rehabilitation, as a way of expanding the reach of education. Audie (Gordon, 1989), a music learning game for toddlers ages three to four, was made to stimulate and encourage children’s music learning and music play. Audie is short for audiation, the ability to comprehend music. The development of audiation is crucial for children to receive the benefits that come from both listening to and performing music throughout life. Young children have the capacity to absorb and retain musical skills, and Audie can take advantage of these capabilities by providing active methods of reinforcing musical concepts in a call-and-response format. The game is designed to enhance audiation skills of children by encouraging practice in recognizing rhythm and melody through the auditory cues presented by the game. Because the game was originally distributed by cassette, it is an outdated tool. By translating the physical game into a digital game, Audie may transform the means of testing and manual data collection by parents and teachers to automated data collection by the game. The Audie application collects data from the child’s feedback through in-game interactions. The feedback is then transferred to a MySQL database in real time and processed in a back-end application. The desired statistics are the improvement of scores over time, along with recognition of trends to improve certain skills. For example, if a child is scoring lower on the rhythm section of the game, the application will recognize and adapt the game experience to help improve the child’s rhythm understanding. Audie’s goal as a tool for young children’s music education is to monitor the musical growth of the child by processing their feedback as a player. The data collected by the application will provide parents and teachers a better understanding of their children’s music learning potential and how to proceed with furthering of their music educations.

**Jameson, Bethany**

**Mentor(s) -- Dr. William Jackson**

### **Cloning an anti-Rev shRNA to inhibit HIV-1 replication**

HIV-1, the Human Immunodeficiency Virus, is a retrovirus that attacks and kills CD4+ T helper lymphocytes leading to a progressive inability to fight infection and ultimately the Acquired Immune Deficiency Syndrome (AIDS). A potential target for anti-HIV-1 treatment is the viral regulatory gene, Rev. Rev is a small regulatory protein expressed early in virus replication. As Rev builds up in the cell, it is localized to the nucleus where it binds to viral transcripts containing the Rev Response Element (RRE) located within the env coding region. Upon binding, Rev facilitates nuclear export of partially spliced and unspliced mRNAs, which encode the viral structural proteins and genomic RNA for packaging. In the absence of Rev, viral replication is inhibited. The goal of this project is to design and clone an anti-Rev shRNA for use in assays designed to measure the effect on viral replication. The Rev genetic sequence was obtained from the HIV-1 NL43 genomic clone (Accession number M19921) and analysed for potential siRNA binding sites using the Biosettia shRNA designer (Biosettia.com). One site, located at nucleotides 8622-8640 was selected and used to generate a shDNA

for cloning. The shDNA was synthesized (Integrated DNA Technologies) and the resulting oligonucleotides were cloned into the retroviral vector, pSuper.retro.neo+GFP under the control of the RNA Polymerase III H1 promoter.

**Janflone, Madeline**

**Mentor(s) -- Mr. Keith Kenney**

**The Career I Was Destined For**

During my time at the University of South Carolina, I successfully immersed myself in a variety of industries. As a public relations major in the School of Journalism and Mass Communications, my in-class experiences have prepared me for a career in communications. With graduation on the horizon, I am applying for full-time positions in major cities. My resume is diverse in that I have experience in the fashion industry, the corporate world, as well as agency life. My time at Carolina has molded and shaped me into the person I once aspired to be. Whether that be through my time in the classroom, my experiences in a professional environment, or the memories I made in student organizations, I owe my success to this university. I had the opportunity to learn from professors and peers alike, which allowed me to launch myself into roles where my skill set could only grow. My presentation will discuss the insights I gained in these three settings and how my time at Carolina has prepared me for the career that I was destined for.

**Jaten, Abigail**

**Mentor(s) -- Prof. Maegan Gudridge**

**My Internship Experience at Palmetto Health USC Orthopedics**

This spring I have had the opportunity to complete an internship at Palmetto Health USC Orthopedics. I have been working with the spine team, which is comprised of doctors, PAs, residents, fellows, and medical assistants. As part of the spine team, I have many daily tasks such as assessing patient's vitals, taking patient histories, and working with the computer charting system. My favorite part about the internship is being able to interact with the patients while assessing their vitals. It allows me to work on my communication skills, as I ask them pertinent medical questions about their health. Throughout my internship, I have learned about medications, diagnoses, and treatment options that are common within the spine specialty. After taking medical histories, I am presenting this information to the provider, allowing me the opportunity to interact with them. Another great aspect of the internship, is being able to shadow the health care professionals in a medical setting. From this, I am learning how to better communicate with a variety of people. During my time at the internship, I am becoming more educated on the anatomy of the spine by being able to look at x-rays and MRIs. The experience is also teaching me about the dynamics of a medical clinic environment. It has been refreshing and interesting to see how the team members all work together to provide the best care for their patients. This internship relates directly to my future goals, as I hope to become a physician assistant after finishing my undergraduate studies at The University of South Carolina. I will take the knowledge and information I have gained from this experience with me and apply it in my future career, so that I can also provide my patients with the best care possible.

**Jefferies, Wesley**

**Mentor(s) -- Prof. Elise Lewis**

**Finding Myself Abroad**

During my fall semester in my junior year of college, I studied abroad at the Florence University of the Arts in Florence, Italy. I chose to study in Florence, Italy because I wanted to experience works of art in person that I had been studying nearly my entire life. Since coming to the University of South Carolina to major in art education, my lifelong passion for both art and education has been strengthened. On a personal level this experience shifted my perspective on how I view myself in my field of interest. As an African American woman, I am often not reflected in the works of art that I have stud-

ied in art history. It is painfully clear that art history textbooks are very Eurocentric and male dominated in terms of both subject matter and selection of artists. However, as I wandered the galleries of elaborate palaces and prestigious museums in Europe, I was surprised at the number of sculptures and paintings that depicted people of color and women, specifically in roles that were not subservient. This shift in perspective made me think about the ways in which the concepts of identity and representation affect the way we view ourselves and the world. In my future art classroom, I am going to challenge these norms by making it a priority to expose my students to art that includes various cultures and perspectives. I want to give them chances to explore new ways to think and view the world around them. As a future art teacher, I will use lessons I learned abroad and at Carolina to foster creativity and push students to think critically about the images they consume.

**Jefferson, Jaleel**

**Mentor(s) -- Dr. Heather Brandt**

**Enhancing Communication to Support Dissemination and Implementation of the Healthy Eating and Active Living in the Spirit (HEALS) Program**

An evidence-based diet and physical activity intervention to address health disparities in the African-American community - the Healthy Eating and Active Living in the Spirit (HEALS) program - was implemented in 27 churches across South Carolina. The HEALS program is implemented by trained church education team (CET) members who are lay health advisors with support from mentors with previous experience implementing the intervention. My previous research experience with the HEALS program included conducting interviews with CETs and mentors about their thoughts on various aspects of the HEALS program and specifically on their recommendations for how the program can improve recruitment, retention, training, and technical assistance. Through the interview process, many CETs reported that there was a need for enhanced communication methods through either an online portal or website. This study aimed to determine if offering information and materials through an online website will lead to improvements and further support any dissemination and implementation needs. One of the main goals of this study was to enhance the communication between CETs, mentors, USC research staff, and a community-based organization. Additionally, we want to address the communication needs of the program by providing a user-friendly website containing health information and health materials specific to the HEALS intervention is in the process of being developed and evaluated. The website was developed and evaluated by CETs and mentors as well as USC research staff and a community-based organization. The results of the evaluation will be presented.

**Jenkins, Davonte'**

**Mentor(s) -- Prof. Patrick Gelinias**

**The Butterfly Effect: The Reconstruction of the Food Pyramid**

Within recent years, there have been numerous discrepancies regarding recommendations for the consumption of various food groups. Over recent years there have been new and significant findings in nutritional research that would serve to undermine previous recommendations. Rampant health issues such as obesity, type II diabetes, dementia, heart disease and others have escalated at alarming rates under current recommendations. The general population has become accustomed and unresponsive to previous nutritional schemes. In light of these trends it would appear appropriate to revisit the safety and efficacy of conventional dietary recommendations, as well as objectively consider recommendations which might offer equal or greater quality nutrition with lesser or no consequence. The purpose of this project was to revisit long-standing governmentally-issued food recommendation models and propose a novel, updated model based on current science and health statistics.

**Jervey, Heather**

**Mentor(s) -- Prof. Andrew Newton**

**Initiatives for economic success & financial literacy in students**

This year, I had the privilege of being selected to volunteer for Junior Achievement of a Greater South Carolina at the Columbia, SC location. Junior Achievement's purpose is to inspire and prepare young people to succeed in a global economy by integrating class programs that foster work-readiness, entrepreneurship, and financial literacy skills while using experiential learning to engage kindergarten-12th grade students. After completing the training sessions for JA, I was assigned to the Carolina School for Inquiry in Fairfield Columbia. This is a public school which focuses on a unique, Inquiry-based structure of learning for their students. The program I chose to lead was called "JA Personal Finance" which allows students to experience the interrelationship between today's financial decisions and future financial freedom. To achieve financial health and wellness, students learn about money-managing strategies, including earning, employment, income, budgeting, savings, credit & debit, consumer protection, smart shopping, risk management, and investing. This is where I took the skills I learned in my Cognitive Psychology class related to Constructivism and Cooperative Learning and applied them to my experience. This experience really taught me how we must do a better job equipping students for postsecondary education and entry into the global workforce. By implementing the strategies I learned in my courses at USC & JA's Common Core standard initiatives at elementary, middle, & high school levels, we can all work to ensure that students are college & career ready at a younger age. I have learned so much from my experiences at USC & with JA SC, and I hope that I can make others more aware of these issues as well. I plan to stay involved with the program and continue to learn outside of class how I can better prepare myself to teach leadership and development skills to others.

**Johnson, Kendrea**

**Mentor(s) -- Ms. Theresa Harrison**

**Becoming a Superhero!**

Marian Edelman once said, "The question is not whether we can afford to invest in every child; it is whether we can afford not to." There are thousands of at-risk students that have one thing in common, a lack of opportunity. As a volunteer case manager at Communities In Schools of the Midlands (CIS), I want to become a beacon of change for at-risk children. Communities In Schools' mission is to surround students with a community of support to empower them to stay in school and achieve academic success. I work with a caseload of fifteen students at a local elementary school, where I provide academic support, behavior interventions, and attendance monitoring. Over time, I have discovered that every child's experience affects how they come to school prepared to learn, what works for one child does not work for another; therefore, a one-size fits all education can be detrimental. Every child deserves a superhero. They need someone willing to root for them through their highs and lows, someone to listen to their concerns, and advocate for their needs. I want to continue to work with at-risk children in order to learn as much as I can, so someday I can use that knowledge to create policies that provide opportunities to everyone.

**Johnson, Mackenzie**

**Mentor(s) -- Dr. Ho-Jin Koh, Ms. Ran-Hee Choi**

**Knockout of AMP-Activated Protein Kinase (AMPK) facilitates Exercise-induced Beige Fat Formation**

An energy imbalance due to sedentary lifestyle and consumption of high-caloric diets has contributed to the recent obesity epidemic and increasing prevalence of obesity-related metabolic disorders such as type 2 diabetes. Comprising their adipose tissue, humans have three types of adipocytes: an energy storing white adipocyte found in traditional white adipose tissue (WAT), an energy burning brown adipocyte found in brown adipose tissue (BAT), and a third "beige" or "brite" adipocyte that appears in WAT but retains the metabolic biosynthetic activity of BAT. Previous studies suggest activating the thermogenic activity of beige fat via exercise can improve glucose homeostasis and ameliorate the obesity-related metabolic disorders through the activation of the energy sensing kinase AMP activat-

ed protein kinase (AMPK). However, the roles of AMPK in beige fat formation is not fully understood. Thus, in this study we aimed to further elucidate the underlying mechanism behind exercise-induced beige fat formation by studying C57BL/6 wild type (WT) and fat-specific AMPK (FKO) mice. We trained mice on a treadmill for 6 weeks to determine if AMPK plays a role in exercise induced beige fat formation. Results showed that there were no differences in body weight or food intake after 6 weeks. However, FKO mice showed significantly improved body composition, with less fat (13.1%) compared to WT (16.2%). Also, FKO mice improved glucose tolerance compared to WT after 6 weeks of training. We analyzed subcutaneous fat (Sub), which has potential to be beige fat, to confirm if AMPK is important for the browning of fat. Interestingly, Sub from FKO mice had increased uncoupling protein 1 (UCP1), a strong marker of BAT, yet PGC1 expression, a marker for mitochondrial biogenesis, was decreased. Indeed, PGC1, COX4, and COX1 showed similar mRNA expression patterns. These results suggest that manipulation of adipocyte AMPK may affect body fat composition, glucose homeostasis, and thermogenic activity through beige fat formation, indicating its ability to serve as potential therapeutic target for those with various metabolic disorders.

**Johnson, Johnathan**

**Mentor(s) -- Ms. Ivy Sibley**

**Global Learning Impact**

After reading "The Ugly American" in high school, my dream was shaped into being able to represent my great country in the best way I could, from working in the Peace Corps and to be a diplomatic force for good in foreign lands. In the fall of 2016 I studied abroad at the University of Groningen in the Kingdom of the Netherlands. Studying in the Netherlands helped me achieve personal, professional, and academic goals. Due to the rigorous and robust nature of the courses offered at Groningen, I knew that I would get an academic experience that would not be able to be easily replicated back in the States. Groningen offered specialized classes in Eastern European studies and brought me in contact with a large variety of people from all over the world. Being able to interact with many people from all over the world and with people with other mindsets allowed me to learn and grow personally and professionally. I was able to learn important diplomatic skills from interacting with the other international students. And I was able to sit on a SIB committee, where I presented and recruited top lecturers to present topical international relations issues to large groups of 80+ on topics ranging from Populism to Cyberwarfare to the South China Sea. Travelling abroad and alone has allowed me to meet many great people and learn more about myself and my own beliefs. I will take all the skills and educational experience I have had and apply them to my career in diplomacy and foreign service.

**Johnson, Austin**

**Mentor(s) -- Mrs. Sarah Gay**

**Connecting through Music**

During my time at USC, I had the opportunity to engage and grow through community service. Engaging in my own community taught me the value of the culture I grew up in and the value the people that create that community. After learning more about my community, I then was able to take that knowledge and apply in my music teaching. Through music instruction, I was better able to connect with my students and create boundaries in the classroom that made classroom management an easier task. Taking the knowledge I learned in my community, I was then able to engage with others in a different community. I had the opportunity to travel abroad and learn about the Haitian culture. Through this experience, I also had the ability to learn about myself and for the first time become a minority. This experience was of course humbling, but through music education, I was able to connect with the Haitian people in a way that would have been otherwise unavailable to me. Having the opportunity to connect with these people allowed me to dig deeper into their culture and work to better understand our cultural differences. I learned that even though their third world culture is very different from mine, our values are still very similar. Through a better understanding of their cultures values, I learned that

circumstance is merely a place in time, and you can make the most out of any situation set before you. I plan to use all the things I learned during my community service in order to better prepare my students to be socially aware and to connect to those in a different situation than their own.

**Jones, Deborah**

**Mentor(s) -- Mrs. Anna Oswald-Hensley**

**Debbie's Role on Campus**

OSP Representative

I'm a student at the University of South Carolina-Sumter and while a student here I was elected to be an OSP (Opportunity Scholars Program) representative. In this position, I help with anything OSP needs, I am there to help all who need help. I give speeches for activities OSP has, such as the OSP Gala and the OSP Awards Ceremony. This is such an honor to me because has made me a stronger and more open student. I have learned the work that goes into helping us, the students, which makes me appreciate the OSP program even more than I already did. I think all the people that are shy or nervous should participate in this role. It will bring them to a good comfort zone. I would love nothing more than to stay with OSP, unfortunately that is not possible as I be will graduating and into an Upstate program.

#### Work Study

In my last semester as a University of South Carolina-Sumter student, I was hired as a work study in the records department. I do the scanning and filing of all the forms that are submitted in the records department. I help with putting folders together that are given to potential new students. I answer the phone and take messages. I do anything that helps the staff. I love having this opportunity and learning experience, I have learned that everyone needs their records stored properly and confidentiality. I feel it has taught me the importance of privacy and this will be very helpful in my teaching career.

**Jones, Alec**

**Mentor(s) -- Dr. April DeLaurier**

**The effect of HDAC inhibition on tbx5a and tbx5b expression in zebrafish**

Valproic acid (VPA) is known to inhibit class I and II HDAC activity and disrupt numerous developmental processes, including the development of the pancreas, liver, and pharyngeal teeth. We observed a strong phenotype in zebrafish exposed to VPA, which includes cardiac defects, reduced forelimb growth, and ocular coloboma. This suite of phenotypic defects is identical to phenotypes observed in Tbx5 loss-of-function studies in zebrafish and other model organisms. Transcription factors tbx5a and tbx5b, paralogs of tbx5, have previously been shown to co-express in both the heart and eye, and are responsible for the developing fin buds, and establishing cardiac asymmetry and the retinal axis. Current research suggests these duplicates may have subfunctionalization unique to each co-paralog in zebrafish, and may be regulated differentially during development. It is not known how VPA or HDACs target Tbx5 expression in zebrafish. However, our initial observations support a hypothesis that Tbx5 is a target of HDAC repression during normal development, and that loss of Tbx5 produces the phenotypes associated with VPA exposure. Conditional knock-out of Hdac3 in mice has demonstrated increased expression of Tbx5, although it is not known how Hdac inhibition could lead to reduced expression of Tbx5 in zebrafish. Semi-quantitative RT-PCR of 1 and 2 dpf larvae, treated with either 0.5 or 1.0 mM VPA, revealed increased tbx5a activity in a dose-dependent manner, while a corresponding decrease of tbx5b expression was observed. This suggests a possible regulatory feedback mechanism, in which the tbx5b paralog is downregulated in response to over-expression of tbx5a. qPCR analysis of expression in VPA-treated fish of tbx5a, tbx5b, and additional downstream targets of Tbx5, including tbx2b, bmp4, fgf24, hey2, and nppa is in progress. We will also be analyzing tissue-specific mRNA expression of tbx5a, tbx5b, bmp4, hey2, and vcana in embryos and larvae

using mRNA in situ hybridization. This research suggests a novel function for Hdacs as upstream regulators of Tbx5, which has important implications for understanding mechanisms in human genetic diseases related to the Tbx5 regulatory pathway, including Holt-Oram Syndrome or other phenotypically-related disorders.

**Kahler, Sophie**

**Mentor(s) -- Dr. Conor Harrison**

**A Neighborhood Transformed: Urban Renewal and University Expansion in Wheeler Hill**

Wheeler Hill, a small neighborhood located just south of the University of South Carolina's campus, was a community of working-class African Americans for much of the 20th century. In 1959, as the University and the City of Columbia embarked on the city's first urban renewal project, Wheeler Hill homes were targeted for purchase and demolition to make way for university expansion. In the years that followed, USC acquired the land on Wheeler Hill, as well as much of the land south and west of campus where the Greek Village and Coliseum stand today, which were also a low-income black communities. The acquisition of this land was shocking to residents, who found themselves displaced from their neighborhood and separated from their tight-knit community. In the mid-1970s, the university began demolishing the Wheeler Hill homes and opted to sell the land to private developers to construct high-end townhouses. Despite former residents' pleas for public or mixed-income housing that would allow many to return to Wheeler Hill, the area became the upper-middle class white neighborhood seen today.

My research of Wheeler Hill illustrates the power of institutions in shaping the urban landscape and the oppression of minorities in American cities. The landscape around us is not there by chance, and Wheeler Hill reveals an overlooked and intersecting history of power, class, and race between a university, city, and residents."

**Kalb, Erin**

**Mentor(s) -- Dr. Paula Vasquez**

**Mathematical Modeling of Pituitary Organogenesis**

In vertebrates, the pituitary gland controls vital physiological processes including the regulation of growth, metabolism, reproduction, stress coping, and immune defense. These processes are regulated through the secretion of hormones that affect specific target organs. To understand the development of the pituitary gland and the differentiation of cells into different hormone production types is to gather insight into the crucial role the pituitary plays in vertebrate physiology. My thesis focuses on the formulation and solution of mathematical models, closely guided by experiments, that will contribute to our understanding of how the pituitary gland is formed and how different developmental processes affect the final state and function of this gland. We have been creating a mathematical model of the development of the pituitary gland using MATLAB software package that allows us to correctly capture the proliferation of self-renewing stem cells based on available experimental data. This vertex model will then allow us to understand the extent in which external factors, such as signaling molecules and spatial location, play a role in the way these stem cells can be manipulated to become different hormone-producing cells.

**Kalmanowicz, Madison**

**Mentor(s) -- Mrs. Asheley Schryer**

**Balancing the Scales Between Creativity and Analytics: An Underestimated Business Strategy**

If I prompted you to tell me everything you know about creativity – what it means, how people obtain it, who possesses it, what would you say? I would anticipate general characterizations of people like musicians, writers, photographers, etc. Surely these sorts of people come to mind easily. On the other hand, perhaps someone like a financial consultant or a branch manager may not appear to fit that

mold so seamlessly. Frankly, industries that stray outside of the typical artistic world tend to be slighted in regard to creativity. I began working an internship at a financial consulting company specializing in data analytics the summer before my senior year at USC. I chose to pursue this opportunity because of the complexity of the business and the unique nature of the company's culture. They utilize vast amounts of extended creative problem solving in addition to rigorous amounts of data analysis to predict the cash flows of loans. In conjunction with my experiences at the Moore School and a few weeks spent at the consulting company, I realized how crucial the balance of creativity and analytics is to all aspects of a business, but specifically in the expansion of new and ingenious ideas and operations. In an industry that historically aimed to promote itself as traditional and straight-laced, imaginations were typically put on a back burner and employees were trained to rely on the tried and tested, already established processes and methodologies. However, there's a new wave of business practices beginning to flood the industry – a more modern, innovative driven form capitalizing on the ingenuity of employees. In regard to future plans, I will be continuing to work for this company after graduation and hope to keep the momentum of the balance of creativity and analytics alive in the business industry by encouraging college students and peers to take advantage of their originality and imaginations, applying them to all aspects of their work.

**Karnavas, Elizabeth**

**Mentor(s) -- Ms. Hayley Efland**

**Production and Sales of Sustainable Tea Products**

Throughout this project, I utilized and developed my knowledge of sustainable gardening and farming practices to plant, grow, cultivate, and harvest pesticide-free and organic herbal teas in the Carolina Community Garden. This project required research on the manufacturing, marketing, and sales strategies necessary to sell the product at a small scale, such as the Healthy Carolina Farmer's Market. Additionally, my tea served as a hands-on educational tool for college students interested in sustainability.

**Kaura, Nancy**

**Mentor(s) -- Dr. James Carson, Mr. Brandon Vanderveen**

**Muscle AKT Signaling Sensitivity to Short-Term Fasting in Tumor Bearing Mice**

Background: Cachexia, muscle mass loss secondary to chronic disease, commonly affects cancer patients and is directly related to reduced life quality, poor treatment outcomes, and reduced survival. While the basal disruption of cachectic skeletal muscle protein turnover is well established, significant gaps remain in our understanding of how cancer influences physiological short-term fasting regulation of protein turnover. Purpose: We examined short-term fasting regulation of skeletal muscle Akt signaling in tumor bearing mice exhibiting cachexia. Methods: Cachectic (>5%BW loss) ApcMin/+ (MIN, n=3) and age matched C57BL/6 (WT, n=3) mice were sacrificed after a 4 hour fast. MIN (n=3) and WT (n=3) mice given food ad libitum served as controls. Analysis was performed on the tibialis anterior (TA) muscle. Results: MIN mice had significant body weight loss (-15% ± 2) and reduced TA weight (29mg ± 1) compared to WT (48mg ± 2). Akt phosphorylation (T308) was reduced after a 4 hour fast (-81% ± 9) in the MIN, while the WT (10% ± 5) did not change. Conclusion: These results demonstrate that cancer increases catabolic signaling caused by short-term fasting in cachectic mouse skeletal muscle. Additional work is needed to determine the effect of a short-term fast on downstream Akt signaling that regulates muscle protein turnover. Supported by NCI R01-CA121249.

**Keen, Deanna**

**Mentor(s) -- Dr. Sarah Keeling**

**Global Learning in Pursuit of Self**

For six months, I studied abroad at Peking University in Beijing, China in order to accelerate my knowledge of Chinese language and culture. While I made great strides in improving my language

proficiency, the lasting effect of studying in a foreign country was jumping out of my comfort zone and into another culture. The purpose of my study abroad was not progress toward a career but progress toward the pursuit of passions that are not necessarily in line with a career goal. I was responsible to maintain a commitment to my end goal in Chinese language and cultural understanding which I carried out by living with a host family, forming meaningful relationships with Chinese friends, visiting multiple areas of the country, and even working in Beijing as an AuPair. My experiences abroad taught me the value of global citizenship, the importance of understanding culture, the beauty of international relationships, and the value of pursuing your passions in learning so that you never stop.

**Kendall, Kiersten**

**Mentor(s) -- Mrs. Theresa Harrison**

**Supplemental Instruction: Catching Students Before They Fall**

The academic success of students is the main goal of any university but many first year students fall through the cracks. As a Supplemental Instruction (SI) leader I serve as a safety net to keep those students on the right path. I have the opportunity to use my experiences in Biology 101 to support students enrolled in the course and help them reach academic success. As an SI leader I am responsible for holding 3 review sessions each week in which I facilitate a collaborative learning environment. I construct a lesson plan for each session in which I create activities and worksheets to provide students resources to help them study. I am also a mentor for the SI program in which I provide logistical support and play a role in the development and improvement of other SI leaders. I really enjoy working closely with students and seeing how they develop as individuals and become successful, self-sufficient learners. I learned that I have a desire to help others no matter what the problem is. I also came to value teamwork and the importance of collaboration in the learning process. As a future medical school student I will apply my knowledge of how collaboration can enhance understanding in order to be a successful student. Similarly, this experience has given me the leadership skills I need to become an effective physician who promotes collaboration among coworkers in order to ensure adequate health care to patients.

**Kenny, Tyler**

**Mentor(s) -- Ms. Sarah Gay**

**Paying it Forward: Leading First-Year Students as a Resident Mentor**

As a student who has been passionate about the University of South Carolina since the moment I stepped foot on campus to tour, I've always wanted to make my mark on the university and its students. Mainly my goal was to do my part in helping ease the transition into college and to get new students excited about being at Carolina. The best way I could find to do that was to become a Resident Mentor and live with new students. My responsibilities were to guide first-year residents in their new surroundings and assist them in accessing and utilizing available resources offered by USC. I maintained a living space for freshmen, advising them on the best ways to get into a routine, handling conflicts, managing their time and prioritizing their schoolwork while enjoying themselves and spending time with their new friends. This experience tested my managerial and professional skills and helped me to develop an understanding of what tendencies my residents developed, as well as to understand when things seemed wrong and how best to approach the situation and find a solution. One of the best results I got out of my time as an RM was the feedback from residents who told me I was a massive help to them in their first year and they were better off having gotten to know me. The management skills I learned from some of my courses in the Moore school were crucial in my effectiveness as a leader in the role as a Resident Mentor and I was able to facilitate an excellent living and learning community. This experience helped me to become more confident as a leader and a young professional and I look forward to potentially leading others as a career opportunity in the future.

**Kerfonta, Caroline**

**Mentor(s) -- Prof. Subrahmanyam Bulusu**

**Estimation of Freshwater Fluxes from the Arctic Ocean using Satellite Observations and Climate Forecast System**

In recent decades we have seen major changes in Arctic Ocean circulation, salinity, and temperature and associated declines in sea ice coverage and mass balance. There is evidence of connections of these changes with climate indices, and the changes arguably affect climate by changing the radiative heat balance at high latitude, impacting the strength of the global overturning circulation. The Arctic Ocean is a mixing basin for freshwater and an ice factory. Since 1990 we have seen major changes in the Arctic Ocean. Given the possible role of Arctic Ocean outflow in controlling global overturning circulation, there have been extensive efforts to monitor fluxes between the sub-Arctic seas and the Arctic Ocean in recent years. The change of climate has become more obvious in the last few decades. Due to limited in situ monitoring of sea surface salinity (SSS), particularly, over the Arctic region, its temporal and spatial scale distribution was not well known until recent satellite measurements resolved this limitation. This Arctic ice melt has led to an influx of freshwater into the Arctic environment, a process that can be observed in SSS. Comparisons of model and observed SSS will help assess the realism of the simulated Arctic circulation, as well as the freshening of the Arctic waters due to ice melt. In this study we will use salinity derived from NASA's Soil Moisture Active Passive (SMAP), and Coupled model simulations using NOAA/NCEP Climate Forecast System (CFSv2).

**Khan, Abraham**

**Mentor(s) -- Dr. Joshua Cooper**

**The computational complexity of enumerating the linear extensions of a dimension two poset**

In this presentation, we will be looking at dimension two posets and determining the computational complexity of enumerating their linear extensions. In order to accomplish such a task, we have been looking at the related problem of determining the computational complexity of enumerating the linear extensions of dimension two semi-orders. The two problems are very closely related, and we are confident that determining the computational complexity of enumerating the linear extensions of dimension two semi-orders will help us resolve the more general problem.

**Kibler, Jessica**

**Mentor(s) -- Ms. Stephanie Suarez**

**The End for Sexual Assault in the Midlands and Being a Good Advocate**

According to the Center for Disease Control and Prevention, about 45.9% of South Carolina women and about 17.8% of men have reported that they were sexual violence survivors in their lifetime. Sexual Trauma Services of the Midlands (STSM) is a non-profit organization in the state which focuses its efforts on the survivors of sexual violence and works to empower those who are impacted by it. As a community service ambassador, one of the most impactful opportunities I have been able to be a part of is being an advocate for STSM and accompanying survivors at the hospital as well as directly speaking with them over the phone through our crisis hotline. The ability to be there for someone in their time of need at such a vulnerable moment has been a crucial part of this organization's mission to serve the community. This opportunity has allowed me to gain experience in making decisions in times of crisis and learn proper communication for those who have survived any form of trauma. Being an advocate involves reading people to determine the type of role you need to play to best support and empower them as well as connecting them with the resources they need. These employees and volunteers devote their time so that no person will be alone during such a traumatic time of their life by guiding and supporting them throughout the whole process, whether that is for a few hours in the hospital or six months in counseling.

**Kiefer, Mikala**

**Mentor(s) -- Dr. Jena Chojnowski**

## **Characterization of Human Corneal Epithelial Cells to be used in Research for Patients with Aniridia**

Auburn University, University of Georgia, Cincinnati Children's Hospital, and University of South Carolina Beaufort have a collaborative mission to find better treatment options for patients with aniridia. This will be done by collecting fibroblasts from patients with aniridia, inducing those cells into pluripotent stem cells (PSCs), introducing a good copy of the Pax6 gene into the induced PSCs, stimulating those modified cells to become corneal epithelial progenitor cells (CEPCs), and transplanting the CEPCs back into the patient's eyes. This mission requires a subset task of practicing transfection of Pax6 and transplantation of CEPCs into rabbits. Since CEPCs from patients are limited, HCECs for this subset task will be purchased from the ATCC Company. To increase the success rate of this subset task, it is necessary for the purchased HCEC to be molecularly characterized and the percentage of CEPCs to be known in this population, which is my part of the bigger mission. Characterization of these cells is important to create a control for future experimentation and to use as a reference point for any subsequent characterizations. This project will use a cryopreserved HCEC line from the ATCC Company. Molecular and morphological characteristics of this cell line will determine the percentage of progenitor vs non-progenitor cells within this population. This is important because regeneration of the cornea requires a significant population of progenitor cells. I will use immunohistochemistry (IHC) to identify the presence or absence of specific antibodies known to be associated with progenitor or non-progenitor HCEC. No single protein can determine progenitor vs non-progenitor cells which is why a combination of proteins is necessary. PAX6 is expressed in both populations and therefore will be used as a control. Morphologically, I will be looking at shape and size as a biomarker for the presence of progenitor cells. My molecular and morphological characterization data will confirm there is a population of cells with the potential, through manipulation, to regenerate the cornea in the rabbits, and ultimately for patients with aniridia.

### **Kiger, Reagan**

**Mentor(s) -- Dr. Morgan Adams, Dr. Victoria Hetherington**

### **Difference in prescribing patterns of antiplatelet therapy for patients with ischemic vascular disease between primary care and specialty providers (Research-In-Progress)**

#### **Background**

Ischemic vascular disease (IVD) is a group of diseases that encompass coronary heart disease (CHD), carotid artery disease (CAD), and peripheral artery disease (PAD). In 2017, cardiovascular disease accounted for nearly 801,000 deaths in the United States, with 45.1% of these attributed to coronary heart disease, costing \$10.4 billion. This cost is projected to increase 100% by the year 2030.

To promote preventative measures, the Center for Medicare and Medicaid Services (CMS) under the Affordable Care Act (ACA) created the Medicare Shared Savings Program (MSSP), a performance-based payment program for Accountable Care Organizations (ACO). This program incorporates 31 quality measures to incentivize improvement in the quality of patient care and reduce unnecessary medical costs. One of the quality measures used for determination of reimbursement is antiplatelet use in patients with established IVD.

The purpose of this study is to compare the prescribing rates of aspirin (ASA) between primary care physicians and specialty providers in an effort to increase awareness of appropriate prescribing methods as described by the MSSP. Evaluation and improvement on this metric will potentially improve reimbursement to the health system.

#### **Methods**

Data will be collected within the Palmetto Health system for patients ages 18 years and older with an active diagnosis of IVD, or who were discharged alive for acute myocardial infarction (AMI), percutaneous intervention (PCI), or coronary artery bypass graft (CABG) between the dates of January 1 and June 30, 2017. Practice site, patient demographics, and whether or not patients have documented use of antiplatelet therapy during the study period will be reported. Appropriate therapy consists of aspirin, prasugrel (Effient), clopidogrel (Plavix), and ticlopidine (Ticlid). Results will be categorized into sub-specialties within the Palmetto Health system, not individualized to patient or provider, and will be compared to determine a difference in prescribing rates.

**Kim, Sung**

**Mentor(s) -- Dr. Melanie Palomares**

**Do Asians under-use mental health services especially in Southern States?**

Mental illness is a topic that is slowly being taken seriously, but there still is a problem that remains. In the current system, Asians and Asian-Americans may be under-utilizing mental health services especially in the southern part of the United States. It is through the research of other psychologist and through statistics about Asians and Asian-Americans that I try to see if this is true. In all the literature about Asians and Asian-Americans, it is shown that Asians and Asian-Americans are under-utilizing mental health service. This is mainly due to two things, the first is their lack of understanding of mental illness and mental health. The other is there are very few service that are geared towards Asian-American especially in southern states. In southern states it is mostly true do to there being a very small Asian population compared other places like California or New York. In conclusion, educating on mental health would be beneficially to help the Asian community as well as having programs or people that understand the Asian culture and lifestyle. Doing these things would greatly help a community that is silently suffering under a great weight.

**King, Reese**

**Mentor(s) -- Dr. C. Nathan Hancock**

**Investigating the mPing Transposition Complex Through Overexpression of ORF1 and Transposase Proteins**

Transposable elements (TEs) are mobile DNA segments found throughout many organisms' genomes. While most TEs exist in low numbers and are relatively inactive, some regularly relocate to new genomic locations. For these "jumping genes" to be mobilized, proteins must interact with the element's ends and catalyze DNA cleavage. This project studied mPing, a highly active rice transposon that is mobilized by two proteins, ORF1 and Transposase. Understanding the ratio and organization of these proteins in the transposition complex sheds light on the transposition mechanism. Previous results indicate that ORF1 forms oligomers and binds to Transposase. To consider the number and function of these proteins in the transposition complex, we tested the effects of ORF1 and Transposase overexpression on transposition rates in yeast. Overexpression of ORF1 increased transposition, while overexpression of Transposase negligibly effected transposition. We thus determined that ORF1 is the limiting factor governing transposition. Subsequently, we tested whether overexpression of partial ORF1 and Transposase proteins would disrupt transposition. We hypothesized that partial proteins having the ability to interact with the complex will disrupt transposition, resulting in a dominant-negative effect. Yeast transposition assays were conducted with the addition of N-terminal and C-terminal halves of the ORF1 and Transposase proteins. The strongest dominant-negative effects (lowest transposition rates) were observed in constructs with overexpression of the ORF1 C-Terminal and Transposase C-Terminal, suggesting that these regions of the proteins contain domains important in transposition complex binding. Of these, the ORF1 C-Terminal domains appear to be more important for transposition complex activation.

**Kirby, Alexander**

**Mentor(s) -- Dr. Varsha Kulkarni**

**Constraining Extinction due to Dust in Distant Galaxies**

Extinction due to interstellar dust is a ubiquitous phenomenon that dims and reddens the light of background objects. As such, it is essential to apply extinction corrections to observations of distant objects in order to deduce their properties. Since the discovery of interstellar extinction in 1930, astronomers have developed a fairly detailed understanding of the interstellar dust in the Milky Way and other Local Group galaxies, especially the Magellanic Clouds. However, studies of extinction by dust in galaxies beyond the Local Group have been limited. In this work, we seek to generate better constraints on dust extinction in other galaxies in order to improve corrections for observations of objects that lie beyond them. As such, we are constructing spectral energy distributions (SEDs) for quasars/active galactic nuclei whose lines of sight go through foreground galaxies at lower redshifts. We will describe our compilation of archival optical, UV, and IR spectroscopic and photometric data from various observatories. Using the SEDs compiled from these data, and fitting the underlying continuum of the background quasar/AGN, we will estimate dust extinction curves for each foreground galaxy, and compare those with extinction curves in the Milky Way and the Magellanic Clouds.

**Kiser, Alexis**

**Mentor(s) -- Ms. Hayley Efland**

**Diversity and the Office of New Student Orientation**

The Office of New Student Orientation is one of the first offices on campus incoming students interact with and have a profound view on the shaping the student's and their family's view of the University of South Carolina. Orientation leaders serve as a mentor to incoming students of all different walks of life who are entering the Carolinian Community. One of the most significant activities I have participated in as a student is serving as an Orientation Leader. As an orientation leader I was able to interact with a diverse group of current and incoming students, refine my communication skills on difficult topics, and solve community issues. Through this experience I learned how to work effectively with a wide range of people, present material to large groups, and how to carry myself in a professional manner. My Discovery Day presentation will provide insights I learned about my leadership abilities and the impact that serving as an orientation leader shaped my future career.

**Klink, Rachel**

**Mentor(s) -- Dr. Elise Lewis**

**Leading Fellow Leaders**

My most meaningful contribution to the University of South Carolina has been through my involvement with the Carolina Judicial Council. Serving as President of CJC in 2017 was a challenging and fruitful time of academic enrichment, professional development and personal growth. In facilitating council meetings and trainings, executing all provisions of the CJC Constitution, overseeing and supporting the executive board, serving as the hearing chair for numerous student conduct hearings and representing the student body on the Honor Code Review Committee and Student Code of Conduct Review Committee, I discovered my capacity for leadership. I devoted myself whole-heartedly to an organization I found joy, value and fulfillment in, and never imagined how life-altering and empowering my experience on the council would be. Through implementing effective, clear communication strategies, pursuing rewarding opportunities in spite of the risks involved, and personalizing my own vision, goals and methods to meet the ambitions and objectives of our members, I learned that leadership demands engagement at the most rudimentary level. My experience leading and serving on the Carolina Judicial Council has reaffirmed my desire to attend law school after graduating with my Bachelor's Degree in English. In my presentation, I look forward to demonstrating my newfound understanding of leadership, the positive impact that this experience has had on me as a student leader, and how this growth has influenced my post-undergraduate school plans.

**Knight, Hannah**

**Mentor(s) -- Prof. Hilary Lichterman**

**Learning the Ins and Outs of Teaching**

Pleasant Hill Middle School, Home of the Cougars, is the place I have called home for my student teaching internship the past year. During the fall semester, I spent one day each week with 125 seventh grade math students and one day each week with 120 sixth grade science students. I spent much of my time observing and learning from the classroom management and teaching strategies of my coaching teachers. As an observer, I saw the classroom from a different perspective that no one else in the room had. I saw the inefficiency of lectures on student learning, I saw the things that served as distractions for the students and I saw the things that resonated best with the students. When I had the opportunity to plan and teach individual lessons throughout my time in each class, I reflected on my observations and used this to plan in a way I thought would be more effective. During the spring semester, I choose to stay with my 6th graders and spent every day in the 6th grade science classroom. Being in the classroom every day, I was able to teach several class periods each day, planned many lessons, and developed a three-week unit plan on vertebrates. It was during this time that I learned the ins and outs of being a classroom teacher. I learned the importance of building relationships with students, developing engaging activities, and setting high expectations for all students. I saw how those things were crucial to student achievement. I have explored the use of high cognitive demand tasks with students and experienced great success in doing so. All of my experiences through this internship have adequately prepared me to successfully enter the field of education.

**Knopf, Katelyn**

**Mentor(s) -- Dr. Dimitris Rizos**

**A Non-Contacting Vision Based System for Rail Neutral Temperature Measurements**

The rail industry has been a driving force behind economic development in the U.S. for over two hundred years. The industry's sustained growth and safety of its operations depends heavily on the condition of the infrastructure and adoption of new technologies. Among the new technologies is the Continuous Welded Rail (CWR). CWR eliminates joints and provides a smooth continuous running surface, alleviating a number of critical issues that affect the safety of the operations and maintenance demands. Rail Neutral Temperature (RNT) is defined as the temperature at which the rail is free of any stresses, and is typically associated with the temperature at which the rail is first installed in the track. However, temperature deviations from the RNT during cycles cause the rail to expand and contract and, in the absence of joints that relieve the thermal deformations, stress in the rail develops. The stress buildup can lead to track buckling or rail-breaks posing a significant derailment risk. Therefore, the ability to measure the stress in the rail at any time during service and estimate the RNT is of paramount importance in assessing the track's integrity. Existing techniques for RNT and stress measurements are destructive, disrupt operations, expensive, and even pose health risks.

This research pertains to the development of a non-destructive, non-contacting measurement system of full-field deformations and strains. The system is based on 3-D Vision technology and a methodology that correlates the measurements to the RNT and stress in the rail. This work is a proof-of-concept that will demonstrate the feasibility to develop such a system through high fidelity lab testing and advanced computer simulations using Finite Element Analysis.

The proposed research represents a simple to adopt and cost effective technology that improves the safety of operations due to timely detection of imminent track instability, or rail failure. It can be deployed fast on a routine basis, or on demand without disrupting service. Furthermore, it results in more efficient track maintenance because interventions can be prioritized based on knowledge of rail

conditions and can also be integrated with other track sensing technologies.”

**Komondor, Kara**

**Mentor(s) -- Mrs. Katie Hopkins**

**GLD: Professional and Civic Engagement: My experience with leadership and stepping out of comfort zones both on and off the “field.”**

Looking back on my time at Carolina, I can pin point a few major moments and experiences that have led to overall success as a student. This project will have two parts. The first focus will be on the time spent in the field of Sport Management as an intern for two straight summers at Ripken Baseball drawing from all of the skills I had gained in the classroom. I was motivated to find an overall meaning and worth within the major I had selected and did so when helping to bring people of all backgrounds together through the mutual love of the game of baseball through the Cal Ripken World Series.

These experiences helped me develop as a student, as a leader, and as a future professional. I will also focus on the leadership opportunities outside of the classroom that Carolina has presented me with. Drawing from my time in the classroom, time spent leading through extracurricular activities, and time working within the field of Sport Management; I was able to find the importance of jumping outside of your comfort zone to enhance yourself as a person.

**Kopp, Megan**

**Mentor(s) -- Dr. Shuo Xiao**

**Multidrug resistance protein 1 deficiency promotes doxorubicin-induced ovarian toxicity in female mice**

Multidrug resistance protein 1 (MDR1), a phase III drug transporter that exports substrates out of cells, has been discovered in both cancerous and normal tissues. The over expression of MDR1 in cancer cells contributes to multiple drug resistance, whereas the MDR1 in normal tissues protects them from chemical-induced toxicity. Currently, the role of MDR1 in the ovary has not been entirely understood. Our objective is to determine the function of MDR1 in protecting against chemotherapy-induced ovarian toxicity. Using both the in vivo transgenic mouse model and in vitro follicle culture model, we investigated the expression of MDR1 in the ovary, the effect of MDR1 deficiency on doxorubicin (DOX)-induced ovarian toxicity, and the ovarian steroid hormonal regulation of MDR1. Results showed that the MDR1 was expressed in the ovarian epithelial cells, stroma cells, theca cell layers, endothelial cells, and luteal cells. The lack of MDR1 did not affect female ovarian function and fertility, however, its deficiency significantly exacerbated the DOX-induced ovarian toxicity in both in vivo and in vitro models. The MDR1 showed significantly higher expression levels in the ovaries at estrus and metestrus stages than those at proestrus and diestrus stages. However, this dynamic expression pattern was not regulated by the ovarian steroid hormones of estrogen (E2) and progesterone (P4) but correlated to the number and status of corpus luteum (CL). In conclusion, our study demonstrates that the lack of MDR1 promotes DOX-induced ovarian toxicity, suggesting the critical role of MDR1 in protecting female ovarian functions during chemotherapy.

**Kopp, Megan**

**Mentor(s) -- Dr. Shuo Xiao**

**A Pilot Study to Assess Oncofertility Knowledge in Obstetricians and Gynecologists in China**

With the significantly improved cancer survival rates in the past several decades, there is now an increased awareness regarding the side effects from anti-cancer treatments in non-tumorous organs. Oncofertility, the fertility preservation and protection for young cancer patients, has been an afterthought to many doctors due to the severity of cancer and the expedited process of treatment. Awareness and background knowledge regarding fertility especially lacking in countries like China, where many of the practices are not readily available. To address the severity of the lack of Oncofertility awareness and knowledge, a questionnaire was formulated and provided to OB/GYN doctors in

The First Affiliated Hospital in Xiamen University, Fujian Province in China. Participants were asked to express their opinion, knowledge, as well as their practices involving fertility preservation for female cancer patients. The questionnaire consisted of 21 questions regarding their practices and beliefs and 12 questions assessing background knowledge in those areas.

Of the 87 OB/GYN related medical professionals who responded, the gender, age, educational level, specialty, etc. were recorded. All of the demographic information was utilized to determine an association between their opinions on fertility preservation and background knowledge for each classification. Based off the given responses, 91.7% of doctors encounters patients facing infertility and 58.3% of doctors were approached by female cancer patients with fertility concerns. 98.3% of doctors believed their patients would want to pursue fertility preservation but only 75% knew what fertility preservation was. 40% of OB/GYN doctors have been consulted by oncologists about patient's fertility risk from anti-cancer treatments and 88.3% of them were willing to collaborate with oncologists to determine fertility preservation options for their patients. With respect to the background knowledge, the participants were given a score based upon the percentage of correct answers. On average the participants received a score between 71-80 but over 28% had scores 60 and lower, showing a lack of basic Oncofertility knowledge.

**Kostelnik, Colton**

**Mentor(s) -- Dr. Melissa Moss**

### **Analysis of Amyloid-Beta Mutant Aggregates through Capillary Electrophoresis**

Alzheimer's disease (AD) is a neurodegenerative disease that results from the accumulation of extracellular plaques in cerebral vasculature. The particular 40-42 residue peptide known as amyloid-beta ( $A\beta$ ) can induce morphological and biochemical changes in the microenvironment of the brain.  $A\beta$  exists in many forms and variations including: E22Q (Dutch variant), E22K (Italian variant), A21G (Flemish variant), and D23N (Iowa variant). Effectively analyzing conformational and associative events of  $A\beta$  throughout the aggregation process would bring insight into toxic oligomer structures and affinities. Through a collaborative study between the University of South Carolina and the University of Arkansas, a Research Experience for Undergraduates (REU) was developed to study these mutant aggregate models. The research conducted in Dr. Christa Hestekin's laboratory at the University of Arkansas studies elution profile of protein aggregates through various separation techniques. The separation methods that were primarily used throughout this laboratory experience included capillary electrophoresis, PAGE, and nanodrop spectrophotometry. This REU project provided valuable laboratory skill-building sessions as well as increased the knowledge of theories described in the classroom setting. The information taught in the Bioinstrumentation class offered at USC assisted in the understanding of the project and the development of solutions and experiments during troubleshooting phases. Example of the application information utilized in this project include capillary electrophoresis theories, mechanisms, and machinery. This experience has propelled my research interests and increased my comprehension of how research is conducted in an academic setting. This experience as a whole has prepared me to with the information on how to conduct my own research project as I continue onto graduate school.

**Krauss, Jessica**

**Mentor(s) -- Mr. David DeWeil**

### **Leaders still need to learn**

Throughout my time as a USC student, I have assumed many leadership roles. My major involvements included serving as a JumpStart mentor to incoming freshmen; interning with Healthy Columbia; moving from Coordinator, to Assistant Director, to Director of Walk Home Cocky; gaining professional experience through internships with physical therapy clinics; working as a Resident Mentor and Lead Resident Mentor; leading a small group through First College Ministry and serving as Vice President, then President, of the ministry's Serve Team. Great purpose and passion lie behind each of my

commitments, the greatest of my passions being my love of people and desire to promote health. My experiences have taught me the importance of self-efficacy in the pursuit of success, why it is necessary to limit how I invest my time, and the role that integrity—including practicing what I preach—plays in being a strong leader. Knowing your worth, narrowing your passions, and doing as you say are the key insights that I have drawn from my experiences. As a Carolina student who has constantly been motivated to invest in the lives of my peers and the community around us, I see many similarly motivated peers whose leadership could be strengthened from the same insights I have gained. Looking to future careers, I am better equipped to use my strengths to lead, whether that be through advising a client, organizing a team of coworkers, or engaging a larger community, and I know that I will be ready for future challenges.

**Kulibert, Jean**

**Mentor(s) -- Dr. Jennifer Pournelle**

**Remediation of the phosphorous cycle by the potential harvest of *Cladium jamaicense* as livestock fodder and effected water quality standards of constructed wetlands**

MaRSHil (Maintaining and Restoring Sustainable Hydrology in Iraq) is an applied archaeology research program, conducted in cooperation with the University of Basra, Iraq. MaRSHil is now testing how constructed wastewater treatment wetlands can be integrated with wetland agriculture to restore ecosystem-provisioning services, such as livestock fodder and fisheries. This particular study uses Phinizy Swamp, Augusta, Georgia to draw a connection between reed mash (a controlled destruction/suppression of vegetation growth to prevent disruption of the swamp's ecology due to roosting black-birds) and water quality data in order to determine two things: the quality of sawgrass as livestock feed for comparable regions in southern Iraq which rely on marshlands for fodder and the presence of chemical stressors in the water which may harm fish as measured by the phosphorus cycle and other compound concentrations.

Water entering Phinizy comes from the Messerly Wastewater Treatment Plant, and at the point of discharge the plant's effluent is compliant with EPA standards. Water sampling from different source points in order to measure phosphorous levels took place a couple months after the facility's annual sawgrass mash. Measured levels read 40-200ppm above EPA standards of 0.25ppm, the elevated levels hypothesized to be due to the annual mash. Around this time, sawgrass samples were collected using a sickle to simulate local harvesting methods of Southern Iraq. The sawgrass was weighted wet then dry after several days. Phosphorous values for the sawgrass between 0.20% and 0.22% as provided by Clemson lab shows sawgrass bioproductivity as adequate for livestock fodder in Southern Iraq. Additional water quality data in search of potential stressors for fish would be measured by widely available water tests to search for chlorine, hardness, iron, pH, alkalinity, copper, iron bacteria, nitrates, nitrites, and hydrogen sulfide levels.

A follow-up measurement of phosphorous levels will be conducted at Phinizy Swamp to show continuation of the phosphorus cycle as reuptake occurs as the weather warms and plants increase their growth rates. A second test of other compounds will also be performed on the water samples gathered at this time.

**Kumte, Nabihah**

**Mentor(s) -- Dr. Carole Oskeritzian**

**Could Mast Cells Be Early Diagnostic Markers of Colorectal Cancer?**

Colorectal cancer (CRC) is one of the three most common causes of cancer-related deaths worldwide. Mast cells (MC) function as initiators and immunomodulators of many inflammatory disorders such as allergic reactions, and cancer initiation and progression. Once MC reach the tissues where they inhabit during homeostasis, they differentiate into one of two possible phenotypes defined by specific proteases stored inside cytoplasmic granules that characterize MC. In mice, MC that express tryptase, the most abundant serine proteinase, are identified as mucosal (M)MC, while MC that ex-

press both trypsin and chymase, another serine proteinase, are identified as connective tissue (CT) MC.

In addition to inflammation, genetics may contribute to cancer. Previous research has found that nearly 85% of sporadic colon cancer has been linked to the inactivation of adenomatous polyposis coli (Apc) gene, a critical tumor suppressor gene which prevents colon malignancies in humans. Families who carry a mutation in one copy of this gene suffer from multiple intestinal neoplasia (Min) due to the loss of the remaining wildtype (WT) gene. Similarly in mice heterozygous for the Apc gene (Apc Min/+), Apc-deficient cells appear due to the heterozygosity loss.

Screening for CRC is invasive and often avoided by at-risk patients. It's hypothesized that MC slough off in the colonic lumen of sick mice, and can therefore be collected using a rectal swab. The rectal swab would be less invasive than a colonoscopy and could allow CRC diagnosis based off of MC presence in the swab.

Staining of samples revealed lesions and transformation among Apc Min/+ colonic tissue, reasoning that MC may be sloughing off into the lumen of Apc Min/+ mice but not WT mice. These findings suggest that premalignant stages of CRC are associated with MC phenoconversion from MMC to CTMC. Staining of the rectal swabs suggest that MC slough off in the lumen of the Apc Min/+ group but not the WT group, and that they can be collected through a minimally invasive swab. These findings suggest that MC collected through rectal swabs may aid in acting as an early diagnostic marker for CRC.

**Lambdin, Mary**

**Mentor(s) -- Mr. Andrew Schramm, Dr. Suzanne Swan**

### **Frequency and subtypes of stalking behavior among heterosexual and sexual minority college students**

Stalking, defined as "repeated visual or physical proximity, non-consensual communication, and/or verbal, written, or implied threats directed at a specific individual" (National Center for Injury Prevention and Control, 2003), is a phenomenon that affects many people. In fact, an estimated 3.3 million people aged 18-24 reported experiencing stalking victimization during the prior year (Catalano, 2012). Prior research shows that stalking victimization largely affects sexual minority individuals (i.e., LGBTQ+ persons). For example, one study found that 36% of bisexual women vs. 15% of heterosexual women have been stalked before (Walters, Chen, & Brieding, 2013). Another study found that 53.1% of sexual minority college students and 36.0% of non-sexual minority college students report unwanted pursuit (Edwards, Sylaska, Bary, Moynihan, Baynard, Cohn, Walsh, & Ward, 2015). Despite the fact that sexual minorities appear to be disproportionately impacted by stalking, no prior study has compared rates of stalking perpetration among sexual minority and heterosexual college students. Using a sample of N = 6,931 college students from three universities, we sought to determine whether sexual minority college students were more or less likely to be stalking perpetrators than heterosexual college students. We also evaluated variation in stalking rates by gender and the form of stalking (e.g., unwanted phone calls versus unwanted physical proximity). This study is an important step toward better understanding and preventing, stalking among heterosexual and sexual minority college students.

**Lamison, Ryan**

**Mentor(s) -- Dr. Raymond Thompson**

### **Reproducibility of Accelerometer-Based Mechanomyography**

The purpose of this study is to determine the reproducibility of accelerometer-based mechanomyography (aMMG) to assess skeletal muscle endurance. A second purpose is to determine the reproducibility of the isokinetic dynamometer to assess peak torque. Electrical muscle stimulation (EMS) induced muscle contraction (twitch and tetanic) is traditionally used in both clinical and research settings. While current data is limited supporting reproducible measures of muscle-specific endurance, aMMG measures can be used to evaluate changes in acceleration stemming from low frequency

EMS and assess muscle endurance during contractions. In addition to measuring muscle endurance, isokinetic dynamometers are used to measure peak torque and can provide good comparison for skeletal muscle endurance. For this overall study, a longitudinal design is used to measure the reproducibility of aMMG to assess the change in acceleration over time for the rectus femoris (quadriceps muscle) and biceps femoris (hamstring muscle). The Endurance Index (EI) consists of the percent decline in EMS induced acceleration over 3 consecutive 5-minute stimulation periods. The assessment will be made on 3 nonconsecutive days within a 2-week period. Low frequency (4 Hz) EMS will induce muscle twitch contractions in the rectus and biceps femoris. With this, the change in acceleration from the initial stimulation to the last stimulation will be recorded, compiled, and calculated as percent change. This longitudinal study will provide evidence whether this EMS protocol yields reproducible results within subjects. At each lab visit the participant will also perform 3 maximal voluntary concentric contractions (MVC) each for the quadriceps and the hamstring muscles. Peak torque will be assessed by an isokinetic dynamometer and reported as the highest values for each muscle as each visit. Reproducibility measures will be recorded over the same time frame as EMS. Anticipated results will support previous studies reporting high reproducibility of the isokinetic measurements of peak torque. Limited data is available on the reproducibility of the aMMG endurance index. However, we expect the EI results for each participant will be consistent and reproducible of the 3 assessments.

**Landau, Amy**

**Mentor(s) -- Mrs. Asheley Schryer**

**Refreshing Old Ideas with New Technology: EZGO ELITE Golf Carts**

Textron Specialized Vehicles (TSV) is a division of Textron, a Fortune 250 company that owns companies including EZGO golf, Cushman vehicles, Textron Off Road, Jacobsen, Bell Helicopter and Cessna. I interned for TSV two terms, Fall 2016 and Summer 2017. During the terms I worked in the new product group under the golf division to prototype and innovate lithium ion powered vehicles. The product I focused on with during Fall of 2016 was the eLite RXV and TSV that were released during the first months of 2017. These are the first stock lithium ion golf vehicles in the American market. I worked with the data collection of the battery discharge to detail the proper sizing of the battery packs to ensure optimal operation and choose the appropriate sizing for each golf course. I also helped build the gamma models of the vehicles on the prototyping line to send out for more testing at golf courses in California, Kansas, North Carolina and Georgia. This experience taught me different steps in the design process and methods for testing the different components to verify their effectivity. It showed me the trouble shooting needed to check how problems occur and the steps to document resolutions and design changes. From this I learned I am interested in working in the research and development sector of companies and continue to help innovate new ideas.

**Lang, Anastasia**

**Mentor(s) -- Ms. Theresa Harrison**

**Learning from Cultural Differences in Respect**

After my sophomore year, I had the opportunity to visit Japan for a Maymester focused on Business in Asia. As a business major with a Japanese minor, I wanted to learn more about how cultural differences affect business interactions while also getting the chance to practice speaking Japanese. As someone who wants to work in strategic human resources for an international company, seeing these interactions first-hand and learning to quickly adapt to new cultures was a fantastic immersive learning experience. While I was there, I learned how the concept of respect plays an essential role in business and influences many interactions, from introducing yourself to a new colleague to handling business cards. Through my conversations and interactions with locals, my eyes were opened to how respect also affects the Japanese language and how people speak with each other.

This experience was especially significant for me because it was my first time outside of the United States. I knew that this was an opportunity for me learn about Japanese culture, as well as my own

cultural assumptions and practices. My time in Japan was a period when I was able to improve my language skills significantly and become more comfortable engaging in conversation. In addition, I was able to learn more about the culture of Japan and how that affects day-to-day life in the country. This, which led me to better understand how to navigate cultural differences in a way that respects each party's culture. In the future, I hope to use the skills I acquired on this trip to create an environment for my colleagues that emphasizes embracing and learning from others' diversity.

**Lanier, Robert**

**Mentor(s) -- Prof. Edward D' Antonio**

**Synthesis, Purification, and Characterization of Monosaccharide Inhibitors for Trypanosoma cruzi Hexokinase**

The human pathogenic protozoan parasite Trypanosoma cruzi, being the cause of Chagas' disease, is a neglected tropical disease. In Latin America, there are currently 6-7 million people affected by Chagas' disease, also killing over ten thousand people each year. T. cruzi cells possess a glycolytic enzyme, hexokinase (TcHxK), that is essential to its survival. Due to the broad substrate range of TcHxK, various monosaccharides can be phosphorylated at appreciable rates. This study focuses on the synthesis and purification of potential inhibitors of TcHxK in order to discover an inhibitor that is effective at killing T. cruzi cells. To identify a class of monosaccharide-based inhibitors that are potent and selective with respect to the human homologue, a focus was centered on the structure-activity relationship from a previously confirmed inhibitor for T. cruzi glucokinase. Three monosaccharides were explored that included: D-glucosamine, D-mannosamine, and D-galactosamine using 7 acyl chloride derivatives to tether on having an amide bond. Each inhibitor was purified through a semi-preparative high-performance liquid chromatography instrument, purifying and collecting a single compound. These compounds were characterized using nuclear magnetic resonance spectroscopy and high-resolution mass spectrometry. The compounds were confirmed to be the desired products from the syntheses.

**Lanigan, Connor**

**Mentor(s) -- Mr. Drew Newton**

**Fostering Knowledge Across All Lifespans: A Guided Approach**

Over the course of my past 4 summers, I've had the privilege of working at YMCA Camp Sea Gull as a camp counselor on the coast of North Carolina. During the summer of 2017, I had the opportunity to spend 12 weeks leading the camp's U.S. Powerboating program. As the head of U.S.P.B. instruction, I was tasked with guiding and educating counselors assigned to my activity on how to instruct campers, creating a curriculum that best fosters knowledge and is aligned with N.A.S.B.L.A. standards, and ensuring campers that have just obtained their boating license are safe while out on the water. From experiences that I've had in my introductory courses as a nursing major, and through my time as an Supplemental Instruction leader, I was able to incorporate the newest and most effective learning strategies to educate both staff and campers on safe boat handling, and gain a deeper understanding of what it means to be an instructor and leader. Throughout my time last summer, I had paired more experienced staff members with new staff members, lead them both through mock boating drills, explained to them key points that were needed to be made when teaching campers. While creating a curriculum for campers, I had ensured that lectures were simplified and understandable to the campers attending (some of which were only 8 years old), incorporated periods during the class where students had to use multiple types of learning styles (i.e. visual/kinesthetic), and created time towards the end of each lecture where students were given questions on each topic and were expected to explain their reasoning behind their answers. As these methods were implemented more and more throughout the summer, staff became more proficient instructors and U.S.P.B. pass rates rose higher and higher. In conclusion, implementing evidence-based teaching methods in curriculum best helps students bridge the gap between what they are and aren't capable of learning.

**LaPointe, Jeremy**

**Mentor(s) -- Dr. Rosemarie Booze**

### **Physical Activity Promotes Neurogenesis in HIV-1 Transgenic Rats**

Adult neurogenesis has emerged as a relevant topic of study within the field of neuroscience. Adult neurogenesis refers to the growth of neurons during postnatal periods. Environmental enrichment and physical activity has been shown to promote neuronal proliferation in mammals and humans. The current study examined the impact of physical activity on neurogenesis in human immunodeficiency virus-1 (HIV-1) transgenic (Tg) rats. The current study examined the impacts of exercise among male and female rats with the HIV-1 transgene compared to F344 controls. Animals were continuously run until sacrifice to promote exercise-induced adult neurogenesis. After sacrifice, the hippocampus was sectioned into 500 micrometer ( $\mu\text{m}$ ) thick slices and retained for processing. Half of these slices were processed with immunohistochemical procedures to stain for the protein doublecortin (DCX). DCX is a structural protein that is expressed in developing, maturing neurons two to eight weeks after creation. Expression of these proteins in adult rats indicated the stained neurons were a product of adult neurogenesis within the previous four to six weeks. The StereoInvestigator (MBF Bioscience) computer program was used to count the neurons expressing DCX under a Nikon Microscope. Neurons were counted as either cell bodies (immature) or fibers (more mature). Cell bodies were strictly somas found in the region of interest (ROI), devoid of any dendritic branches. Fibers consisted of a soma with at least one clearly connected dendritic branch. The ROI (dentate gyrus of the left hippocampus) was encircled under 4x magnification and the DCX+ neurons were counted under 20x magnification. We hypothesized that HIV-1 viral proteins gp120 and Tat would inhibit neurogenesis and expected to find that more DCX+ cell bodies and fibers in F334/N controls compared to the HIV-1 Tg animals. Additionally, it was hypothesized that rats participating in physical activity would have increased DCX+ neurons as a product of exercise-induced adult hippocampal neurogenesis in both the HIV-1 and control groups compared to their sedentary counterparts. This experiment showed the impact of exercise on neurogenesis in the HIV-1 mammalian brain.

**Larkin, Kelsey**

**Mentor(s) -- Dr. Peter Binev**

### **Improved Filtering of Electron Tomography EDX Data**

The processing of EDX tomography data involves using an electron microscope that scans a sample containing different elements which occasionally emit x-rays. Each element emits an x-ray with specific energies which are then collected. We use mathematical methods to manipulate the data to produce the best reconstructions of the samples. The collection of data using the electron microscope involves various inaccuracies that arise when the data is obtained. Additionally, there are not many x-rays detected at a single position and in order to see which elements are involved and how their energies are distributed, it is necessary to perform the analysis of this information on the combined spectrum of all the positions. We decompose the data into a background and several Gaussian-like bump functions. This is used to create filters to faithfully extract the counts for the elements at each individual pixel and provide accurate data for tomographic reconstruction. The focus of this presentation are the improvements of several particular elements of the procedure. The Gaussian-like bumps are usually represented by  $e^{(-b)(x-c)^2}$  and the focus is on specifying the factor "b."  $\square$  It is traditionally equivalent to  $1/(2*(\sigma^2))$  but since the distribution is not exactly Gaussian - the specialists have observed that it varies with the position of the center "c"  $\square$  and the bump itself is not exactly symmetric. Another problem is that some bumps are formed by two close energies of the same chemical element and for those, we should consider different approximation containing two exponentials. The parameters are fit for each bump using the nonlinear least squares iteration with a very good initial guess provided by the preliminary analysis of the data. Several different sets of data involving different compositions of chemical elements were analyzed.

**Lasche, Wyatt**

**Mentor(s) -- Dr. Faye Riley**

**January**

This project looks to see how high the quality a short film can be on the budget provided from the Office of Undergraduate Research. Creating a film that represents and deconstruction of the superhero genre so well known today, I along with many fellow USC students have been filming and editing together this project here in Columbia, South Carolina since January. We are still in the process of filming, but once we are finished we will submit it to film festivals to hopefully have it shown in many different locations, including here in Columbia.

**Lash, Garrett**

**Mentor(s) -- Dr. Courtney Worsham**

**More than Numbers: How International Business Opened My Mind to More Than Just Business**

When I first enrolled in the International iBusiness program at the University of South Carolina before the fall of my freshman year, I had little knowledge about what I was getting myself into, other than taking very hard courses in very nice classrooms. I had a preconceived notion that the entirety of my curriculum would be focused on ways that the process of international commercialization could be streamlined, perhaps even conforming cultures in certain ways and at the expense of characteristics that have been making countries unique for so long.

Once I started my courses though, I realized that the courses I would be taking would help me develop in more ways than I could have imagined. My language courses prepared me to communicate with native speakers overseas. My International Business courses presented me with multiple ideological frameworks that I never would have thought of, one of which explained why cultures matter to people and are important constructs to the functionality of international trade as a whole.

When I left to study abroad in Shanghai as a requirement of the International Business program, I was amazed at how applicable so many of the things I had learned in class would be. I saw firsthand the differences in so many different cultures across Asian cultures, and how it was just as important to adapt to the differences in their cultures as it was to meld cultures for simplicity. More than that, however, I was amazed how content in class classes I had no idea would relate to my overseas travel would come to life. Lessons learned in negotiations classes and Supply Chain courses seemed to apply themselves half a world away from home.

**Lateef, Azalfa**

**Mentor(s) -- Dr. Jessica Klusek**

**Heart Activity and Anti-Saccade Performance in Women with the FMR1 Premutation**

Background: The FMR1 premutation occurs when there is an expansion of 55-200 of the CGG codon on the FMR1 gene. Many people carry the FMR1 premutation, which affects about 1:151 women. Some research suggests that women with the FMR1 premutation show impaired inhibition skills, although the mechanisms are poorly understood. The study of respiratory sinus arrhythmia (RSA) may lend insight into inhibition deficits in the FMR1 premutation. RSA is the variation in the inter-beat intervals which can be used to measure vagal tone. Increased vagal reactivity marks greater autonomic flexibility and improved ability to respond to stressors. Research Question: (1) Do women with the FMR1 premutation show impairments in inhibitory control, as assessed by an antisaccade eye tracking paradigm, as compared to control women? (2) Does RSA reactivity relate to inhibition? Methods: Participants were made up of 28 women with the FMR1 and 18 neurotypical control women, aged 26-65 years. The groups were similar in age ( $p = 0.180$ ). A prosaccade task was performed, followed by an antisaccade task. The average latency and percent correct was computed for each condition, and a difference score for latency and was computed by subtracting the prosaccade from the antisaccade condition. Heart activity was recorded during the antisaccade task and the resting baseline condi-

tion, and mean RSA in each condition was estimated using CardioEdit/CardioBatch. Results: Group comparisons indicated that the latency difference score was significantly elevated in women with the FMR1 premutation compared to controls [ $F(1,44) = 4.88, (p < 0.0325)$ ], suggesting poorer inhibitory control in this group. There were no group differences in the percent of correct trials [ $F(1,44) = 0.64, (p < 0.4271)$ ]. No significant correlations were detected between performance on the antisaccade task and RSA in either group. Conclusion: Women with the FMR1 premutation showed difficulties in inhibitory control compared to control women. Performance on the antisaccade task was not associated with RSA, suggesting that reduced inhibitory control in the FMR1 premutation does not stem from autonomic dysfunction.

**Lateef, Almeera**

**Mentor(s) -- Dr. Rosemarie Booze, Mr. Adam Denton**

**The effect of chronic escitalopram treatment upon motivation in HIV-1 transgenic rats**

HIV is a serious viral infection affecting approximately 37 million people as of 2015. Despite the development of combination antiretroviral therapy (cART), roughly 40-60% of seropositive individuals develop some degree of clinical depression and HIV associated neurocognitive disorders (HAND). The HIV-1 transgenic (Tg) rat contains 7 of the 9 genes that comprise the HIV viral genome, thus representing a non-infectious model of HIV infection. Previous research with this model has demonstrated significant impairment in dopaminergic and serotonergic neurotransmission. Deficits in serotonergic and dopaminergic function have been consistently demonstrated to play a role in the pathogenesis of clinical depression. With these findings in mind, the present study seeks to examine the therapeutic efficacy of Escitalopram, an SSRI antidepressant, in attenuating motivational deficits in HIV-1 Tg rodents. Lack of motivation is a reliably well-documented feature of clinical depression. For the present purpose, a 2X2X2 factorial design was employed in an attempt to measure the effects of sex (male vs female) genotype (HIV-1 Tg vs F344 control) and drug treatment (escitalopram vs placebo) upon motivational behavior. A 5 bottle sucrose preference test using concentrations of 0%, 1%, 5%, 10% and 30% sucrose solution was used to measure motivation/reward seeking behavior. Animals were habituated to the presence of five cylinders containing distilled water for a period of two consecutive days. Following habituation, animals were tested with concentrations of sucrose solution for a period of five consecutive days. Consumption per bottle was measured via meniscus differences before and after a 30 minute testing period, and by cylinder weight in grams before and after the testing period. The order of cylinder presentation was randomized daily using a Latin square design to control for any locational biases. Given that lack of motivation is a core component in clinical depression, the present study thus seeks to treat depressive-like symptoms in an HIV-1 transgenic model of HIV infection in hopes of furthering the understanding of the nature of comorbid HIV infection and clinical depression while elucidating reliable methods of treatment for this serious condition.

**Lavandero, Beatriz**

**Mentor(s) -- Dr. Dan Freedman**

**Curriculum to Campus: Integrating Public Relations Into Outside the Classroom Experiences**

Upon entering the University of South Carolina, I found a passion for creating meaningful content and developing relationships with local publics. This brought me to the realization that public relations was the best major I could have picked in order to fulfill my future career goals. By being a student in a developing and innovative public relations program, I was able to take my in-the-classroom curriculum and apply it to the following campus leadership positions: Public Relations Chair of Delta Zeta, Director of Public Relations of USC Dance Marathon, and Public Relations Chair of Order of Omega. All of these leadership experiences gave me the opportunity to use my writing, graphic design, and journalistic skills and apply them to real-life situations and tasks. These leadership roles have taught me things that textbooks and exams do not cover, and that includes effective delegation, professional communication, and metric measurement. On-campus leadership positions, such as the ones previ-

ously mentioned, allow students to blossom in their professional lives and provides stepping stones to desired careers. The University of South Carolina has prepared me for my professional career by providing me with the tools necessary to succeed through its curriculum, opportunities, and mentors.

**Lavin, Helena**

**Mentor(s) -- Ms. Theresa Harrison**

**The Many Faces of Leadership**

Serving as a Peer Leader for the University 101 Program at USC has been transformative for me as I have experienced firsthand the numerous positive benefits of investing your time into others. Having a strong support system during college allows students the freedom to further their goals and find themselves before being fully immersed in the demands of college and beyond. As a Peer Leader, I helped facilitate activities and presentations for my U101 class along with my co-instructor. I also met with students one-on-one to develop our relationships and provide insight and advice when necessary. Through my experience, I have learned that investing my time is the greatest gift I could give during my time at Carolina. I was able to give back to the community that had shaped me, and in doing so, found my passions and refined my leadership skills, which I have since been able to apply in a variety of other settings. Through my U101 Peer Leader role, I have learned to work with people of different personality types, the importance of finding what motivates individuals, and the power of having a positive attitude. In the future, I would like to work in a healthcare setting as a PA, where I plan to continue to invest my time in others. I look forward to growing as a professional and I hope to one day have students shadow me in my office.

**Lawlor, Mary-Kate**

**Mentor(s) -- Dr. Sofia Lizarraga**

**A study on the role of IL-17A in neuronal development and in autism pathogenesis**

Autism is a highly heterogeneous disorder with close to 50 to 75% of cases being of complex genetic etiology. This highlights the importance of understanding how gene-environment interactions might impact autism risk. Epidemiological studies have suggested that severe immune dysregulation during pregnancy might contribute to increased autism risk in the offspring. In rodent models of maternal immune activation, the cytokine IL-17A has been previously identified as a major factor mediating the effect of inflammation in increased autism-like behaviors. This project aims to characterize the effect of IL-17A in neuronal development. We used a combination of imaging and biochemical approaches to characterize the effect of IL-17A in stem cell derived human excitatory neurons. In addition, we analyzed the expression of the IL-17A receptor at different stages of human brain development and in different brain regions. Finally, we conducted a comparison of previous transcriptome studies on rodent models of maternal immune activation with autism databases in order to identify common genetic signatures that might be relevant to autism pathogenesis in response to inflammation.

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**Laymon, Jared**

**Mentor(s) -- Dr. Bobby Gibbs, Dr. Dan Fogerty**

## **The Relationship between Speech Entrainment and Speech Recognition in Noise**

Speech is a temporally complex acoustic signal that modulates in amplitude over time. The ability of a listener to detect and process these modulations is vital to speech recognition. Furthermore, speech production can entrain to these amplitude modulations, suggesting that measuring entrainment of speech production may be used as an assessment of the ability to process speech amplitude modulations. As such, this experiment was designed to test whether entrainment in speech production is a relevant predictor of speech recognition. This study measured young normal hearing listeners' ability to synchronize their speech production with the speech amplitude modulations of a model talker. As an index of entrainment, the vowel onset asynchrony and the correlation of speech amplitude modulations between the model and subject's productions were analyzed. These entrainment measures were then correlated with the listener's speech recognition in three different background conditions: speech in fluctuating noise, speech in babble, and speech in competing speech. Preliminary results suggest that entrainment measures best predict speech recognition in the presence of competing speech by a single or multiple talkers. Additional semantic predictability of sentences may reduce the contribution of perceptual entrainment due to the contribution of cognitive-linguistic processes. This work explores the relationship between the detection of amplitude modulations and the ability to recognize speech in noise. Defining this relationship will aid in understanding the role of amplitude modulation processing for the perception of speech in noise.

**Leal, Andrew**

**Mentor(s) -- Dr. Scott Strayer**

### **A Novel Interactive Voice Response System for Increasing Smoking Cessation**

The goal of this study is to assess the ability of an Interactive Voice Response (IVR) system based on Motivational Interviewing (MI) to influence smoking cessation as measured by the primary outcome of smoking cessation rates in primary care clinic patients. We are currently in the process of adapting a current smoking cessation tool, QuitAdvisor, to this IVR system. The plans of project execution by the research team will be presented by means of a poster at Discovery Day.

**Lebron, Logan**

**Mentor(s) -- Prof. Jan Eberth**

### **GIS in Infectious and Chronic Epidemiology**

Introduction: By comparing the cartographic and spatial analytic methods of John Snows original epidemiological map to modern digital cartographic and analytical methods. The impact of geographic information systems on epidemiological research in the fields of chronic and infectious disease can be evaluated.

Methods: To evaluate this impact, comparisons were made between John Snows Cholera research and research conducted on accessibility to lung cancer screening centers here at the University of South Carolina's Cancer Prevention and Control Program. These comparisons focus on the data set sizes, data collection, and visualization of results.

Results: Geographic information systems allow epidemiologist to perform spatial analysis more efficiently than ever before. This effects the fields ability to examine the spatial nature of sociological, psychological, anthropological, and environmental variables that may affect a population. Allowing for finer policy recommendations or more accurate allocation of public health resources.

**Lee, Grace**

**Mentor(s) -- Mr. David Deweil**

### **How two cultures stayed apart yet became one**

I am Graduating with Leadership Distinction with the Global Learning Pathway. I am studying Human

Resource Management along with Marketing and Hotel Restaurant Tourism Industry. I studied abroad to South Korea during my Spring 2017 term.

My family is from South Korea and going there for the first time brought many challenges, lessons and the best of experiences. I grew up with the belief that being Korean and being American were two different identities. I initially chose South Korea to understand my Korean side. I struggled with being placed as “more American” all of sudden and it was very difficult to come to terms with at first. I felt like I was insulting my Korean side. In the end, I reconciled with my upbringing and changed how I view myself. I am not Korean or American but rather both. I no longer fight which culture outshines another but rather bring to light that being Korean American is its own culture. My values, habits, way of life are a blend of Korean and American. I am Korean American. Proud to be from both backgrounds that embody who I am today.

Academically, my courses have provided me frameworks to help better understand myself both externally and internally. I have made a process of elimination to conclude that I hate human resources and love marketing and tourism. But while I love marketing, I do not enjoy product marketing from a traditional business perspective but rather marketing for tourism- destination marketing.

**Lee, Madeline**

**Mentor(s) -- Mr. Timothy Lewis**

**Neaux Limits**

The University 101 model at USC is followed by schools across the country. I knew I wanted to be a peer leader once I fell in love with Carolina and wanted every new student to do the same. Being a U101 peer leader has been the most impactful experience of my college career. I knew that I would be there to make a difference in the Carolina experience of my nineteen students but I didn't realize how much they would change mine. I had an HRSM section that taught me more about myself than I could have ever imagined. Through my peer leader journey, I learned how to lead a group who has diverse needs, styles, and wants. Each day of class was tailored to the personalities of my class while preparing first semester gamecocks for their next four years. My leadership and personal skills were tested and grown over a full semester. I know that everything I learned about my students and myself will carry me into my further education in law school and into my career as a leader.

**Lee, Koby**

**Mentor(s) -- Dr. Randy Lowell**

**Understanding connections between Art and Sexual Identity in Western Europe**

During the Summer semester, I studied abroad with a travel group from the University of South Carolina at Lancaster. We traveled through London, England; Paris, France; and Amsterdam, Netherlands for a short period of time. I was majoring in Fine Art with a minor in Sociology, and I wanted to travel to these cities in order to expand my understanding of the issues that minority groups face in larger cities (i.e. sexual minorities), and how art can be used to draw attention to these issues. I had already studied social conflict and discrimination against sexual minorities in several classes and had compared this to my own personal experiences. However, I had never witnessed the way that these concepts merged into common interactions when in a society that is so broad and diverse. The way in which these concepts magnified when in such culturally dense areas was well beyond what I had experienced within the United States. While the discrimination against minority groups was much more prominent in these areas, so was the art that meant to draw attention to these issues. With some of the most prominent western art pieces in the world, cities like London, Paris, and Amsterdam are rife with the opportunities to study not only classical art and the impact that it still has today, but also modern art pieces and the effect that these smaller art communities have on Society and the struggles faced by minority groups. This opportunity to study not only interactions between minority groups but also the art that they use to draw attention to discrimination was immeasurably beneficial to what I had already learned through my academic studies. To see the concepts surrounding social conflict

and biases against minorities in person in such dense cities was beneficial to my studies in Sociology. Meanwhile, being able to study the way that these groups use art to draw attention to the discrimination that they face greatly expanded my understanding of art and the ways in which I develop my own pieces. This led me to grow as an artist and as a human.

### **Leschinsky, Nicholas**

**Mentor(s) -- Dr. Thomas Makris, Mr. Jose Amaya**

#### **Development of a Platform for the Study of Transient High-Valent Cytochrome P450 Intermediates**

The depletion of fossil fuel reserves in conjunction with an interest in environmental protection has spurred investigation into the applications of biocatalysis for the synthesis of commodity chemicals. OleTJE, a cytochrome P450 in the CYP152 family, is an attractive candidate for the production of biofuels that are relevant to current energy infrastructures. OleTJE catalyzes the hydrogen peroxide dependent decarboxylation of C<sub>n</sub> fatty acids to C<sub>n</sub>-1 terminal olefins. A hallmark of this decarboxylation reaction is the accumulation and unprecedented stability of two highly oxidizing intermediates: the iron(IV)-oxo species termed compound I and an iron(IV)-hydroxide (compound II) that forms from substrate hydrogen atom transfer. Although the evolution of these species can be followed by transient absorption spectroscopy, a full electronic description of these ferryl species requires high concentrations of intermediates. To date, these types of studies have been impossible with OleTJE due to enzyme instability and aggregation. Recent characterization of OleTSA, an ortholog isolated from *Staphylococcus aureus*, have indicated that it maintains the product conversion seen in OleTJE while increasing its stability. This increase in achievable protein concentrations has enabled the accumulation and isolation of compound I and II throughout spectroscopic and transient kinetic experiments. The increase in stability has also facilitated crystallization efforts through the production of reproducible, high-quality crystals. Previous studies have indicated that alteration of the interaction between the heme-iron and thiolate ligand may be used to promote the substrate-bound, high-spin state which reacts more readily with H<sub>2</sub>O<sub>2</sub> and serve to further promote the buildup of Compound I. Site-directed mutagenesis of a residue neighboring the thiolate in OleTSA (Ala369Pro) has resulted in a dramatic perturbation of the spin-state equilibrium, and leads to stoichiometric preparation of compound I. This paves the way for further interrogation of the structure and nature of this normally fleeting intermediate through advanced spectroscopic techniques.

### **Lewis, Austin**

**Mentor(s) -- Dr. Jeffery Twiss, Dr. Pabitra Sahoo**

#### **ATF4 increases axon growth through altering neuronal gene expression**

Neurons of the peripheral nervous system (PNS) can spontaneously regenerate axons after injury while those in the central nervous system (CNS) do not. Axon regeneration requires changes in neuronal gene expression, with injury initiating signals that activate expression of growth-associated genes and inactivate expression of genes needed for function of the neuron. The activating transcriptional factor (ATF) subfamily of basic-region leucine zipper (bZIP) proteins modulate expression of genes in response to stress, including the axotomy resulting from neuronal injury. These changes change be pro-growth or pro-death. For example, ATF3 expression in response to stress is known to have pro-regenerative functions through mechanisms that require the related ATF4 transcription regulator. Despite this, the role of ATF4 in regenerative responses has not been clear and deletion of ATF4 does not delay locomotor recovery in PNS injury. Many of ATF4's targets are regeneration-associated genes but others are stress-response genes associated with cell death. Here, we have used overexpression of wild-type ATF4 and a mutant ATF4 that lacks DNA binding activity to test its role(s) in growth promotion versus cell death using cultures of adult rat dorsal root ganglia (DRG) neurons. Over-expression of ATF4 increases rates of axonal growth in culture. These regenerated axons show increase in total axon length but decrease in axonal branching, which would accelerate functional

PNS regeneration. At the same time, the ATF4 triggered a three-fold increase in Schwann cell death in the DRG cultures as well as in isolated Schwann cell cultures. By droplet digital RT-PCR, we show that ATF4 overexpression triggers specific changes in gene expression in the DRG cultures and isolated Schwann cell cultures suggesting that the growth modulation in neurons and death of Schwann cells is through modulation of gene expression by ATF4. However, the non-DNA binding mutant ATF4 also triggers changes in gene expression, indicating that ATF4 likely has roles outside of the nucleus. Taken together, my data suggest that neuronal ATF4 pathways bring a potential target for advancing neural repair mechanisms, but distinction between growth promotion and cell death pathways downstream of ATF4 must be further dissected.

**Lewis, Brittany**

**Mentor(s) -- Dr. Lara Ducate**

**Sustainable International Economic Development**

Throughout my years at the University of South Carolina, I experienced multiple cultural immersions; first within my minor in Spanish, I independently spent a summer studying at El Instituto de Allende in the central state of Guanajuato, Mexico, as well as represented the College of Arts and Sciences during a maymester homestay at Universidad Deusto, in the northern Basque region of Bilbao, Spain. Appreciation of these two distinctive cultures speaking the same language stimulated my interest to spend a semester absorbing the vibrant landscape and unique history of South Africa that sparked the multicultural, multilingual conversation at the University of Cape Town during a period of intense social revolution and political transformation. This metamorphosis of my world view increased my passion for service, taught me to explore creative opportunities in various diverse socioeconomic environments, and essentially focused my career interests on sustainable international economic development.

Through active participation within Sigma Omega Upsilon, my international business fraternity dedicated to continuing social, cultural and professional development within and beyond the Carolinian community, and through completion of the Peace Corps Prep certificate program, I discovered a network of passionate individuals prepared to commit their time and skills to support foreign communities. In fostering these ambitions, I worked as the Management and Operations Intern during the Summer Overseas Staff Training Conference at Peace Corps Headquarters in Washington, D.C., within the Office of Staff Learning and Development which allowed me to further develop my financial management knowledge and intercultural communication skills.

Realistic presentations reinforced my educational endeavors as concentrating on global sourcing strategies, supply chain planning, and operational efficiency taught me to analyze data in cultivating insights, creating economic advantages, and evaluating systems for efficiency and sustainability, commercially as well as in regard to global impact. Worldwide connectivity strengthens through practicing world languages and establishing trade relationships to build an internationally-focused, shared future while respecting the boundaries of the Earth's natural resources. My goals of understanding the connections between the world's single ecosystem and its many cultures have proven essential in facilitating international economic development and producing significant, beneficial solutions for equal world citizens.

**Lin, Steven**

**Mentor(s) -- Dr. Jun Zhu**

**Effects of the HIV-1 viral protein Tat on the dopamine and norepinephrine transporters**

Introduction of combinatorial antiretroviral therapy (cART) in 1996 noted a revolutionary change in treatment of Human Immunodeficiency Virus (HIV). The development of cART allowed HIV-infected patients to live longer by transitioning HIV from a terminal to a chronic illness. Over 50% of HIV-in-

ected patients develop symptoms of HIV-associated neurocognitive disorder (HAND) which include cognitive dysfunction, behavioral changes, motor deficits, and dementia. Recent studies have found that the cause of HAND may be due to dopamine (DA) dysregulation. Our lab has previously shown HIV protein Tat (trans-activator of transcription) to decrease DAT (dopamine transporter) and NET (norepinephrine transporter) function by about 30%. For this study, our lab utilized iTat mice, an inducible Tat transgenic mouse model, which recapitulates many of the neuropathologies and neurocognitive impairments observed in HAND patients. The iTat mice were treated with doxycycline (Dox) which induces brain-specific Tat expression. Following a seven day treatment with Dox, iTat mice were found to have a 26-27% reduction in the maximum velocity of [3H]DA uptake (Vmax) in the prefrontal cortex (PFC) through both the norepinephrine transporter (NET) and dopamine transporter (DAT), respectively. The inhibition of DAT and NET function may possibly be due to alterations in DAT and NET trafficking to and from the cell surface as demonstrated by PC12 cell biotinylation studies. These findings suggest that the effects of Tat on DAT and NET may underlie the neurocognitive impairments observed in HAND patients.

### **Lin, Shang-Chien**

**Mentor(s) -- Dr. Sarah Keeling**

#### **Sports Medicine Experience through Internship at the University of Maryland**

During the summer of 2017, I worked with the Women's Basketball Program at the University of Maryland as an Athletic Training Intern. The team was preparing for the 29th Summer World University Games, an international athletic event that provides a platform for collegiate athletes to compete with each other. During my time with at the University of Maryland, my main responsibilities included assisting the Women's Basketball athletic trainer/physical therapist with the daily operations of the athletic training facility, working directly with student-athletes from various varsity teams with their rehabilitation activities, and assisting the Sports Performance Coordinator with preseason physical screenings such as baseline concussion tests and Functional Movement Screen (FMS). This really helped me develop my rehabilitation skills in terms of being creative when prescribing exercises and continue to work with athletes after they are clear to return to activity. Additionally, I was also responsible for packing necessary medical supplies for the two-week international tournament, which required me to become familiar with the customs regulations regarding medications and medical equipment. Participating in this internship allowed me to experience what it is like when I become a Certified Athletic Trainer, it also reaffirmed my decision to become a director of sports medicine at a division I institution and manage my own sports medicine program.

### **Linder, Dillon**

**Mentor(s) -- Mrs. Alisa Liggett, Ms. Nicole Belinsky**

#### **Integrity and the Judicial Way**

My presentation will focus on my involvement with the Carolina Judicial Council (CJC) and its impact on the legacy I will leave at USC and in my legal career moving forward. The Office of Student Conduct and Academic Integrity encourages personal growth and reflection for the students who come through the process. The office ensures everyone a right to due process, including appellate procedures. The first appellate process is to present the case to the CJC, made up of fellow peers and faculty/staff members. Serving on hearing panels was an amazing experience because it allows other students to be heard by their peers, builds integrity across campus, and teaches professionalism. Simply being on the council was not enough. I had the honor of serving as the Vice President of Recruitment for the CJC. In this role, through hard work, dedication, and fellow members' support, I helped increase application numbers by 40%. We were able to find some of the brightest minds to serve the student body. In doing so, I developed my professional communication skills and learned how to delegate tasks, but most importantly, I learned what it meant to be a Carolinian and to strive to meet the goals set by the Carolinian Creed. My presentation will discuss different concepts of the

Creed and how we should live them out every day in our lives.

**Lindsay, Sean**

**Mentor(s) -- Mr. William Quinlan**

**Applicability of Theory-Based Learning**

I interned with the John Buck Company, a commercial real estate development company based in Chicago, over the 2016 and 2017 summers. The John Buck Company develops and invests in properties across the United States, but focuses primarily on the Chicago market. The company develops office and apartment buildings. I worked within the Investments group, which analyzes any potential development deals that the Company considers. While at the John Buck Company, I underwrote potential deals. Utilizing assumptions that the Company had amassed from previous developments, I estimated the costs of potential developments. I measured the costs across the lifespan of each development, which is typically five years. Using market research that I gathered, I forecasted each development's rents over the same period. Using all the inputs, I calculated the expected returns for each project. If the expected return of a deal exceeded the Company's required return, I passed the deal on to an analyst. During my time at the John Buck Company, I took the theories that I had learned in FINA 490 (Global Real Estate Capital Markets) and put them into practice. FINA 490 taught me the concepts that drive the formulation of a deal's expected return, and the relationship between expected and required returns. Calculating the expected return and comparing it to the Company's required return allowed me to see the applicability of the theory that I had learned in FINA 490. As I start my career, I will continue to expand this framework when I underwriting deals.

**List, Paul**

**Mentor(s) -- Dr. Gwen Geidel**

**My Internship at Second Nature Wildlife Rehabilitation**

During the summer of 2017, I participated in an internship at the non-profit organization Second Nature Wildlife Rehabilitation (SNWR) in Thompsonville, Illinois. SNWR accepts orphaned, injured, and ill wildlife and provides care with the goal of enabling their return to the wild. The majority of our animals were raccoons and opossums, but we also treated squirrels, groundhogs, a fox, and even a bobcat. My daily tasks at SNRW included: bottle feeding infants, preparing solid food for the mature animals, enclosure cleaning, and medical care. In addition, I repaired enclosures, reunited a baby raccoon with its mother, rescued an injured fox, and presented animals to a local group of children. As an aspiring wildlife biologist, I grew in several important ways at SNWR. First, my work helped me better understand the life cycles and behaviors of a variety of mammal species. Second, through learning about the rules and regulations surrounding wildlife rehabilitation as well as shadowing a wildlife biologist with the DNR, I gained an introduction to the politics that influence wildlife biology. Finally, my responsibilities at SNWR renewed my dedication to wildlife conservation and enabled me to develop a stronger work ethic to apply to future positions. By sharing my experiences, I hope to present animals that some might regard as a nuisance in a new light, and I hope to inspire others to share my love for wildlife and recognition of our responsibility for conservation.

**Liu, Yixuan**

**Mentor(s) -- Ms. Tricia Kramer**

**Stepping out of the border, stimulating the world: Study abroad in the Netherlands**

During the spring semester of my junior year, as part of the International Business Program, I chose to study in the Netherlands for a semester. I was born and raised in China and came to the US when I was fifteen years old. I've experienced living in other countries, and I have visited Europe a couple times before. This is the first time I lived in Europe for a long period of time. I chose the Netherlands because it has one of the most prominent business schools in Europe, and it is located in a safe urban area. I took many international business classes in Dutch perspective. For example, International

Business in the Dutch way, cross-cultural management, and innovation management. These classes taught me business knowledge including managing people from different cultures. During the time I was there, I traveled to about fifteen countries in Europe and Morocco in North Africa. I saw the world on my own and adapted to the local lifestyle. My motivation for choosing an unfamiliar continent was to travel to different places, therefore Europe is the ideal location for me to study and live. Exploring something new is always what I've been looking for in my life, whether it is an activity or living in a new country. After the global experience, I became more culturally competent, and I learned so much about how to cope with cultural differences through applications of theories and group projects. I also learned different frameworks to analyze countries. This knowledge gave me insights into my future. I want to be a global citizen working in a multinational company, where I can move around globally and experience new things. The experience helped me become more adaptable to different environments regardless of the resources I have.

**Lizana, Caitlyn**

**Mentor(s) -- Mrs. Phani Gummadidala**

**Human pathogen *Aspergillus flavus* internalized by marine bacterium *Vibrio gazogenes***

Clinically significant bacterial-fungal interactions are common. These interactions are complex and depend on the microbes involved, the environmental conditions, and the host. Designing applicable bacterial-fungal models to study these interactions is crucial for our understanding of their significant role in human disease. Bacterial-fungal interactions exist via various physical associations. One form of association is the internalization of fungi by bacteria, which alters the fungal physiology. In this project we used *Vibrio gazogenes* (non-pathogenic marine bacterium) and *Aspergillus flavus* (plant and human pathogenic fungus) as model organisms to understand the fungal uptake of bacteria. *A. flavus* was exposed to 16 million live *V. gazogenes* cells in Yeast Extract Sucrose (YES) medium and the distribution of *V. gazogenes* in growth medium and in the mycelium was studied over time. *V. gazogenes* was measured spectrophotometrically at 600nm and optical density was obtained. We observed the significant increase in percentage of *V. gazogenes* removal from medium over time and by the fungal mycelia. We further collected the fungal mycelia at various time points, fixed and mounted on glass slides. Confocal microscopy clearly revealed the presence of *V. gazogenes* inside the mycelium. The results present a novel start point for investigating the regulatory mechanisms underlying fungal uptake of bacteria and fungal-bacterial interactions.

**Locke, Anna**

**Mentor(s) -- Mrs. Tricia Kramer**

**Growth in Global Leadership**

During the spring of my Junior year, I had the opportunity to study abroad at Kedge Business School in Marseille, France. Here I was able to grow my French language skills, learn new differing perspectives from people all over the world, and grow my appreciation for cultural understanding. While I was abroad, I was taking master's level courses at Kedge. I also had the ability to explore not only within France, but also outside of France in 11 different countries. I was able to build international connections with my peers, gain a new perspective on how different people go about their daily lives, and immerse myself in diverse cultural activities. My sense of adventure derived from growing up in a military family moving from place to place at the beginning of my life. This background pushed me to take the next big step and come to college 9 hours away. While at South Carolina, my French language education and the International Business Program are the predominate contributing factors for my ability to experience living in a foreign country. During my experience, I encountered challenges every day that taught me how to better understand myself and the inner strength I have to overcome these difficulties. I was able to grow my language skills, cultural understanding, and a new appreciation for the inner workings of becoming world citizen. In the future, I plan on not only continuing my French language skills, but also learning new languages. My passion for international connectedness

has led me to pursue a career in an international business or in an international affairs position. I plan to continuously learn about different cultures and expand my transnational mindset and my ability to be not only a world citizen, but also a global leader.

**Logue, Johnni**

**Mentor(s) -- Dr. Daniel Freedman**

**It's More Than Just 'Getting Involved.' It Could Be Your Future**

The most common piece of advice that I was given as an incoming college student was, "Get involved." As an introverted, insecure freshman, I doubted my ability to find the organization where I could get involved and truly be myself. After some encouragement from my former University 101 Instructor, I decided to step far out of my comfort zone and apply to be an Orientation Leader. While I doubted myself and my ability to be a successful leader, I saw this as a unique opportunity to make new friends and grow in an area that I knew I lacked confidence. Little did I know, this opportunity would be the root of my future career goals. Though I am graduating with a B.S. in Chemistry, I had a newfound passion for Student Affairs, specifically working with first-year students. Throughout my college career, I have gained more exposure in the world of Student Affairs by continuing to work with the Office of New Student Orientation as a Team Leader and as a Student Desk Assistant. I have also had the opportunity to serve as a University 101 Peer Leader. Through my Professional and Civic Engagement at the University of South Carolina, I have found what I am truly passionate about and am excited to continue my education at Florida State University to receive a Master's Degree in Higher Education Administration.

**Looney, Lev**

**Mentor(s) -- Dr. Ryan Rykaczewski, Dr. Benjamin Hamlington**

**Exploring Natural Variability in Upwelling of the California Current**

The intensity, seasonality, and locality of winds in the ocean's eastern boundary current systems are critical factors influencing ecosystem processes. Interannual variability in upwelling is influenced, in part, by large-scale ocean-atmosphere processes. For the California Current System, variability in upwelling winds has been associated with El Niño-Southern Oscillation and with lower-frequency atmospheric variability in the North Pacific. Here, we used cyclostationary empirical orthogonal functions to investigate how these climatic fluctuations might influence the seasonal timing, location, and magnitude of upwelling-favorable winds in the California Current System. Estimates of upwelling were derived from data provided by the National Oceanic and Atmospheric Administration and the Japanese Meteorological Association. We compared our results with those of earlier researchers who have taken different analytical approaches. A major advantage of our technique is the ability to look at the spatial anomalies in winds throughout the seasonal cycle. In general, our findings are consistent with previous analyses investigating the relationship between large-scale climate conditions and upwelling winds, but the approach we applied offers some new perspectives. Both El Niño-Southern Oscillation events and lower-frequency atmospheric variability in the North Pacific are correlated with upwelling in the California Current. Our study suggests that this correlation results from modifications of the seasonal cycle and intensity of winds, both of which are dependent on location. Understanding the relationships between climate processes and upwelling-favorable winds is crucial to accurately forecast the responses of these important biological communities within an ever-changing climate.

**Luat, Edgar**

**Mentor(s) -- Dr. Chuanbing Tang**

**Bio-renewable, Biodegradable and Regenerable Antimicrobial Polymer Surface by Electrostatic Layer-by-Layer Assembly**

Surface fouling of biomedical devices is a known problem in the healthcare industry, with the resulting bacterial infections contributing significantly to current issues of antibiotic over-prescription and rising

healthcare costs. As such, the synthesis of biocidal surfaces is very helpful in biomedical implants and devices to prevent subsequent consequences of infections. Traditionally, the solution has been the immobilization of antimicrobial polymers, creating a contact-biocidal coating that prevents bacterial proliferation. However, these surfaces face two major drawbacks: a lack of longevity, and the development of biofilms. Layer-by-layer (LbL) assembly of polyelectrolytes has shown promise in addressing such challenges, utilizing electrostatic interactions between alternating polymer layers to create a lasting, regenerable coating that allows a surface to have a freshly exposed bactericidal layer against the biofilm formation. We aim to incorporate this technique utilizing a resin acid-derived cationic antimicrobial polymer, synthesized by our group, that has shown enhanced antimicrobial activities against multi-drug resistant bacteria, such as Methicillin-resistant *Staphylococcus aureus* (MRSA). The fully biodegradable nature of the coating would allow physiological conditions to slowly degrade each layer, releasing accumulated dead bacteria, and consequently regenerating a new antimicrobial layer with full activity. Derived from an abundant natural source, antimicrobial resin acid polymers open up a novel, low-cost avenue for reinforcing the safety of medical devices.

**Lucas, Jennyfer**

**Mentor(s) -- Mrs. Samantha Lewandowski**

**Beyond a Title**

For the past two years, I have had the great pleasure of being a Resident Mentor to over 72 students. The title as a Resident Mentor has a deeper meaning and role than what many first think. As a Resident Mentor, I live in a residence hall with a diverse group of first-year students. I am more than just the policy implementer, I am a driven student who strives to build a community and help foster healthy relationships. To achieve this, I highly encouraged an open door policy competition for the first semester. Every time I spotted a resident with their door open, I would give them a ticket and by the end of the month, the resident with the most tickets would be given a prize. This initiative allowed residents to engage with one another seeing as they were going to live with several other students on the hall. Being a part of the Patterson residential community alongside an energetic staff with similar goals as me, I have been able to grow and step out of my comfort zone. Reflecting on my second year as a Resident Mentor, I have gained meaningful and concrete characteristics that will help me in my career as a physician assistant. I have learned that it is okay to fall back and depend on others for any assistance that I may need. Growing up, I have depended on myself because of the language-barrier between my parents and I. This independence gave me an, 'I only need me' mentality. Working on a staff of 15 other Resident Mentors for the past two years, I have learned to trust them, their capabilities and learned to collaborate alongside them. Through this experience, I see myself continuing to foster an environment where not only can I thrive but also those around me. From professionalism in the work that I do, to the confidence in the execution of my work, I feel that I have had the opportunities to channel many of the characteristics that will lead to a successful career as a physician assistant.

**Lucas, Joseph**

**Mentor(s) -- Mr. Drew Newton**

**Graduation with Leadership Distinction**

One may encounter many experiences throughout the vast amount of time spent in college. A person could rank one of those experiences above another. There also is a plethora of knowledge that an individual might absorb from the time spent within the classroom. Moreover, being able to use concepts/theories from within the classroom, beyond the classroom has a positive impact on the student's experience. Through the concepts of qualitative research methods, from my POLI-402 course with my mentor, I have been able to critical think and research numerous topics. Through my experiences at the Department of Juvenile Justice, I was able to use my qualitative research skills to learn about the overall structure of the agency, the inputs and outputs of governmental legislation, as well

as the design of the agency in response to those rules and how they affected individuals within the system. Consistently, the director of institutional programs and I would make visits to the Resocialization Unit, a place where many juveniles had to enter before entering back into general population. My director and I would have sit downs in which we would talk about what would and would not work within the system he created. One thing that I suggested was that the language in the handbook was too technical for the juveniles. I had the opportunity to revamp the current Juvenile Resocialization Unit handbook. I believe that upon earning my law degree, I would be an advocate for those who are unable to defend themselves. Those that fall short and are abused by the law. A reflection of my leadership experiences through the Department of Juvenile Justice provide an explanation for my aspiration to lead upon earning my other degrees.

**Lucherini, Elena**

**Mentor(s) -- Ms. Theresa Harrison**

**Preparation for the Field of International Business**

During the spring semester of my junior year, I studied abroad at the Kedge Business School in Marseille, France. While at Kedge, the bulk of my courses related to international business. These included Entrepreneurship, International Marketing, Corporate Strategy, and Operations Management, and all were taught by international professors. Since entering college, I have always wanted to study abroad. I chose France as my study abroad location because I have been taking French language classes for 6 years, and I wanted the opportunity to practice it and become fluent. I succeeded in this goal, simultaneously finishing my minor and becoming fluent. While in France, I discovered that I love the French culture, food, wine, and people. Despite the stereotypes, I learned that as long as you make an effort to immerse yourself in the culture, such as speaking the language, the locals will be more inviting and welcoming. While I did not find Marseille to be that enjoyable of a city, I learned how to make the best of any situation and find the silver lining. Now that I have finished studying abroad, I hope to work for corporations that have some hand in global business. Right after graduation, I am moving to Charlotte, North Carolina to work with Wells Fargo. However, at some point in my career, I would like to move back to France or anywhere else in Europe and work in an international office, so that I have another opportunity to live abroad and immerse myself in another culture.

**Lundy, Taylor**

**Mentor(s) -- Ms. Ariel Domlyn, Dr. Abraham Wandersman**

**Prioritizing equity: Exploring conditions impacting community efforts**

Background

The Institute for Healthcare Improvement's 100 Million Healthier Lives campaign endeavors to reach its namesake goal by the year 2020. One of its initiatives - Spreading Community Accelerators for Learning and Evaluation (SCALE) - supplies 18 community coalitions around the United States with tools and resources to improve health equity among vulnerable populations. Using these resources, each coalition sets their own goals and chosen methods for improving health in their region. But do their efforts address inequities? This study aims to determine how community setting, coalition attributes, and readiness for change can each contribute to whether a coalition prioritizes tackling inequities while working to improve community health.

Methods

Using qualitative comparative analysis (QCA), this study will explore different conditions that may influence coalitions' prioritization of equity and inclusiveness in their health improvement plans. QCA assumes causal complexity and equifinality to examine the relationships between conditions. This method, based in Boolean logic, analyzes combinations of conditions to determine causal recipes (the necessary or sufficient combinations of conditions) to achieve outcomes.

Discussion

Understanding the attributes that may influence coalitions' willingness to tackle sensitive issues in

their community has implications for the future of health improvement initiatives. This is particularly important for allocation of resources, where certain coalitions may be more effective for achieving equity than others based on these attributes. There are also implications for the type of support provided to coalitions who wish to increase their ability to promote healthier communities. Finally, this study will demonstrate how QCA can be a valuable tool for evaluating programs and understanding the conditions that lead to successful fulfillment of initiative goals.

**Lynch, Emma**

**Mentor(s) -- Prof. Jay Pou**

**Combining Communication with Service**

During the fall of my junior year, I interned with Ronald McDonald House Charities as the Events and Marketing intern. I planned and worked three events. I learned how to communicate well with people and how to work in a nonprofit organization. Using the information I learned from my nonprofit public relations class, I was able to have hands on experience combining communication with service. I love helping people, and my internship was the perfect gateway to allow me to do so. I learned how to combine business with service, which is incredibly important to me. I am not a scientific person and hate the sight of blood, so finding something that fulfilled my want to help others was amazing. My internship with RMH was one of the best experiences that happened to me in my college career.

**MacDonald, Madison**

**Mentor(s) -- Mr. David Deweil**

**My experiences at the University of South Carolina taught me how to communicate, collaborate and create**

I am pursuing Leadership Distinction of Professional and Civic Engagement. I studied Mass Communications and Sport and Entertainment Management and created many memories through my unique experiences.

My experiences within the classrooms have taught me how to effectively communicate to engage, collaborate with others to gather insight, and to create new things by building on what I have learned through my studies at the university.

While being a student at the University of South Carolina, I interned at the South Carolina Department of Commerce and Intellectual Capitol, a government IT staffing company, photographed for the on-campus newspaper, The Daily Gamecock, and led a Young Life mentoring group at a local high school.

My internships taught me marketing skills, enhanced my social media efforts, and how to manage events. Both were in my field of study and made my classroom experience easier since I had hands-on experience.

I joined The Daily Gamecock to meet new people as a freshman but soon learned to love the inner workings of the journalism process. Since I love to meet new people, I joined Young Life during my freshman year, as well, and was selected as a leader of River Bluff High School where I mentored high school girls by leading bible studies and was being camp counselor.

Once I graduate my plan is to work with an organization that builds on my skill set and can introduce me to new things, new people and new processes.

**MacKenzie, Morgan**

**Mentor(s) -- Ms. Sarah Gay**

**Bringing Personal Globalization Home**

Ever since my first Spanish class in eighth grade, I have fallen in love with the language and all the cultures that speak it. In January 2017, I began my study abroad experience through UofSC in Valencia, Spain. Little did I know, it was going to be much more than simply an academic program in a different location; it going to be was a immersive experience and crash course in acceptance, inde-

pendence and problem solving. I lived with a Spanish family who spoke no English and had a roommate that spoke limited Spanish. I translated not only my own thoughts and conversations, but also my roommate's, improving my Spanish significantly and strengthening my relationship with my family and roommate. My coursework further immersed me in the culture of Spain. My professors held some classes outdoors, showing us different parts of history throughout the city. I read the mediaeval Spanish Epic, El Cid, on top of a tower that was mentioned in the work. I walked through the basilica where Popes have stayed. I ate foods that I had never tasted before and learned how to cook them. These valuable new experiences sparked my curiosity, prompting me to travel to five additional countries before returning home. I have applied the knowledge and understanding that I gained abroad to my extracurricular activities here at USC. I am a Peer Leader for University 150, a first semester class that international students take to integrate into the university. My experience abroad has equipped me to be a resource and mentor for my class as they explore their new home and adapt to the culture and customs here. This class is a continued practice in acceptance as well. The students have grown up very differently than I have, leading to differences in opinion and behavior. I am continually adapting necessary lessons to be conducive to everyone. I have been able to take my independence and problem solving into job interviews. Knowing I have built these skills in a unique way has given me confidence and ability to provide a different perspective.

**Mackey, Tristan**

**Mentor(s) -- Ms. Maegan Gudridge**

**Observing Determinants of Health through Community Service**

Harvest Hope Food Bank is a local, non-profit organization that provides food resources for clients in the surrounding community and other resources to partner agencies to run smaller food pantries. Through my time with this organization, I was able to work in the emergency food pantry at this organization and provide assistance to food insecure families of Columbia. During my time at the food bank, I was responsible for filling food orders for the clients, delivering those orders to them, and also stocking the pantry with donations. This allowed me to not only interact with the clients on a personal level, but also to understand the difficulties they faced in obtaining food such as having a large family or a many small children for whom they need to provide. I decided to volunteer my time with this organization in order to learn about the impacts that food insecurity can have on the health of individuals and a community, and also to be an agent of change on behalf of decreasing food insecurity. By observing first hand the experiences that each individual endured to obtain food and access such a basic need, I am better able to connect with the factors that impact the health of these individuals and understand the interactions between these factors. I think that this topic is important to understand because it occurs everyday in society and affects such a wide array of people from varying backgrounds. Through interacting with this community, I gained insight into not only what it means to live without food, but the events and stress that surround that state. Considering my future plans to become a competent physician who not only focuses on a disease, but also the outside determinants that lead to that disease, the experiences that I have had at the food bank and the insights that I gained will allow me to better interact with future patients. This experience will help me to relate with patients from different backgrounds on a deeper level and provide comprehensive care to a wide array of patients.

**Madia, Kayla**

**Mentor(s) -- Dr. Amber Fallucca**

**Growing in Leadership and Collaboration Through Service**

I have been dedicated to serving others and my community since middle school, and I was determined to keep that trend going when I came to college. One way I did that was by spending two of my summers as a counselor at a service camp, WOW Urban Ministry. The focus of the camp was to better the community, one with a large homeless population, with a faith-based motivation. After having a

great experience with the camp in high school, I decided to use my time and talents to go back to help run it. I knew that through this decision I could make a difference in so many lives, and not only in those I served but also in those of the middle and high school campers who came to us every week. I encountered many new and different perspectives through this experience which helped me to grow as a person and widen my outlook on others. The service site that I spent the most time at was a thrift store affiliated with the homeless shelter. Every \$2 in proceeds at this thrift store equated to a meal served at the shelter. While there I would organize the store, restock the clothes, and bail clothes that had not been sold which the store would then sell to companies overseas. Through the collaboration and group leadership of the camp I learned a lot about how to work with others, how to handle conflict, and how to stay focused on a goal despite distraction. This experience showed me how much can be accomplished by a small group of dedicated people. The time I spent at WOW shaped my outlook on my faith, my service, and the world. I believe it has made me a better version of myself, not only through the positive growth, but through the challenging and frustrating aspects that I learned from. The knowledge I gained about leadership and collaboration have helped me to excel at USC, and I know I will be able to draw from those resources in my future career.

**Madormo, Victor**

**Mentor(s) -- Dr. Guiren Wang**

### **Dielectrophoretic Separation of Premalignant Tumor Cells**

If we could diagnosis metastatic cancer through separation and identification of the smallest concentrations of cancer cells, cancer survival rates would increase exponentially. A developing technology for detection of circulating tumor cells is a microfluidics chip that uses dielectrophoresis (DEP). DEP is the phenomenon when a force is exerted on a dielectric particle resultant from a non-uniform electric field. The applied nonuniform electric field induces a dipole moment in the particle and due to unbalanced Columbic forces on each half of the induced dipole, a net force on the particle's interface in the surrounding solution is generated. The net force, pulling the particle so it can best achieve electrostatic equilibrium, is called DEP force. For a cell under low frequencies, the cell's dielectrophoretic properties rely heavily on extracellular factors, such as membrane-bound proteins, solution conductivity, electric permittivity, and cell size. Thus, because different types of cancer cells and healthy cells all express different extracellular factors, they will experience different dielectrophoretic responses under the same electric field.

The DEP sorter is an electrokinetic chip microfabricated with a main channel and significantly smaller side channel branching off. Two strips of gold are laid in the main channel which generate a dielectric field when electrodes apply an alternative current to them. This electric field causes particles with a negative DEP force (pushed away from the higher concentration of electric field) to be pushed into the side channels, separating from the particles with a positive or negligible DEP force. Our laboratory successfully used DEP to separate biological material from polystyrene (a type of plastic) beads, separate out different cancer cells based on their type, and separate out cancerous cells from healthy cells. The optimization techniques are reported in this work.

The entire apparatus is relatively inexpensive, small, and highly sensitive when compared to current technology. Thus, the technology can be made available to the developing world, so early stage cancer can be detected and properly treated. The proposed microfluidic device is expected to increase the detection capabilities as well as availability, potentially preventing hundreds of thousands of deaths from cancer each year.

**Magro, Nicholas**

**Mentor(s) -- Dr. Michael Beets**

### **The Effects of Exercise and Sleep on Childhood Obesity**

One of the most common and well-known problems in many current industrialized societies is the obesity epidemic. Because obesity is a lifelong issue, it is important to identify risk factors in the early

years of a child's life that may contribute to this disease. Some of the factors that influence the prevalence of obesity in society include diet, exercise, and sleep patterns. P2YP, or Policy to Practice in Youth Programs, is a research group that primarily studies the effects of physical activity and sleep patterns on rates of obesity in children. Sleep deprivation or decreased sleep quality is known to be linked to an increase in body mass. P2YP monitors sleep activity using devices such as the Fitbit, which detects and tracks a person's total sleep time and time spent in deep or REM sleep, and the Beddit, which analyzes and records sleep time, heart rate, breathing, snoring, and environmental factors such as temperature or humidity. Along with sleep quality and quantity in affecting youth obesity rates is the amount of exercise that children perform each day. Using multiple accelerometers on children in different programs and areas, P2YP attempts to monitor physical activity and exercise based upon available equipment and space accessible to the children. By using accelerometers, which measure acceleration forces generated by movement, the research group tracks behavioral exercise patterns in youth before and after new playground facilities or equipment has been implemented, such as the new recreational area at one of the locations. Although data collection and analysis is not yet complete, the information collected thus far has linked higher levels of physical activity and exercise to better accessibility of equipment and recreational areas. The data collected therefore suggest that children with better access to proper physical activity have decreased risks of obesity in the future.

**Maissy, Erica**

**Mentor(s) -- Dr. Lawrence Reagan, Ms. Victoria Macht, Dr. Claudia Grillo, Ms. Jennifer Woodruff, Dr. Jim Fadel**

**Modeling Gulf War Illness: neuronal activation and transmission in the rat prefrontal cortex**

Gulf War Illness (GWI) is a syndrome experienced by veterans of the 1990-1991 Gulf War that is characterized by a myriad of symptoms including deficits in memory and attentional processing. During the Gulf War, soldiers were prophylactically administered pyridostigmine bromide (PB) to protect against potential nerve gas exposure. To evaluate the hypothesis that interactions between the stress of deployment and PB contributed to the pathogenesis of GWI, we established an animal model using Sprague Dawley adult male rats. We used a 2x2 design that subjected rats to 14 days of either water or 1.3 mg/kg PB treatment, with days 5-14 of either 6 hrs/day restraint stress or non-stressed control (NSC). Interactions between glutamate, acetylcholine, and GABA in the prefrontal cortex (PFC) play an integral role in the coordination of attention and working memory, and deficits in the dynamics between these systems may underlie cognitive impairments in GWI veterans. To assess whether PB and stress interacted to cause neurochemical changes in glutamate and acetylcholine, in vivo microdialysis was performed with an acute restraint stress (ARS) challenge.

Results indicate that PB attenuates acetylcholine levels but augments glutamate levels following the termination of stress selectively in PB-NSC rats, suggesting an inability for these systems to recover from stress following PB exposure. To assess whether these stress-induced neurochemical changes were associated with changes in neuronal activation of inhibitory neurons, we performed double-label immunohistochemistry (IHC) for the immediate early gene c-fos and the GABAergic marker parvalbumin. Results from single-label c-fos indicate a trend for increased c-fos activation in the PFC of PB-NSC rats relative to vehicle-treated rats. Interestingly, ARS did not modulate c-fos positive labeling in rats with a prior stress history relative to NSC rats. However, fos-parvalbumin double labeling was significantly increased in PB-RRS rats compared with PB-NSC. Collectively, these results suggest that ARS differentially activates PFC neurons in PB-treated rats as measured by c-fos IHC, which could be influencing the distinct neurochemical changes for glutamate and acetylcholine in this brain region. Ultimately, these findings provide novel insights into the neuropathological changes incited by PB administration in soldiers with Gulf War Illness.

**Malhotra, Neha**

**Mentor(s) -- Dr. Adam Hartstone-Rose**

## **The Ontogeny of Muscle Architecture in the Masticatory Muscles of *Microcebus murinus***

Changes in primate muscle architecture associated with age are not well understood and have not been extensively examined in prior literature. If adult animals were perfectly scaled versions of juvenile animals, the physical strain on the adult skeleton would be unsustainable and approach failure points. In this study, we hypothesize that physiological cross sectional area (PCSA) would scale positively while fiber length would scale isometrically in masticatory muscles of mouse lemurs from birth until adulthood. Thereafter, both PCSA and fiber length would scale isometrically throughout adulthood and senescence. To test these hypotheses, we dissected the masseter, temporalis, digastric, and pterygoid muscles in 34 *Microcebus murinus* individuals ranging in age from 10 days old to 10 years old. Each muscle was put into a 35% nitric acid solution, thereby dissolving the connective tissue and disarticulating each fascicle. A representative sample of fascicles was measured for each muscle using the ImageJ computer program. The average fiber length and PCSA of each muscle was then compared across age groups in order to observe changes in muscle architecture as related to age and body mass of an individual. Preliminary analysis has shown an increase in total adductor PCSA, total adductor fiber length, and total adductor muscle mass with age. Total adductor PCSA, fiber length, and muscle mass additionally increased with body mass in grams of each mouse lemur. If this trend continues, it is possible that PCSA, muscle mass, and fiber length for other muscles will also increase with age and body mass. These changes possibly correspond to an increase in bite force production and an increase in speed and stretch capabilities of the muscle. The findings for this project could potentially be used to track and quantify changes in muscle characteristics as a result of aging.

**Malinski, Katherine**

**Mentor(s) -- Dr. Joseph Quattro**

## **Timing the Divergence of Geminate Ray Species Separated by the Isthmus of Panama**

The rise of the Isthmus of Panama was a significant geological event that separated the Atlantic and Pacific Oceans while joining North and South America, thereby creating a barrier to marine dispersal. While the closing of the Isthmus is commonly reported as having occurred 3.5 million years ago, recent research suggests a more complex and stepwise development over approximately 15 million years before complete closure. Analyzing the relationships between geminate species – that is, closely related species that arose due to the formation of a geographical barrier that isolates intraspecific populations – separated by the Isthmus of Panama would provide insights into the timing of the species' divergence and therefore the closure of the isthmus. Four rhinopteran species – commonly known as cownose rays – presently exist on either side of the Isthmus of Panama. A previous study found that several specimens of one Atlantic species of Rhinoptera were genetically more similar to one of the Pacific species, based on analysis of a mitochondrial gene used commonly for species barcoding. However, it is cautioned that other processes could explain the current data, so additional genetic analyses with are needed. The present study aims to disentangle the history and phylogenetic relationships of these species-pairs. The preliminary findings of this study suggest phylogenetic relationships in rhinopterans that support the sequential formation of the Isthmus of Panama that would have allowed for gene flow between ocean basins (isthmus opening followed by closing) at two separate points in its development. We expect the more thorough genetic analyses in this study to indicate phylogenetic relationships in accordance with these findings.

**Mangus, Victoria**

**Mentor(s) -- Dr. William Jones**

## **Community Service: More than Just a Requirement**

Community service is an integral part of my collegiate career and my character as a person. But I recently realized how much the people I were serving, were also serving me. Through serving others in various leadership positions, I've gained valuable experience and the ability to pursue my passion. In

one of my leadership positions, I learned the important lesson that not everyone has the same love of community service that I do. Although, those I have served have taught me to focus on the real reasons to volunteer beyond just having a passion, and my collegiate courses have helped me learn how to communicate those reasons to others. I hope that I can help people see that community service is more than just a requirement.

**Manning, Tykiera**

**Mentor(s) -- Dr. Rishika Rishika**

**Like It. Share It. Love It: Social Media's Influence on the Development of a Business through Brand Marketing**

There was a time when only brick and cement businesses thrived. The present innovation prompts brand marketers to be relevant by designing marketing strategies involving online networking, and social media. Along these lines, social media is influential in the improvement of the business field, particularly when industry and marketing trends are constantly evolving. This investigation audits current proof on (1) the utilization of social media in the development of a business and (2) the technological advances utilized in brand marketing. Implications for the use of social media and innovation in business development and brand marketing are discussed as well as suggestions for future research.

**Mao, Yujie**

**Mentor(s) -- Ms. Rui Qi**

**The relationship between family factors with international students' decision on studying abroad**

Little is known about how family influence the whole study abroad process. (i.e. pre,during,post); destination selection, program selection (undergraduate/master/phd),study plan (continue to higher level of education or not), career plan (stay at US or go back home)...International student has become an important role of global college.This research aims to examine how does family factors motivate international students make the decisions to study abroad. Through the survey, the paper investigate Chinese overseas students' family factors include individual, economic, cultural, social and other aspects influencing final decision.Convenience and snowballing survey will be used. The finding will provide a comprehensive and useful perspective for university psychologist to develop strategies for helping more with Chinese Student. It could also be a reference for students who intend to study abroad.

**Marciano, Sara**

**Mentor(s) -- Dr. Katie Kathrein**

**Genotyping Zebrafish to Identify Mutants**

Regulation of gene expression is important for development and plays a key role in stem cell biology. To understand how stem cells function, our lab studies uses the hematopoietic system as a model. Hematopoietic stem cells (HSCs) require specific programs of gene expression to function properly. To study the role of specific genes in HSC function, we are generating zebrafish mutants in genes that lead to a decrease in HSCs. Previously the Crispr/Cas 9 complex was used to edit certain genes of the genome. To identify zebrafish with successful editing of those genes, we analyze DNA from the fins of potential mutant fish. A portion of the regenerative tail is cut from each fish to obtain DNA. Using PCR, a segment of around 350 base pair (bp) of the zebrafish DNA is amplified where the mutation is predicted to be located. The PCR product is incubated with a restriction enzyme which only cuts the wildtype DNA into two products sized 125 bp and 225 bp. The mutation is identified in the organism by observing a third uncut 350 bp PCR product. These organisms are heterozygous carriers. Once we identify the fish that carry a mutation, we in-cross mutant carriers to generate a homozygous mutant. Then, we use qPCR and in situ hybridization to see if they generate stem cells and can differentiate into the mature blood lineages (T cells, B cells, lymphoid cells).

One of these genes we are looking at, Rbb4l, is the zebrafish ortholog of human retinoblastoma binding protein Rbb4 which has been shown to play a role in cancer. They are structural proteins that keep the NuRD (nucleosome remodeling and histone deacetylase) complex together. When a short term knockdown is done on the zebrafish there is a reduction in hematopoietic stem cells. The next step is looking to further characterize this phenotype. These experiments will lead to a better understanding of stem cell biology and may help with diseases where the targeted genes are misexpressed.

**Margolis, Rachel**

**Mentor(s) -- Mr. Tim Kadar**

**Margolis Equestrian**

Over the past two years I have been running and expanding my own small business in the equine industry called "Margolis Equestrian." I have been training and competing a wide variety of horses for private clients in Sumter and Camden, South Carolina. In creating my business I was seeking to continue riding while in college even though I did not have the funds to support my own horse. Through networking with different farm owners and trainers in the area, I came into contact with my very first clients in South Carolina. Tim and Mary Kadar hired me to train their horse Maximo, known as "Mo," so that he would be safe for Mary to ride. Mary suffers from Vertigo so I was tasked to train Mo to be the ideal partner for Mary. The partnership grew and I eventually began competing Mo in United States Dressage Federation competitions regionally for the Kadars and he has been very successful. As I continued to ride Mo, friends and neighbors of the Kadars heard of my training and began to get in contact with me. Mo had been notoriously a difficult horse and my ability to better him made me a very attractive trainer to use and led me to the current string of five horses I now have in my program. I had found my niche of clientele. I strategically priced my services to attract clients. I have learned a lot in terms of training from riding five very different horses as well as an extreme amount of patience dealing with not only difficult horses but at times difficult clients. I have also become very well organized in order to work around everyone's schedule including my own. Running my own business while in school has been difficult but every time I get to wear my polo shirt with my "Margolis Equestrian" logo it is all worth it. I hope to continue to expand my training services and have more of my horses competing in regional competitions this coming season.

**Marker, Zachary**

**Mentor(s) -- Prof. Theresa Harrison**

**I Developed Myself Professionally by Interning at Solvay**

During the summer of 2017, I interned at Solvay Specialty Polymers in Augusta, Georgia. I worked as a process engineer intern, working mostly in the utilities department of the plant but also doing some work in the Sulfone monomer production unit. My work consisted of typical day-to-day activities, mixed with projects and some meetings. My day-to-day activities mostly had to do with troubleshooting issues and monitoring work onsite. My projects included a pump design/installation, purchasing replacement equipment for utilities, repainting a corroded chemical tank, and creating a technical presentation for an air cooling tower. I also worked with a large amount of people of all ages and backgrounds.

I learned a lot during this internship, both in terms of practical skills and in soft skills. I learned how to read and draw equipment blueprints, read/create technical documentation, contact and contract vendors, and how to work with a team more effectively. I also learned how to network with 250+ people onsite and how to stay in good graces with other departments, which will be valuable to me in the future when I work for other companies. This internship was an important piece of work experience that will transfer into a full time job after graduation. I hope to continue to work in a manufacturing environment, and this internship was an amazing introduction into the full time work force.

**Marks, Hannah**

**Mentor(s) -- Dr. Breanne Grace**

**Closing the golden door: Effects of the political climate on refugee resettlement centers**

On January 27th, 2018 President Trump signed the first executive order of what would come to be known as “the travel ban,” barring immigration from seven countries and restricting overall refugee resettlement. Public backlash, blocks by federal judges, and restructured versions of the order followed. Through over 250 hours of participant observation, I studied the effects of this political climate on a refugee resettlement center in a mid-sized southern city. Working as a teacher for the children’s ESL program and an assistant to the Health Support Services, I found the major effects of the ban on the center to be a lack of resources, turbulent community support, and overwhelming uncertainty. In anticipation of the fallout from the ban, restructuring began almost immediately. Staffing shortages increased the need for community support, but this support fluctuated with the news cycles. While immediate community response was strong, long term resources quickly fell. The ban created uncertainty by undermining current financial and human resources and creating uncertainty for the future of refugees and refugee resettlement in the U.S. The travel ban upended daily work in centers by adding uncertainty into the already chaotic resettlement process. Despite all of these things, hope is at the forefront of resettlement in both my specific center and in resettlement as whole. Resettlement is an inherently hopeful process, and the executive orders could not shake that core. The future of resettlement in the United States is still yet to be seen, but my research puts stories and faces to the buzzwords lost in politics and media coverage.

**Marks, Hannah**

**Mentor(s) -- Mr. David Dewell**

**GLD in Community Service: My time at CrossRoads Ministry**

As seen in the responses to the Florida school shooting, young people hold the power to make the changes needed in society. This idea is what drives CrossRoads Ministry, a small retreat center located in the west end of Louisville. Calling themselves “a different kind of retreat,” CrossRoads focuses on connecting with those in the margins of society. I attended a retreat with CrossRoads the summer before my freshman year of college on the urging of a high school teacher and became involved the following summers when I returned home, first as an intern and then as a volunteer.

At CrossRoads, I watched young people become transformed through relationships. I served as a “companion” on retreats, helping to guide high school students through a retreat called “CrossWalk.” Based on the bible story of the Road to Emmaus, CrossWalk encourages retreatants to encounter the stranger and find God in places some may be afraid to look. This experience is what ignited my desire to teach high school and reinforced my love for service and social justice. Every experience of leadership and service has been impacted by my time at CrossRoads. I maintain that if every person could go on a CrossRoads retreat, there would be peace in the world. In CrossRoads, a simple concept - that of radical hospitality - transforms lives on a daily basis. By encouraging vulnerability and community, CrossRoads creates a space to ignite compassionate leaders. I hope to do the same in my future classrooms, and I plan to maintain my relationship with CrossRoads.

**Marryat, Jane**

**Mentor(s) -- Ms. Jennifer Bess**

**Learning to be an Ambassador in Scotland**

This past summer, I spent three weeks abroad in Scotland as a participant in the UK Fulbright Summer Institute program, a program created by the US-UK Fulbright Commission to send about seventy American college students overseas every summer to various locations across the United Kingdom. The goal of the program is to foster better intercultural understanding and teach participants how to serve as ambassadors for both their home country and the UK. I spent my time in the program

abroad in Scotland with nine other American students from all across the country. My Institute was focused on Scottish technology, innovation and creativity; throughout my three weeks in the country, I learned a little about everything from Scottish theater to advances in biomedical engineering. I was also immersed in the rich culture and history of Scotland and was able to visit many different parts of the country, spending time in both the post-industrial city of Glasgow and an idyllic small town in the beautiful Scottish Highlands. My time in Scotland ended up not only being three of the best weeks of my life, but also three of the most informative—the Fulbright program helped me to step outside of my comfort zone and gain a whole new perspective on the world and the people who live in it.

**Marshall, Hayli**

**Mentor(s) -- Dr. Spencer Moore**

**Are a parent's social networks associated with their child's eating behavior?**

The social environment, including family and friendship networks, has been shown to have direct and indirect effects on the dietary behaviors of both adults and children. These interpersonal influences may operate through several mechanisms, including modeling, social support, and reinforcement. Research suggests that parents are the strongest influence on children's health behaviors, and children's diets often strongly resemble those of their family members. Few studies, however, have examined how parents' social ties may influence their children's food intake. This study aimed to evaluate associations between the composition of parents' social networks and their children's diets. Data came from a subsample of the Brain-to-Society study, a cross-sectional study examining drivers of childhood obesity among children ages 6-12 in Canada and India. The study sample was restricted to parent-child dyads (n=280) residing in Montreal, Canada. Survey data were collected on the social networks, income, and nutrition habits of parents and their children. Social network data were collected using three name generator questions on close friends, persons with whom the respondent discussed important matters, and persons with whom they discussed nutritional matters. Children's nutrition was assessed through a 24-hour recall, and responses were aggregated into healthy food and junk food indices. Data were analyzed using linear and Poisson regression, adjusted for sociodemographic characteristics. In general, parents had networks with a high percentage of other parents. Respondents whose social networks contained a higher percentage of fellow parents were positively associated with healthy food index scores ( $b=2.18$ ,  $SE=1.02$ ) among children. Parental social networks containing a higher percentage of parents were negatively associated with junk food scores among children ( $b=-0.63$ ,  $SE=0.19$ ). Findings suggest that parents' social networks have a strong influence on their children's eating behaviors, particularly as they relate to overall dietary quality. Interventions aiming to improve healthy eating among children may benefit from involving parents and their social ties. Future research might examine ways in which different social mechanisms (e.g., social support, influence, or social comparisons) within parental social networks may influence the child's dietary habits.

**Marshall, Wyatt**

**Mentor(s) -- Dr. Jane Roberts, Mrs. Kelly Caravella**

**A Comparative Look at Social Interactions: Comparing Social Skills Between Males Diagnosed with Fragile X Syndrome and Males Diagnosed with Autism Spectrum Disorder**

Introduction: Many children with FXS exhibit social communication deficits such as challenges with interpersonal relationships and withdrawal. These impairments often result in a ASD diagnosis since ASD is characterized by similar social deficits (Kaufmann et al., 2017). Recent research, however, has suggested the two disorders present themselves distinctly, with those having ASD displaying more severe impairments with social communication abilities while children with FXS were observed to be more socially responsive (Abbeduto et al., 2014). The current study is interested in examining social communication skills at a early stage in development.

Methods: The sample consisted of 25 twenty-four month old males with either FXS (n = 20) or non-

syndromic ASD (n = 5). The Brief Observation of Social Communication (BOSCC), was coded on all participants for at least one time point. Three item level codes, eye-contact, directed vocalization and frequency of social overtures were compared between the groups. The BOSCC results in 2 scores for each item level code, which are averaged to yield a mean score.

Results: Welch's t-test was conducted to compare mean BOSCC scores for each item across the two groups. The test indicated that mean eye contact scores were significantly greater for children diagnosed with ASD (m= 2.2) than those for children diagnosed with FXS (m=1.425),  $t = 2.66$ ,  $p = .02$ , indicating less advanced usage of socially communicative eye contact in children with ASD. No significant differences were found between the two groups on either vocalizations or social overtures.

Discussion: Our findings indicate similar communicational abilities for children with ASD and FXS, other than eye contact, suggesting the two groups' social skills are comparable at this age. Despite recent research demonstrating various differences in social communication deficits, our samples performed similarly with their use of vocalizations and social overtures, suggesting these skills are comparably impaired in both disorders while toddlers with non-syndromic ASD evidence more impaired eye-contact. While important, this study is limited by the small sample size, which is especially problematic in the ASD group. Further research should be conducted in order to see if these results are generalizable.

**Martin, Lauren**

**Mentor(s) -- Dr. Elise Lewis**

### **Management through Motivation**

Management has played a major role throughout my career at the University of South Carolina and in experiences I have held beyond the classroom. During my freshman year, I began working at the Hyatt Place Columbia/Harbison hotel and realized my passion for hospitality and customer service. Through this position, I added a minor in Hospitality, Restaurant and Tourism Management (HRTM) and discovered an endless thrill of long nights and early mornings spent working with a team. After 9 months, I increased my rank from gallery host to lead gallery host where I was tasked with managing a diverse set of employees; many of which were older than me. As a retail major, I brought in a fresh sense of customer service to our quirky hotel as the front desk team shifted focus to delivering the product (customer service) to the consumers (our guests). A major issue plaguing the retail and hospitality industries is high employee turnover rates. To combat this issue I created a training guide specific to new-hire employees in order to effectively and fully train each new member while establishing clear guidelines and a pathway detailing their future goals with the company. This guide is used at multiple hotels in the franchise and the main idea is to focus on hiring the right people, training them properly, and retaining them for the future in order to avoid high employee turnover. Growing and excelling in my experiences with the Hyatt Place has reaffirmed my decision to continue expanding my skills in management and cooperative step training. Through this experience I hope to pursue a career with a leading and innovative hotelier upon graduation.

**Martin, Breanna**

**Mentor(s) -- Mr. Ryan Lloyd**

### **Volunteer Lead Internship at the Sustainable Carolina Garden**

Community service has been a pivotal experience for me as a person and as a student at the University of South Carolina. Experiences from being a volunteer day camp counselor, to serving meals at homeless shelters, to teaching healthy eating classes at youth shelters have helped me to interact with my community and fall in love with the people in it. Perhaps the most impactful service experience was a year-long volunteer leadership position with the Office of Sustainability as the Garden Resource Manager. In this position, I helped to streamline record keeping methods for garden yield and resource consumption. I also helped to create a peer leadership program for a team of garden guides and advocate for sustainable food systems at UofSC. This position helped me to learn many

skills that I have carried with me throughout the rest of college and inspired me to stay involved and make my mark on the Carolinian community.

**Martin, Blake**

**Mentor(s) -- Mr. Safaa Kader, Dr. Esmail Jabbari**

**Determining -OH Functional Group Effect on Quantum Dot Fluorescence**

In recent years, bioimaging has become a key aspect in the fight against disease and understanding bodily functions. It helps us investigate the response functions the human body has to specific drugs as well as give insight on their characterization. In order to know how to design a drug to attack a disease, the microbiological functions of the disease must be known. In addition, the logistics of the attack must be tracked or marked. Bioimaging helps to facilitate the tracking of drugs and monitoring specific areas of cells and their associated responses. A major platform in that field has become the use of Quantum Dots to emit fluorescence. Quantum Dots have been shown to be more stable and give off better yield than other fluorescent emitting platforms. This study aimed to obtain the optimal structure and conditions for Quantum Dot fluorescence and stability.

**Martirano, Julia**

**Mentor(s) -- Mrs. Theresa Harrison**

**WHO Do You Want to be When You Grow Up? : Why First-year Students are our Best Investment.**

The first-year student seminar, University 101, offered at the University of South Carolina is, for many students, one of the most impactful experiences of their initial semester. It is often a catalyst that not only proves integral in a healthy transition to the environment of higher education but also creates a safe space for students to be challenged. Unfortunately, in a demanding technical major, I was prompted to skip out on the experience myself and often felt lost in that first year from a lack of accountability. I chose to become a U101 Peer Leader, and a Senior Peer Leader, in an effort to serve the future students of USC by helping them navigate this transition.

As a Peer Leader I had the opportunity to create lesson plans, out-of-the-classroom activities, and assignments meant to facilitate discussion and promote important resources within the Carolina community. Additionally, as the peer leader of my co-teaching team, I had the unique experience of mentoring first-year students one-on-one and encouraging academic, social, physical, and mental wellness on an individual basis. As a peer leader I had certain pathways of influence that a professor will simply never have. Much of my own mentorship was influenced heavily by my journey and the areas in which I have been successful and the areas where I have failed spectacularly. In reflecting on my own experience, I was able to help other students to, at the very least, be aware of their choices and how those choices impact them as well as others. The skills I developed in this experience will forever guide the ways I approach people on both a personal and professional level.

**Masak, Geneva**

**Mentor(s) -- Dr. William Jackson**

**Designing and cloning of an anti-Rev shRNA against HIV infection**

Human Immunodeficiency Virus (HIV) is a lentivirus that infects CD4 T-lymphocytes, compromising the immune system and leading to the Acquired Immunodeficiency Syndrome (AIDS). One of HIV's regulatory proteins, the regulator of virion proteins (Rev), is fundamental for HIV replication, and functions by facilitating the export of unspliced and partially spliced mRNA out of the nucleus. One way to inhibit this pathway is through RNA interference (RNAi), in which a short interfering RNA (siRNA) can be designed to target a specific mRNA, such as Rev. To create a siRNA targeted to Rev, the Rev sequence from the HIV-1 NL43 genomic clone (Accession number M19921) was analyzed using the Integrated DNA Technology's RNAi Design Tool (idt.com). Once sequence, located at nucleotides 8526-8542, was selected and a shDNA was designed for cloning into the retroviral vector, pSuper,ret-

ro.neo+GFP (pSRNG). The shDNA oligonucleotides were synthesized and cloned into pSRNG under the transcriptional control of the RNA Polymerase III H1 promoter. Once correct cloning of the shRNA is verified, expression studies will be carried out in cell culture to determine the ability of the shRNA to inhibit Rev function.

**Mason, Morgan**

**Mentor(s) -- Dr. Amber Fallucca**

**The Interconnection of Sustainability**

During my last two years at USC I have been in a student organization called Sustainable Carolina. I have participated with the community service team. Our primary focus has been to serve the local community while being stewards of the environment. We have both collaborated with existing programs such as Habitat for Humanity and piloted our own campus projects such as The Big Event, a campus wide service event first created by Texas A&M. Through this experience I have seen the major importance of sustainability on an individual and a community level. Typically when people hear the word sustainability they associate it with environmental matters and in some cases businesses matters. Although this is true, there is so much more to the concept than just how we interact with the environment. Sustainability is also an important concept within communities. In serving the community I not only get to learn about where I live but I also get to build relationships. There is value in the relationships that coexist in a community. When a community has strong and healthy relationships it leads people to live healthier lifestyles. In order for a community to thrive it needs to be sustained. The definition of sustain is actually to strengthen or support. When people band together and serve others this community support is strengthened. There is also an opportunity for environmental education whenever we serve. When asked what organization I am a part of I am given the opportunity to start a healthy dialogue with others about the importance of taking care of our earth. Through my experience in Sustainable Carolina I have gained valuable insight and experience that otherwise I may not have gotten.

**Matthews, Claire**

**Mentor(s) -- Ms. Moryah Jackson**

**Global Learning Through a Semester in France**

My name is Claire Matthews, and I am presenting my GLD experience in the Global Learning Pathway. I am studying Global Supply Chain & Operations Management and International Business. As part of my International Business studies, I studied abroad at ESSEC Business School in Cergy, France from February-June 2017, and my presentation is centered around my experiences during my semester abroad. During this beyond the classroom experience, I traveled to 10 countries, and I learned not only about other cultures, but I also learned a great deal about myself. I grew to be more self-sufficient and adaptable through my weekend trips and adventures throughout Paris. After graduation, I will be joining Schneider Electric for their 2-year Global Supply Chain Advanced Development Program. Schneider Electric is headquartered in Rueil-Malmaison, France, and I am thrilled about the possibility of returning to France in the future for a work assignment after my completion of the program to continue my growth in global learning.

**May, Katherine**

**Mentor(s) -- Prof. Rui Qi**

**Drinking habits of International Students at The University of South Carolina**

The purpose of our study is to investigate the drinking habits of international students studying in the United States. We hope to answer the question "What is the motivation behind binge drinking for international students who are pursuing higher education in the United States?" with our research. Further, we'd like to find the relationship between international students who choose to attend college in the United States for any period of time (whether it be semester, year, or full degree program)

and their drinking habits/binge drinking activity while in the United States. The study will compare the drinking habits of international and non-international students through the use of a survey. We will collect this primary data from those who attend the University of South Carolina and couple our findings with secondary research to determine the accuracy of our hypotheses. To further our research we will interview the Director of International Affairs as well as a student-run organization called Buddies Beyond Borders who are in charge of all the International students that study at this University. This research will not be generalized to the entire population but cover the sample that our group has access to.

**McClamrock, Kaitlin**

**Mentor(s) -- Dr. Brad Epperly**

### **Informal Justice Systems and Civil Conflict Duration**

I examine informal justice systems (IJS), justice mechanisms that exist outside of the formal legal hierarchy of a state, to compare outcomes of peace duration post-conflict for states utilizing IJS. Testing the use of informal justice for reconciliation after civil war or genocide across 60 states and 45 peace agreements, I find that informal mechanisms and a focus on reconciliation lead to more enduring peace following conflict. These hypotheses on whether IJS usage in-state, in-agreement, or via reconciliation impact the longevity of peace are tested through a Weibull time series analysis, a Cox hazard model, and OLS regression. Normative work on IJS and reconciliation mechanisms show informal mechanisms are used by communities to promote coexistence among ethnic groups. Demonstrating this is also empirically supported, through fewer deaths and longer peace post-conflict helps explain the relationship between methods of conflict resolution and the peace process. Foregrounding peace processes and uses of IJS in Burundi, Rwanda, and Sudan, the study examines the relationship between formal measures of reconciliation such as military tribunals, international arbitration, and truth and reconciliation committees, and informal justice systems, post-conflict, in efforts to resolve deep-seated issues. Especially useful is consideration of alternative explanations for peace duration post-conflict in states with high degrees of ethnic fractionalization, such as re-institutionalized historic and culturally significant justice systems, that can be beneficial in transitional justice projects.

**McClelland, Sarah**

**Mentor(s) -- Dr. John Weidner**

### **Let's Run This Thing: How My Internship at Corrigan Sports Changed Me Personally and Professionally and Inspired Me To Make Events More Sustainable**

As part of the University of South Carolina Sport and Entertainment Management program, students are required to complete two separate internship experiences. My first internship was conducted at Corrigan Sports Enterprises in the summer of 2016. I chose to return in the summer of 2017 to continue learning from the sports marketing and event management company. The experiences I had, people I met, and work I did changed me both personally and professionally. My work at Corrigan Sports ignited a passion in me for planning and executing events. I learned many lessons, among them, the true meaning of hard work and how to navigate the event business. Additionally, I witnessed different businesses practices and became more aware of the environmental impact they were having. Combined, what I have learned in and out of the classroom have inspired me to want to make a change in the event industry, and gave me the tools to know how to make that change. I hope to contribute to making events more environmentally friendly, and encourage consumers to choose events that abide by their corporate social responsibility. This project illustrates a specific plan of turning what I have learned into a plan to make events more sustainable.

**McCoy, Tessa**

**Mentor(s) -- Dr. Susan Ruppel, Dr. Scott Meek**

### **Does the Central Bottleneck Occur in a Real-World Voluntary Choice Scenario?**

**Abstract-** The Bottleneck Theory suggests that an individual will face constraint when trying to make a decision while performing two different tasks (Pashler, Harris, & Nuechterlein, 2008). Recent evidence indicates that this bottleneck exists regardless of whether participant choices are preinstructed or voluntarily made during the task. The goal of the current experiment was to assess if the bottleneck will still exist when a more real-world voluntary decision-making task is used. Participants heard a directionally distinct car horn, then were immediately faced with a go/no-go decision task in the form of a driving simulation. Participants needed to respond to the horn's direction while simultaneously deciding whether to go or stop at an intersection. The stimulus-onset asynchrony (SOA) between the horn stimulus and the driving decision were varied between trials. Response times were measured for both the horn and go/no go response time. It is hypothesized that participant response time differences would be similar to the SOA time variance, thus reflecting an unresolvable bottleneck between processing the horn stimulus and the driving decision.

**McCullough, Shir'Mel**

**Mentor(s) -- Mr. Ryan Lloyd**

**The Best Way TO Find Yourself Is To Lose Yourself In The Service Of Others**

Throughout my entire college career here at the University of South Carolina, I have immersed myself in numerous avenues of getting involved and giving back to those who are less fortunate. These include but are not limited to Service Saturdays at the university, the Personal Touch Program with Palmetto Health, alternative breaks with One World Health, Birthright and limitless collaborations with SNA (Student Nurse's Association), Men In Nursing, and Chi Eta Phi. Actor Denzel Washington once stated "At the end of the day it is not about what you have or even what you have accomplished. It is about who you have lifted up, who you have made better." It has always been my drive and passion to give back to the people of my community. Rather young or old, age is not a determining factor for those who are in need. Being a nursing major at the university has given me the platform to better involve myself in the community. Every community, rather large or small, has people that can be reached with the love that nursing provides. It is a profession that allows you to see people at their worst, all while helping them become their best. Spending such a large amount of my time serving others has taught me the compassion and humility that I will need every single moment pursuing a career in nursing. It is a lesson that I will keep with me when those 12-hour shifts get tough!

**McCurry, Marion -- Mentor(s) -- Dr. George Roy**

**A Ride to Remember: Using Research to Make Fundraising More Efficient**

As a senior in the South Carolina Honors College I was required to complete a senior thesis. My thesis is titled A Ride to Remember: Using Research to Make Fundraising More Efficient. As part of my senior thesis, I participated in the 2017 edition of A Ride to Remember which is a fundraising event for the Alzheimer's Association where the participants cycle 252 miles over the course of three days. After the ride was completed, I interviewed nineteen people who participated alongside me in the event in order to determine what factors motivated them to participate in the event. My thesis attempts to use the Situational Theory of Problem Solving to explain and understand the factors that make an individual want to participate in cause related sport events like A Ride to Remember so that event organizers can tailor their marketing materials to reach the best target audience in the most effective way. While working on my thesis I have learned how to manage my time better, the importance of having hobbies outside of school or work, and how to apply some of the principles I have learned in the classroom to real world problems. My experiences have offered me a glimpse into the world of research and all of the different challenges and opportunities that come along with it.

**McDonald, Tashonda**

**Mentor(s) -- Dr. Daniel Freedman**

**Lifting as I climb: Using collaborative leadership to empower a diverse array of professionals.**

During my time at the University of South Carolina, I have been given many opportunities within and beyond the classroom. Many of these experiences contributed to my knowledge about being a leader professionally. For instance, in the spring of 2017 I was elected as the President of National Association of Black Accountants. Being the President has showed me that it is necessary to uplift those around me for the success of the organization. This experience helped me understand the importance of effective communication, plus the necessity of adjusting my leadership skills and fostering relationships. Since becoming President, I have gained the authentic desire to see the success in others, which sometimes results in me stepping outside of my comfort zone. I chose the University of South Carolina specifically because of its emphasis on diversity. My passion for diversity led me to become a Diversity Peer Educator. I used this platform to create change about diversity, inclusion, and fairness as my intention was to find a voice to make a difference. Also, my study abroad experience has helped me connect experiences within and beyond the classroom. Taken as a whole, my experiences holding leadership positions, and traveling abroad have contributed to my understanding about being a leader. As my undergraduate career is coming to an end, it is very important that I share my journey, and what I have persevered to become the leader that I am today.

### **McDonald, Daytona**

**Mentor(s) -- Mrs. Anna Oswald-Hensley**

#### **What is the Weather? Daytona is the Weather**

In Summer of 2017, I was selected to be a OSP peer coach. I was given a group of students who are first term students at the University of South Carolina Sumter. This position gave me the opportunity to lead a group of total strangers and help them with anything that they needed academically. I chose to be an OSP peer coach, because I wanted to help more students one on one environment. I learned how to be a more effective leader because I am basically was responsible for those students, as if they were my students. I also learned how to assess different personalities and make them all blend. This impacted myself a lot because I developed my own little family with in a bigger family. I also learned how to persevere through a big task as guided a group of people. I want everyone to learn from my experience and take away the lesson of no matter how big the role is, you can do it if you believe in yourself.

### **McDowell, Hyuri**

**Mentor(s) -- Dr. Jessica Klusek**

#### **Depression and Anxiety in the Population with Normal Range of CGG repeats on the FMR1 Gene**

About 1 in 151 women have the FMR1 premutation. This is caused by expansion of the CGG trinucleotide segment on the FMR1 gene to 55-200 repeats, in contrast with the “normal” range of <54 CGG repeats. When the CGG sequence is expanded, the gene functions suboptimally and is associated with clinical effects. Women with the premutation have been reported to exhibit higher rates of depression and anxiety (Roberts et al., 2016). The severity of these symptoms is associated with the length of the CGG sequence (Roberts et al., 2009; Loesch et al., 2015). While most studies have focused on the association between the CGG copy number and psychological symptoms in people with the premutation, there is emerging evidence that people with low normal CGG repeat sizes may exhibit adverse phenotypic outcomes such as memory problems, increased cancer risk, and higher risk of having a child with a disability (Mailick et al., 2014). Chen et al. (2003) found that the gene functions most optimally at 30 CGG copies, meaning that individuals with “low-normal” CGG repeats may also experience clinical effects. The current study was aimed to investigate if a correlation exists between CGG repeat length and the levels of depression and anxiety symptoms in individuals with low normal CGG copies.

### **McDowell, Hyuri**

**Mentor(s) -- Mrs. Mary Stuart**  
**CDC Undergraduate Public Health Fellow**

I spent my junior year actively engaging in any opportunities to increase my knowledge about public health. This led me to my internship this past summer as a CDC Public Health Scholar. I was selected to participate in the public health leadership program through the Kennedy Krieger Institute at John's Hopkins. Through the program I completed over 400 hours of public health training. The program is designed to provide a comprehensive introduction to the field of public health. My fellowship included site visits to John's Hopkins, the Center for Disease Control, and other local institutions. I received training from health care professionals and guest lecturers designed to increase my capacity to engage in public health practice. I was placed at the Division of Adolescent Young Adult Medicine at Children's Hospital LA to apply the concepts I learned. I developed a translation brief to highlight results of a secret shopper evaluation of HIV testing sites. The goal of the translational brief is to highlight best practice of HIV testing and to work towards creating a set of uniform standards. I also worked on a set of literature reviews on core topic areas for a health and wellness curricula targeting Black and Latino adolescent males in high school. This project specifically challenged my ability to consider the background of individuals from diverse populations and accordingly use the information to make suggestions for programming and curricula development.

**McGill, Natalie**

**Mentor(s) -- Prof. Rui Qi**

**Motivations Behind Destination Weddings and the Impacts on a Destination**

The aim of this research will be to identify what consumer characteristics motivate a couple to choose a destination wedding. We will be interviewing a destination wedding planner about the typical concerns and process behind destination weddings. By understanding what concerns and questions a bride may have, we can see the motivations as well as the hesitations behind choosing a destination wedding. We will also use convenience sampling and simple random sampling to determine why people would choose to have a destination wedding and what they would look for in a destination. Upon conclusion of this research, we hope to discover the motives and characteristics of these couples. The implication will be that the tourism industry can better prepare to hosts these guests and to accommodate their specific needs and wants if they understand the motives.

**McGoye, Elizabeth**

**Mentor(s) -- Dr. Bentley Coffey**

**Actions Impact Others**

I have had the privilege of being a volunteer for Camp Hands of Hope, a weekend-long bereavement camp for children and their families who have experienced the loss of a loved one. Camp is hosted twice a year throughout South Carolina and seeks to provide a youth-centered, family-focused approach to grief and healing. Since becoming a volunteer in the fall of 2015, I have committed over 200 hours of service for this organization. As a volunteer, I have collaborated with numerous child life specialists and effectively facilitated and designed therapeutic activities that support children on their grief journey.

I have always found great joy in serving others, and pursuing a post-academic career as a child life specialist has encouraged me to seek volunteer experiences related to this field. Graduation with Leadership Distinction in Community Service has allowed me to further understand how these experiences relate to theories first introduced within the classroom; specifically, theories relating to building significant relationships, being versatile, and the motivation behind actions. Through Graduation with Leadership Distinction, I have chosen to make my actions beyond the classroom meaningful, and strive to use these opportunities to impact others in positive ways. Graduation with Leadership Distinction has allowed me to realize that change first occurs at an individual level, and if we, as individuals, can aspire to do good for others, we have the opportunity to make a difference in the world. It is

this same ideology that I plan to share with others as I enter the “adult-world” as a Certified Child Life Specialist.

**McKenna, Grace**

**Mentor(s) -- Dr. Kevin Hull**

### **Multimedia Journalism: Trends in Local Newsgathering and Reporting**

The landscape of broadcast journalism is shifting. In recent years, many local news stations have transitioned from the use of traditional reporter/photographer teams to the use of “multimedia” journalists (Farhi, 2008). Instead of focusing on just the reporting elements of news packages, these “MMJ’s” write, shoot and edit their own content. In one study, researchers found that 81% of journalists say they are working differently than they were a few years ago (Reinardy, 2015). Additionally, broadcast journalists are now required to have comprehensive web/multimedia and editing skills (Wenger, 2012). As news organizations adapt, they also must reinvent the role of their reporters. The premise of this study is to examine news practices in South Carolina newsrooms and determine what measures they are taking to adjust to the multimedia trend. An anonymous open-ended survey was sent to a selection of news directors from local news stations in South Carolina. The survey questions examined basic characteristics of each station’s newsgathering practices, such as how many reporters versus MMJ’s they employ and how many stories per newscast reporters or MMJ’s produced. Additionally, the news directors were asked subjective questions about the quality of the news content produced by reporters and MMJ’s and the vision they have for the future of local journalism. From the responses, two very different types of stations appeared: traditional or multimedia. One “traditional” news director indicated a strong preference for reporter/photographer teams. He or she cited a focus on “quality control” over video content as the reasoning for employing photographers. The multimedia stations reported a strong emphasis on the utilization of MMJ’s, indicating that multimedia journalists produced the majority of the stories in their newscasts. In multimedia newsrooms, financial motivation was an important reason for employing MMJ’s. It appears that newsrooms that focus on MMJ’s are changing their practices not just in response to economic pressures, but because of the new technological skills of their journalists. The results of this study give an inside look at hiring practices in South Carolina television stations and what skills journalists need when entering the workforce.

**McKenzie, Kristen**

**Mentor(s) -- Prof. Anna Oswald-Hensley**

### **Leadership frenzy throughout my experiences**

University Ambassador

In order to become an ambassador, you are selected by both past ambassadors and professors at the university. I interact with incoming students and give them tours. I decided to become an ambassador, because I felt like it was a good opportunity to be more active. During this experience, I have learned that there are many different types of students on the campus, and each type requires different levels of interaction. This impacted me because I had to adjust to each person and work with them. Being a university ambassador means that the incoming students look to you for advice about college. I want others to know that being an ambassador is very self-fulfilling. I will continue to be an ambassador for the school this summer and train new ambassadors. In the aspect of leadership, I took away that you have to be patient in almost every situation.

University 101 Peer Leader

A peer leader helps the professor in a University 101 class, and we give the students a face to look up to for help and guidance. I led lessons, which I felt would help the students understand certain topics. I was a peer leader because I want to help students in any way I can, in or out of the class. I learned that many students require different needs, and this impacted me because I learned what type of student I am. Being a peer means to help students with whatever they need, and I want others to know

that professors are willing to work with you as much as they can. The next step for this experience is to get more students to interact with their peer leader. In order to do this, the peer leaders have to be mentored by past peer leaders.

**McLean, Callie**

**Mentor(s) -- Prof. Caroline Dunn, Ms. Destiny Byrd, Dr. Gabrielle Turner-McGrievy, Dr. Sara Wilcox**

### **A Review of Healthy Eating Interventions Using Faith Based Organizations in the Continental United States**

Background: Faith based organizations are a valuable tool for interventions promoting healthy lifestyles and changes in diet. They offer a built-in community, common meeting spaces, and help promote adherence to the intervention.

Objective: To provide a summary of nutrition/healthy eating interventions delivered in faith-based organizations (FBOs) within the United States.

Design: Full-text Systematic Review

Methods: Researchers systematically searched six databases (PubMed, Atla, Web of Science, CINAHL, PsychInfo, Cochrane) to identify relevant articles on obesity prevention programs in FBOs. Articles were eligible for inclusion if they were peer-reviewed, empirical, conducted in the US, included an obesity prevention or treatment strategy (nutrition, physical activity, or combined intervention), and were published in English. Two researchers conducted title-abstract reviews and full text screenings.

Results: Seventy-nine articles, representing 65 studies were included in the evaluation. African American churches were the most common setting, and adult women were the most common participant population. Nineteen studies (29%) of interventions did not include a nutrition component. Only 8 studies (12%) included multiple dietary goals. Most nutrition interventions focused on increasing adherence to the Dietary Guidelines for Americans (n=20, 31%), or specifically increasing fruit and vegetable intake (n= 19, 29%). Other specific goals included lowering fat (n=5, 8%), increasing fiber (n=3, 5%), decreasing sodium (n=2, 3%), and caloric restriction (n=2, 3%). Outcomes were most often measured by self-report (dietary recalls, diet journals, surveys).

Conclusion: FBOs represent promising partnerships for obesity treatment or prevention interventions that include nutrition components. However, the heterogeneity of interventions, outcome measures, and populations present a challenge in evaluating the overall effectiveness of these programs.

Conflict of Interest: None

Funding Disclosure: None”

**McLeod, Caroline**

**Mentor(s) -- Dr. Kenneth Walsh**

### **Cannabinoids Inhibit Voltage-gated Ca<sup>2+</sup> Channels in a Dorsal Root Ganglion Cell Line**

The cannabinoid CB1 receptor is expressed throughout the central nervous system where it functions to regulate excitatory and inhibitory neurotransmitter release, as well as synaptic plasticity. While the CB1 receptor has been identified as a target for both natural and synthetic cannabinoids, the specific downstream cellular targets affected by these ligands have not been fully described. In this study, we examined the effect of the synthetic cannabinoid WIN 55,212-2 on voltage-gated Ca<sup>2+</sup> channels in the rodent dorsal root ganglion neuron F-11 cell line. The F-11 cells were treated overnight in me-

dia containing 1 % fetal bovine serum, 0.5 mM dibutyryl cAMP, and 50 ng/ml nerve growth factor to induce the differentiation of the cells to a neuronal phenotype. Ca<sup>2+</sup> currents were measured using the whole-cell arrangement of the patch clamp technique. Under these conditions, the F-11 cells expressed two types of Ca<sup>2+</sup> currents; a transient current that activated at -30 mV and a sustained current that activated at potentials positive to -10 mV. Application of 5 μM WIN 55,212-2 inhibited the sustained Ca<sup>2+</sup> current, but had no effect on the transient current. We are presently looking at the effect of other cannabinoids, including the psychoactive plant cannabinoid (-)-trans-Δ<sup>9</sup>-tetrahydrocannabinol (THC), on the F-11 cell Ca<sup>2+</sup> channels. Cannabinoid inhibition of the Ca<sup>2+</sup> channels should inhibit neuronal excitability and neurotransmitter release and, thus, have clinical applications for the treatment of anxiety, depression and pain. As medicinal and recreational use of cannabis continues to rise, it is important to fully elucidate the physiological effects of natural and synthetic cannabinoids on the body.

### **McMahan, Kyle**

**Mentor(s) -- Dr. Karen Patten**

#### **IIT Capstone Project Still Hopes Retirement Employee Software**

We have created new tutorial videos and instructional guides for programs that the employees at Still Hopes Episcopal Retirement Community. These programs include Trakstar, First Sun EAP, BCBS SC Blues, Rally Wellness Portal, John Hancock 401k, Palmetto Smart Exam, and SmartDollar.

### **McNeil, Elizabeth**

**Mentor(s) -- Dr. April South**

#### **Success and Nothing Less**

As a biology pre-med student, I spent my three college summers gaining medical health care experience by job shadowing, gaining certification as a nursing assistant, and working as a therapist with autistic children. Job shadowing provides the most realistic experience you can have when determining what field of medicine fits you the most. By shadowing a pediatrician, radiologist, anesthesiologist, orthopedic surgeon, and physician assistant, I realized the aspect of medicine I connect with the most was family practice. In contrast, as a Certified Nurse Assistant I had a unique opportunity to work exclusively with elder people with dementia. I learned the importance of organization as well as management to solve problems quick and efficiently. Working as an ABA Line Therapist with autistic children ages four to twelve I made daily lesson plans, goals, and learning objectives. I learned how important communication and consistent reinforcement were for my children to progress and meet their goals. Constant feedback was reported to the parents as well as the head therapist. In order for each child to progress in social, language, and behavior development, everyone in the family as well as all therapists had to be on the same page. Participating in these diverse health care experiences has reaffirmed my desire to be a physician so I can be a figure of medical advice, assistance as well as a mentor to improve the quality of people's lives. My presentation will focus on the highlights of these experiences and how they have enriched my leadership skills along with my aspiration for pursuing a career as a physician.

### **McNeill, Madison**

**Mentor(s) -- Prof. Nina Moreno**

#### **From Babysitting to Nursing Care**

Since the age of 12, I have been an active babysitter in my various communities. I have taken care of children from birth till middle school. Throughout my college years, I have nannied for families during the day, babysat for others at nights, and even worked for St. Michael's nursery in Charleston, SC, during breaks. Needless to say, I have always had a passion for young children. I find developmental learning and healthcare field enticing. Therefore, when I decided to pursue my Bachelors of Science in Nursing through South Carolina, I always knew that Pediatrics or Labor and Delivery was calling

my name. Here at USC, I have completed clinical rotations at Lexington Medical Center's Labor and Delivery unit, a pediatric rotation at Palmetto Health Children's Hospital on the adolescent floor and in their emergency room, and I have shadowed a pediatric flight nurse for MUSC in Charleston. These experiences have cemented in my heart, where I see myself after I graduate from the University of South Carolina. After graduation, I plan on working in Charleston with pediatric patients. I am grateful for my classes and my experiences both inside the hospital and outside the hospital that have prepared me for my future career. Nurses are the healing hands of the hospital and I look forward to being a mentor for the adolescents, a gentle voice for the toddlers, and a soft touch for the babies.

**McNutt, Ryan**

**Mentor(s) -- Dr. Troy Herter, Dr. Jay Ginsberg, Mr. Chris Perry**

**Validation of a novel task for designed to examine changes in heart rate variability related to arousal**

Post-traumatic stress disorder is a psychophysiological disorder usually triggered by a traumatic event and commonly foreseen in combat veterans displaying symptoms, such as hyperarousal. PTSD is also associated with dysfunction of the autonomic nervous system, which regulates heart rate. A valid measure used to assess autonomic function is heart-rate variability (HRV), which is natural variations in timing between individual heartbeats. Studies have shown that combat veterans with PTSD exhibit autonomic dysfunction as measured by abnormal decreases in HRV. We know that HRV is modulated by mental states, like arousal, suggesting that constant hyperarousal in PTSD may prevent normal modulation of HRV. The objective of the study is to validate measurements of HRV modulation during a novel task, Action Cascade, designed to systematically manipulate arousal. Our hypothesis is that healthy, young adults will exhibit decreased HRV following task-related events that trigger increase arousal. To test our hypothesis, we will examine HRV in ten young, healthy adult subjects, who will perform Action Cascade using an upper-limb robotic device and virtual environment. In this task, subjects are instructed to respond by moving their hand as quickly as possible to a "frowning face" that's presented in the virtual environment and withhold any movement to a "smiling face" that's presented in the virtual environment. Before presenting the face, each trial starts with a 12-18 second rest phase (low arousal), followed by a 10-14 second warning phase (medium arousal), and a 8-12 second vigilance phase (high arousal). If our hypothesis is correct, average HRV will be highest during the rest phase, moderate during the warning phase, and lowest during the vigilance phase. Preliminary results from three subjects support our hypothesis. Successful completion of this study will validate Action Cascade for use in future studies of the effects of hyperarousal on changes in HRV in combat veterans with PTSD.

**Means, Brittney**

**Mentor(s) -- Dr. Randy Lowell**

**The Impact of News Media on Implicit Bias**

The current study examined whether the type of media a person is exposed to is correlated with racial implicit bias. People may not realize that early in life there is often a negative association formed with the color black (e.g. black worn at funerals, the Black Plague, black cats, etc.). An implication of this was demonstrated by the finding that implicit color bias is present as young as three (Smith-McLallen, Johnson, Dovidio, & Pearson, 2006). Smith-McLallen found that there was a stronger and more positive association with the color white compared to the color black, color preference and racial preferences in that study were significantly correlated, and implicit color bias preferences significantly predicted race preferences. In other studies researchers have examined the benefits of society having interethnic relationships and interethnic contact, and the effects these relationships have on implicit bias. Those who have been taught to believe that a certain race is superior to minorities may come to experience negativity when encountering minorities in the future. Continued experiences of such explicit bias contribute to duplicated association of minorities and negatively bold thoughts,

attitudes and actions. Thus, this indefinitely produces negative implicit beliefs towards minorities in general (Aberson, Shoemaker & Tomolillo, 2004). Aberson assessed the assumption that participants with friends who are of the minority group, or participants that have contact with minority group members in a setting that isn't hostile and offers people of all races an opportunity to engage cooperatively, may contribute to positive and effective communication between both groups, thereby reducing implicit bias. Individuals with close friends of the minority group displayed less implicit bias than those without friends of the minority group. The current study examined how media contributes to implicit bias. A four-item survey assessed participants' thoughts regarding the prevalence/likelihood of racially motivated crimes, and regarding how the media portrays crimes committed by minority/non-minority group members, both before and after viewing news media clips featuring either violence or non-violent/good deeds. The nature of the clip's content was found to shift participants' perceptions of race and crime, above and beyond participant demographics and implicit bias levels.

### **Meeks, Cydney**

**Mentor(s) -- Ms. Maegan Gudridge**

#### **OMSA Peer Educators Benefit You!**

As an Office of Multicultural Student Affairs Peer Educator I have participated in discussion groups and various activities geared toward improving diversity on campus. I helped facilitate a biweekly discussion group called Bridging Boundaries. We would discuss with students various things that went on in society and on campus and about how it affects us. I also participated in events such as volunteering on Greene St during Hip Hop Wednesday, luncheons, and the diversity retreat. I decided to become a peer educator because I am a Black women on a predominantly white campus, so I thought it would be beneficial to become involved in an organization dedicated to improving diversity and inclusion on campus. I learned that diversity goes beyond my race and gender. It includes people's sexualities and self-identification as well. It impacted me because I learned of the different issues people in other marginalized communities faced as well. Society benefits a select few. I have recognized the privilege I have as an educated women in society. The need for diversity never stops on campus. People feel excluded and need the space/people to make them feel included. Others need to know how OMSA peer educators benefits them and others on campus. I am happy to know I helped be a part of something to make everyone feel safe and valued on campus.

### **Meisenheimer, James**

**Mentor(s) -- Ms. Hayley Efland**

#### **Ensuring Water Sustainability in Central California**

Through my studies and work experience in supply chain & operations efficiency, I have developed a passion for ensuring sustainable water conditions in central California. I will utilize my global perspective to strategically place aquifers for supplying water to drought-inflicted areas of central California. This project requires efforts in purchasing raw material, planning of manufacturing aquifer and dam products and a crucial positioning strategy in order to ensure water is supplied to the affected areas.

### **Mele, Emily**

**Mentor(s) -- Dr. Michelle Vieyra**

#### **Measuring the effects of caffeine and exercise on metabolic disturbances in rats fed a sucrose solutions**

The purpose of this study was to examine the beneficial metabolic effects caffeine and exercise have in rats who consume excess amounts of sugar. Over 38% of the US population is obese, primarily from excessive consumption of additive sugars found in soft drinks and other sugar-sweetened beverages. Excess sugar consumption has been linked to an increase in type 2 diabetes, non-alcoholic fatty liver disease, and metabolic syndrome. Exercise and caffeine have been shown to prevent weight gain, reduce the risk of type 2 diabetes, and promote lipolysis in rat models. Rats were used during

this experiment to simulate the metabolic effects caffeine and exercise have on consuming sugar at a level similar to the average American. Rats were randomly divided into six groups; sugar only, sugar + exercise, sugar + caffeine, sugar + caffeine + exercise, exercise only, and control. After 15 weeks rats were subjected to blood glucose testing, weighting, and euthanasia. Dissections were performed after rats were euthanized and visceral fat and livers were extracted and weighted. A modified Folch procedure was used to extract liver lipid content. Results indicated that the sugar only group accumulated a higher amount of visceral fat, followed by the sugar + caffeine group. This was reflected in the total amount of weight gained. The remaining groups were similar in weight gain and visceral fat content and will need further statistical analysis. Normalization of liver weight is needed to reduce the amount of variance in size and the Folch procedure is underway.

### **Melton, Molly**

**Mentor(s) -- Dr. Elizabeth Easley, Dr. Sarah Sellhorst, Dr. William Riner**

#### **Differences Among Body Fat Percentage Prediction Equations in a College Age Population**

Body mass index (BMI) is known to misclassify obesity status according to body fat percentage (BF%). Purpose: To determine if body adiposity index (BAI) and the Deurenberg equation can predict BF% in traditional aged college students. Methods: Anthropometric data were collected on 172 college students (18-25y). BF% was measured using dual energy x ray absorptiometry (GE Lunar iDXA, Waukesha, WI). Paired t tests were used to determine group mean differences in BF% between measured and predicted values. In addition, Pearson's correlation and intraclass coefficient correlations (ICC) were used to examine the association and reliability between the values, respectively. Results: BAI predicted BF% ( $27.35 \pm 5.04\%$ ) and Deurenberg predicted BF% ( $23.48 \pm 7.78\%$ ) were significantly lower than DXA measured BF% ( $28.64 \pm 9.10\%$ ),  $p = .004$  and  $p < .001$ , respectively. BAI ( $r = .817$ ) and Deurenberg ( $r = .847$ ) predicted BF% were strongly correlated to DXA measured BF%,  $p < .001$ . ICC demonstrated strong reliability between DXA measured BF% and the BAI predicted measured BF% ( $ICC = .812$ ,  $p < .001$ ) and Deurenberg measured BF% ( $.828$ ,  $p < .001$ ). Discussion: While statistical significance was noted, the difference of 1% between DXA measured BF% and BAI predicted BF% lacks clinical significance. However, our study concludes that the use of both equations is warranted in this population. Additional research is suggested to further elucidate our findings.

### **Melton, Chandler**

**Mentor(s) -- Dr. Robert Davis Moore, Mr. Jacob Kay**

#### **Influence of Sex Differences in Concussion Recovery in a Pediatric Population**

A sport-related concussion is a mild traumatic brain injury occurring during sport participation. Concussive injuries result in various cognitive, somatic, and physiologic alterations which can negatively influence academic and vocational performance, as well as overall effective functioning. Research demonstrates that biological sex may moderate concussion recovery, with women appearing to experience more severe and more protracted symptoms than men. However, we are just beginning to understand sex-based differences in concussion recovery, particularly during development. Accordingly, our aim is to advance the extant knowledge by examining the role of sex-based differences of concussion recovery in adolescent athletes. We hypothesize that girls will report a greater symptom burden than boys, as well as an increased length of recovery. Our study will include 60 participants (30 boys, 30 girls) undergoing medical treatment at a local sports medicine clinic. To assess deficits and recovery, participants will complete a normative assessment battery including: the Rivermead Post-concussion Symptom Questionnaire, the Profile of Mood States, and the Cogstate Brain Injury Battery. The severity and duration of symptom burden (clinical, affective, cognitive) will be statistically analyzed. Key demographic variables, age, and history of concussion will be controlled for in the statistical analyses. Findings from this study will help fill a critical knowledge gap concerning the role of sex in recovery from concussion. Ultimately our findings will serve to advance the science and clinical

management of concussive injuries.

**Metcalf, Erin**

**(s) -- Ms. Sarah Gay**

**Studying Abroad: Anxious but Able**

During the Spring of 2017, I studied abroad in Dublin, Ireland. I learned more about my capabilities in those five months than I had in the last ten years. Spending a semester in another country with people you don't know is stressful for anyone, but for someone with diagnosed general anxiety disorder? It was even worse. Studying abroad seemed three times as difficult for someone with a mental health concern. Not only did I have to think about how to pay for my trip, but also how to get access to my medications and whether or not I would be able to stay healthy 2,000 miles away from my support system. My anxiety generally manifests itself in the need to make rigid plans that I struggle to deviate from. But, my desire to explore outweighed my fear of being incapable - and I'm so lucky it did. During my time in Europe, I learned just how independent I can be. I can travel alone through three different airports with a flight cancellation and two delays without breaking down. I can find myself in a room with 20 people I don't know and make enough friends to go to the pub on a Friday night. When my plans inevitably go awry, I can execute Plan B. I am flexible and entirely capable of enjoying travel despite my mental health concern. The first few months were scary for me, and I have the journal entries to prove it. But doing the research and planning ahead kept me going. I was able to find methods that worked for me and I handled situations as they came. The self-confidence my semester in Ireland gave me is something I've kept with me here in the States. My attitude is different because I know that I am capable.

**Michalos, Alexis**

**Mentor(s) -- Ms. Anne-Marie Hantman**

**Meeting in the Middle: Education within Informal University Settings**

Throughout my life, education has been a primary focus of mine, one I knew would continue when enrolling in college. College, though, has not only imparted upon me knowledge in my various areas of study, but a new path to follow. My inclination towards education within informal settings originally led me to seek a career in museums; however, serving as a Resident Mentor (RM)—and within other related leadership positions—for the University Housing Department has transformed the trajectory of my life. As an RM, I have formed relationships with hundreds of residents, fellow peer leaders, and an array of professional and graduate staff. While the role has provided me with many hats to wear, such as crisis responder, event planner, active listener, social justice advocate, and advice giver, the most surprising and rewarding is that of the educator. In the residence hall, I have found a setting that meets students at a critical moment where their perspectives are fully challenged without the pressure of classroom hierarchies. Through my work as an instructor I provide students with a peer to whom they can cultivate new ideas and develop their own stories; ultimately, I have also grown as my preconceived notions are confronted and critical thinking is developed. The problem-solving skills and desire to teach outside of the traditional classroom will allow me to flourish not only within my future career in higher education and student affairs but as a citizen of the world.

**Miller, Kailey**

**Mentor(s) -- Dr. Elizabeth Easley, Dr. Sarah Sellhorst, Dr. William Riner**

**Impact of Body Composition on Global Esteem on College age Women**

Previous research has shown that women tend to score lower on surveys regarding their physical self-concept. There is much speculation regarding reasons for decline of physical self-concept with age. Purpose: To determine if the classification of BF% impacts global esteem in women. Methods: Forty-two traditional-aged (18-25y) women participated in this study. Anthropometric data were recorded and BF% was measured using an iDXA (GE Lunar iDXA, Waukesha, WI). Each participant

completed the PSDQ survey. A multivariate analysis of variance (MANOVA) was used to determine whether a difference between groups existed in global esteem, a global component of physical self-concept. The women were divided into two categories based on BF% (Healthy  $\leq$  32%,  $n=19$ ; Overfat  $>32\%$ ,  $n=23$ ). Results: There were no significant differences in the global esteem indicators based on body fat, Wilks Lambda=.865,  $F(5, 36)=1.120$ ,  $p=.367$ . Discussion: The lack of significant differences in the global esteem measures may be attributed to an outward appearance in line with societal norms associated with beauty, further strengthened by waist hip ratio and waist circumference data. Additional research is needed to further elucidate the mechanisms associated with physical self-concept in young women

**Miller, Joshua**

**Mentor(s) -- Dr. Damien Picariello**

**Joshua Miller, Professional and Civic Engagement**

Santee Lynches Regional Council of Governments Economic and Community Sustainability Intern

Santee Lynches Regional Council of Governments is a public planning organization that helps city and county governments plan and coordinate various public projects. In my internship with them, I performed tasks such as research assignments, attending public meetings, and coming up with potential solutions to various regional issues. The reason I decided to engage in this internship was because I wanted to gain a better understanding of how local, county, and state governments function and interact with one another. One thing I learned from this experience was that not all government bureaucracy is bad. Without regional councils of governments, many cities would not be making long term plans to improve their communities. This had a huge impact on me because I used to think that bureaucracy was inherently inefficient, but this is not always the case. What I would like others to take away from this is an understanding that sometimes bureaucracy can be useful and even necessary, so we should not immediately label it as unnecessary or useless. I have been accepted to an internship program through the Charles Koch Institute with the American Council of Trustees and Alumni for this coming summer in Washington, DC, and I plan on continuing to be involved with and hopefully work for public institutions and interest groups in the near future.

**Miller, Payton**

**Mentor(s) -- Mr. Ryan Lloyd**

**The Power of Cultivating an Inclusive Environment**

Coming to college, I knew that I not only wanted to excel academically, but immerse myself in opportunities on campus. I was thankful to have a Resident Mentor who encouraged and continuously supported me during my first year. She made my transition from high school to college as seamless as possible and before I knew it I applied and accepted a position as a Resident Mentor the following year. Through out my time as a Resident Mentor, I had the opportunity to personally mentor 60 women and take on roles such as advocate, mentor, crisis responder, and event planner. Later, taking on the leadership positions of Training Leader and Senior Resident Mentor. During my time as a Resident Mentor, I had the privilege of facilitating interactions to assist first year students in navigating the challenging transition from high school to college. As a result, I witnessed students grow on to become strong leaders within and beyond the classroom. Through this experience, I developed a number of leadership skills including: effective listening, serving others, crisis management, and problem solving. I was able to discover my own values and ignite my passion for being a resource and advocate for students. I am looking forward to applying the lessons and skills I gained from my experiences by pursuing a career in school counseling.

**Mills, Aaron**

**Mentor(s) -- Mr. David DeWeil**

## **Learning Leadership In Two Capitols**

Through a variety of opportunities including internships and student leadership roles in both Columbia, South Carolina and Washington, D.C., I have gained valuable experiences that brought out the lessons that I learned in the classroom. In my experiences as a leader of my peers I gained many valuable lessons that will translate outside of the university setting. USC's prime placement in Columbia has allowed me to take advantage of opportunities exclusive to a city that is both the state capitol and the home of the state flagship university, which allows for internship opportunities with state agencies, serving the public and learning to lead simultaneously. Additionally, internship opportunities in the nation's capitol have given me different lessons that helped shape my idea of leadership. Here I will present my experiences inside and outside of the classroom and my reflections on leadership including leadership and decision-making, helping others achieve their potential, and advocating effectively to an audience.

**Milz, Emily**

**Mentor(s) -- Dr. Kim Creek**

### **P53 Polymorphisms in Human Keratinocyte Strains**

Persistent infection with human papillomavirus (HPV) is linked to higher rates of cancer development compared to individuals who quickly clear the virus. This research aims to examine the single nucleotide polymorphism (SNP) located on codon 72 of the p53 gene as a potential biomarker for increased duration of HPV infection and therefore greater risk of certain cancers. Codon 72 of p53 has either the sequence CCC, which encodes proline or CGC, which encodes arginine. Previous studies indicate a potential link between the proline variant and increased chance of cancer development, however, this suggested correlation continues to spark controversy and warrants further investigation. Frequency of each SNP variant differs among populations. For example, 65% of African-Americans (AA) encode proline whereas a similar percentage of European Americans (EA) express arginine. This difference provides a potential explanation for higher prevalence of HPV infection observed within AAs. In this study, human keratinocyte cells (HKc) were genotyped in order to compare accepted population frequency of p53 the polymorphism to a South Carolina cohort. For each sample, DNA was extracted prior to amplification of p53 via polymerase chain reaction (PCR). Gel electrophoresis was used to identify the presence of p53 in each sample before performing Sanger sequencing to determine genotype. 48% of AA HKc encoded homozygous proline, which is consistent with data that suggest this variant is most common within the AA population. In contrast, the majority (52%) of EA HKc samples were heterozygotes, which conflicts with population data that suggest arginine is most prevalent. Only 36% of AA and 32% of EA expressed homozygous arginine. In future studies, these data will be used to further evaluate the potential link between proline and increased risk of cancer. Sample genotype will be assessed for correlation with spheroid formation, a characteristic of cell growth that may support cancer development after HPV infection. If proline is definitively traced to cancer predisposition, increased screening and prevention efforts in populations such as AAs that exhibit a higher prevalence of this polymorphism variant will likely yield better health outcomes.

**Mishoe, Lacie**

**Mentor(s) -- Dr. April DeLaurier**

### **Determining how PHF21a affects craniofacial development in zebrafish**

In humans, mutations in the transcriptional repressor PHF21a (PHD finger protein 21A) causes craniofacial defects resulting in Potocki-Shaffer Syndrome. Previously, it was observed that knockdown of phf21a in zebrafish caused defects to embryonic cartilage. It is therefore hypothesized that Phf21a functions in zebrafish similarly to how it functions in humans, and thus we can use zebrafish to understand the physiology of Potocki-Shaffer syndrome. In our lab, we generated lines of zebrafish with insertions and deletions in the co-orthologs of phf21aa and phf21ab using CRISPR-Cas9. An F0 line was outcrossed to create an F1 generation, and F1 zebrafish are being screened to identify

heterozygotes using PCR and T7 endonuclease digest. PCR produces a product which is gel extracted. The product of gel extraction is then heated and slowly cooled, producing mismatches between wild-type and mutant DNA. T7 endonuclease digest of mismatched products results in digestion of the product into two fragments. If a fish is heterozygous for a mutant allele, the T7 assay will reveal two lower bands on a gel which equals the size of the original PCR product. For phf21aa heterozygotes, the PCR product is 995 base pairs and the T7 endonuclease digest products are 720 and 275 base pairs. For phf21ab heterozygotes, the PCR product is 613 base pairs and the T7 endonuclease digest products are 447 and 166 base pairs. The fish that contain the lower bands will be outcrossed to AB wild type fish to generate an F2 line and these fish will also be genotyped. The F2 generation will be incrossed resulting in 25% homozygous mutants and will be stained with dyes to label the bone cartilage. Using a dissecting microscope, the mutant zebrafish will be screened for evidence of skeletal patterning defects. Studying how disruptions to phf21aa and phf21ab affect skeletal development in zebrafish can help us to understand the normal functions of these genes in craniofacial development and how mutations cause Potocki-Shaffer syndrome defects.

**Mitchell, Nicholas**

**Mentor(s) -- Dr. David Barbeau**

**Sedimentary Record of Laramide Uplift in the Cañon City Embayment, Colorado, USA.**

This project aims to constrain the timeframe for the onset of the Laramide orogeny in south-central Colorado through sediment provenance analysis of sedimentary rock samples acquired from the Cañon City Embayment. The Laramide orogeny is a poorly understood mountain-building event that impacted the western interior of North America in the Late Cretaceous and Paleogene periods (ca. 90 to 30 million years ago). Understanding the geological history of the Laramide is significant because it provides precise context about the development of the North American continent as well as allowing us to better assess modern regional geologies. An understanding of the orogeny will be developed through the comparison of the ages of individual sediment grains acquired from sedimentary basin deposits adjacent to the uplift zone, to be collected by laser-ablation inductively coupled plasma mass-spectrometry at the USC Center for Elemental Mass Spectrometry. By applying U-Pb detrital-zircon geochronology to the samples, each zircon grain can be categorized as having been derived from the Cordilleran (i.e., pre-Laramide) or Laramide provenances when cross-referenced with sources with known age distributions. Ten samples collected from mid-Cretaceous through Paleocene strata exposed in the Cañon City Embayment will be tested in order to determine whether and when a provenance shift to locally derived sediment occurred. In determining where the shift happens, we should be able to precisely construct the geological timeframe for the mountain uplift. If no Laramide provenance ages are present in the results, then the spatiotemporal zone of analysis will be readjusted.

**Moffitt, Casey**

**Mentor(s) -- Dr. Susan Wood**

**The role of the locus coeruleus-norepinephrine system in inflammatory priming during social stress**

Repeated exposure to social stress is known to result in the emergence of depression. While the mechanism by which this occurs remains unknown, recent studies have shown that inflammation may play a key role. We previously determined that a history of social stress enhances neuroinflammation in stress sensitive brain regions, and was causal to a depressive-like phenotype in socially stressed rats. A growing body of evidence suggests that norepinephrine (NE) is capable of altering inflammatory cytokine release in both the periphery and the brain. Because the locus coeruleus (LC) is the major source of NE, we sought to determine whether the LC-NE system is implicated in the emergence of stress-induced inflammatory priming in the periphery and brain. Therefore, there were two major goals of this study: 1) to determine if a history of social defeat sensitized the neuroinflammatory

response to a subsequent stressor within the dorsal raphe (DR), central amygdala (CeA) and plasma; and 2) to elucidate the role of NE in peripheral and central inflammation by lesioning the LC-NE system with N-(2-chloroethyl)-N-ethyl-2-bromobenzylamine (DSP-4) (400µg/rat, icv), a selective NE neurotoxin that reduces NE levels in LC target regions (ie., DR and CeA). Social defeat exposure in rats with normally functioning LC-NE produced augmented peripheral inflammation and region-specific alterations in central inflammatory tone. Importantly, our studies identified sensitized stress-induced proinflammatory cytokine expression in the CeA of socially defeated rats and decreased expression in the DR compared with rats with a history of control. DSP-4 significantly increased stress-induced proinflammatory cytokines in the CeA and DR in animals with a history of social defeat. Alternatively, DSP-4 treatment reduced plasma cytokine levels regardless of prior stress history. Together these data suggest that LC-NE activity may suppress neuroinflammatory drive under conditions of stress and that the LC-NE system behaves dichotomously resulting in distinct peripheral and central inflammatory profiles. These studies seek to identify mechanisms involved in stress susceptibility, in order to reveal novel targets useful in the treatment of stress-related psychosocial disorders.

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### **Montague, Shannon**

**Mentor(s) -- Prof. Dan Freedman**

#### **Excelling Beyond The Classroom**

My time at USC has truly shaped me into the young professional I am today. Along the way I have met mentors and had experiences that have guided my interests, pushed me to be a better student, and have provided me insights about how to excel in the professional world. While I have learned key conceptual material within the classroom, I have also been shaped by my experiences outside the classroom. In my portfolio I bring these inside and outside the classroom experiences together, and explain how these have guided me through my four years here at USC. A few of the experiences I discuss are my leadership position held in my sorority, my time studying International Business abroad, and my peer leadership experiences I held in the Capstone Scholars office. Within the classroom, I have had two consulting experiences in the areas of Marketing and GSCOM. These experiences have given me a true first look into the professional world and have taught me invaluable lessons. In my GLD portfolio, I reflect on these trivial experiences that have defined my time at USC, and discuss how together they have prepared me for the professional world.

### **Moody, Miles**

**Mentor(s) -- Prof. Hayley Efland**

#### **Fair Systems Cannot Exist Without Formal Structure.**

During my time at the University of South Carolina, I decided to join Greek life to see what benefits I could draw from it. I joined Pi Kappa Alpha my freshmen year and by junior year I became the Sergeant at Arms. This meant I had the responsibility of keeping the fraternity in order and punishing those who violated our rules. I was also there to make sure we went by our rituals and tradition. However, when I took office I quickly realized that there were no formalities in the process. Most of our traditions had been forgotten and our judicial board had no fairness. Without any formal process, the member being charged would not have a fair chance and I thought that was wrong. That is when I decided to once again make this process extremely formal. I took what I learned from my class on criminal courts to better structure our process. I also added an appeals process to give the charged student a time to rebut and to sit in front of other peers. The process now has a solid structure on which its basis is fairness. Now someone can feel as though their due process rights are being accepted and followed to the best of our ability.

### **Morgan, Petra**

**Mentor(s) -- Prof. Hilary Lichterman****Ghana: Medical Internship**

During the summer of 2017, I had the wonderful opportunity of attending a medical internship in the country of Ghana in a small village called Senya, Beraku. This two-month internship was hosted by the Senya Beraku Health Centre in the center of the village with the purpose of serving and acting as a resource to provide health care to members of the community. While there I participated by serving the community through working in the diverse areas of the health clinic such as the maternity ward, vitals, medical records, the mental health ward, and had an opportunity to travel to the northern region of Ghana for a three-day malaria outreach where we dispensed medicine to patients effected by this disease. Through this experience, I was able to take information acquired from my classes taken for my Health Promotion, Education, and Behavior minor as well as other courses taken through my college career and translate it into practical knowledge useful in this internship. This experience reaffirmed my decision to pursue a career surrounding global studies and health care as well as expose me to a country that possesses an abundance of rich culture and knowledge that has generated a shift in my perspective and fueled a love for global health advocacy.

**Morgus, Anastasia****Mentor(s) -- Dr. Daniel Freedman****The Places You Go and How They Shape You**

During my four years at the University of South Carolina, I have gained so much knowledge and insight from both inside and outside the classroom; however, a lot of my learning experiences occurred outside of USC as well. During the spring semester of my junior year I had the privilege to study abroad at Fudan University in Shanghai, China for five months. I was able to travel all over China while taking courses in International Business and Chinese history. This opportunity allowed me to utilize the skills and frameworks I had already learned in my classes at USC and apply them to a real, international setting. As an International Business and Global Supply Chain and Operations Management double major and Chinese Studies minor, I have taken a lot of classes that prepared me for this international experience, and the knowledge I gained abroad has prepared me to become a more effective global leader back at home. In my GLD portfolio, I have reflected on these global experiences, connected them to my coursework at USC, and planned how I will apply these insights towards my future goal of becoming a better global leader. This reflection has helped me realize the steps I need to take to continue understanding cultural differences and how to overcome these differences to be successful in the international business community.

**Morrow, Taylor****Mentor(s) -- Dr. Sanjay Ahire****The Labor Behind Apparel Brands and the Growing Success of the Alta Gracia Project**

Alta Gracia Apparel was founded in 2010 as a groundbreaking new clothing line, marketed to college students, as the only apparel factory in the developing world that provides a living wage to all workers. This living wage is 350% above the legal minimum wage of the Dominican Republic. This difference in income allows the employees to create a pathway out of poverty for their families and larger community. Through interviews with employees of Alta Gracia and comparative research into other ethical ventures in the apparel industry, we seek to prove why the living wage model, among other similar ventures, has the tools to succeed with a sustainable profit. Within my conversations and research, it was important to look at the successes along with the failures of this project as it has yet to make a profit. This research provides an argument for the social and economic benefits of a company founded on the concept of living wages, in opposition to the current industry standard of sub poverty wages and abusive working conditions. It is crucial that the global economy takes note of this initiative and takes a stand against inhumane labor conditions across their supply chains.

**Morrow, Taylor**

**Mentor(s) -- Dr. Giuliano Marodin**

**Sonoco Elk Grove, Illinois Forming Films Inventory Reduction**

The purpose of the project is to reduce finished good and raw material inventory of the forming films segment of the Sonoco Products Company - Elk Grove, Illinois facility. In the current state, raw materials and finished goods inventory is currently 26.23% above target levels. This excess inventory on-hand results in inefficient and idle working capital, as well as increased warehouse space required. Our project utilizes historical inventory data, production and sales history, as well as the lead times and demand patterns for products, to develop a new inventory replenishment process. Our new inventory replenishment model will determine the optimal quantity and frequency for ordering raw materials and producing finished goods to reach a cost savings goal of \$1.2 million in inventory cost.

**Moulton, Karah**

**Mentor(s) -- Dr. C. Nathan Hancock**

**miRNA-Induced Gene Silencing Tagging in Arabidopsis thaliana**

Gene silencing is an important tool used to determine gene function. There are many different methods to decrease gene expression, including RNAi, Cas9 mutagenesis, and microRNA induced silencing. miRNA-induced gene silencing involves attaching a microRNA target sequence to an mRNA sequence, inducing the production of tasiRNAs and subsequent degradation of homologous sequences, including redundant genes. We have used a naturally occurring miRNA in Arabidopsis thaliana, called miR173, driven by the 35S promoter to induce silencing of random sequences in the genome. In this effort, we identified a mutant that exhibits altered leaf shape, delayed flowering, and reduced seed set in a dominant manner. We are documenting the development of the mutant in detail and working to clone the transgene location. Together these results indicate the feasibility of our silencing tagging strategy and its ability to produce novel phenotypes that were not discovered by other mutagenesis strategies.

**Moyers, Caitlin**

**Mentor(s) -- Prof. Daniel Freedman**

**Making the Most out of the Undergraduate Experience: Preparing for a Management Career in the Restaurant Industry**

During my time here at USC, I have discovered how to be a leader through my studies and work in the hospitality and tourism industry. I have learned invaluable lessons as a result of within the classroom experiences. A few of these lessons include, how to be sustainable, what it takes to lead a team, how to plan conferences/events, marketing, and management. I have also learned invaluable lessons as a result of beyond the classroom experiences. I have been able to apply all of my knowledge gained at USC to many of my work and internship experiences. I have also been able to apply the lessons that I learned while participating in a study abroad program to how I will pursue my future career life. One internship in particular, Kiawah Island Club Management Intern, allowed me to truly apply the knowledge I have learned in school to real life experiences. I not only gained more knowledge of the restaurant industry but also more experience in management, leadership, and responsibility. As a tourism major here at USC, my internship experience provided me with first-hand experience of hospitality and management at a high-standard level. The integration of within the classroom and beyond the classroom experiences has produced substantial insight into providing leadership in the restaurant industry. Through this experience, I hope to pursue a career in a management role in the restaurant industry in the future.

**Moyers, Caitlin**

**Mentor(s) -- Prof. Rui Qi**

**The Effect of Destination Marketing in Florida on University of South Carolina Students Spring**

## **Break Decisions**

The purpose of the study is to investigate the relationship between destination marketing methods and college students spring break destination of choice to travel to. This study will research the different reasons students choose a spring break destination to travel to during their vacation. The specific participants for this research study will be University of South Carolina students who are intending on traveling to a destination in Florida for their spring break vacation. We will only be focusing on popular spring break destinations in the state of Florida and researching the ways they market their destination as a "spring break destination". We are interested in finding out what causes a University of South Carolina student to choose a certain destination for their vacation. For this study we will focus on popular spring break destinations in Florida, and how they attract college students. We will create a survey for USC students to take in order to collect data for our research. For this research we will be using the convenience method for the sampling. Therefore, our research question is; How do popular spring break destinations in Florida market themselves to host college student's year after year? Our research hypothesis is, there is a positive relationship between spring break destinations marketing themselves as a beach destination with nightlife and low costs and the amount of college tourist arrivals during spring break. A survey on USC students will be conducted for this research. We hope this research will help the DMO in Florida learn how to market to spring breakers or how to market in order to avoid the spring break crowd.

## **Mulji, Anand**

**Mentor(s) -- Dr. Maksymilian Chruszcz**

### **Studies of Interaction between House Dust Mite Allergen Der p 2 and Antibody 1D8**

Asthma is a chronic respiratory disease, often of allergic origin, that is characterized by continuous or paroxysmal labored breathing accompanied by wheezing, bronchial constriction and inflammation, and often by attacks of coughing or gasping. More than 22 million people in the USA alone who are exposed and sensitized to dust mite allergens have developed asthma, a chronic inflammatory disease of the airways. In the USA and across the world, dust mite allergies occur in about 10-30% of the population. Diverse studies suggest that exposure to house dust mite allergens may be a primary cause or a risk factor in the development of asthma, and that it can act as a trigger for the exacerbation of the symptoms. Dust mites are arthropods that live in warm areas of dense humidity and feed on human skin flakes. Dust mites are found almost everywhere including beds, carpets, and other furniture. Inhalation of house dust mite allergens (found in dust mite fecal matter), is one of the most important risk factors leading to allergic diseases such as atopic dermatitis, rhinitis, and asthma. Group 1 and 2 dust mite allergens are major allergens recognized by IgE antibodies by more than 80% of sensitized individuals. It is hypothesized that characterization of molecular and antigenic properties of allergens is necessary for the development of better allergy diagnostics and therapeutics. To test this hypothesis, we will study Group 1 and Group 2 allergens and their interactions with antibodies. In this research, 1D8 antibody in ScFv format was expressed in E.coli and purified using Immobilized Metal Ion Affinity Chromatography purification and gel filtration purification. Identifying amino acid residues that are important for IgE binding using 1D8 and Der p 2 complexes can be applied to the design of hypo-allergens. The ultimate goal of the project is to produce hypo-allergens that have considerably reduced binding to IgE antibodies which could be used for immunotherapy.

## **Mulkey, Madeline**

**Mentor(s) -- Prof. Cecile Holmes**

### **God at the Games**

The God at the Games project will identify ways in which Olympic Ministry Teams operate and amplify their outreach methods at the 2018 South Korean Winter Olympics through use of private publication and mass media this including the use of social media, religious pamphlets, pin trading, news broadcasts and publications. It will explore how a rapidly changing media landscape shapes such teams'

tactics and outreach, and affects their overall mission experience. In compiling research, interviews were conducted with mission team leaders and participants on their methods of distribution of materials. Mission teams were also observed at a distance, to witness interactions with passersby. Through observing the mission teams, the ministry strategies can be broken down into three categories, pin trading, pamphlet distribution, and hospitality. Contrary to anticipation, the majority of mission groups hailed from the home country, South Korea. Whereas in past Olympics the majority of mission teams were from other countries, the majority of missionaries were residents of South Korea. This influx of native missionaries demonstrates the lasting impact foreign missionaries have had on the country. Modern day ministry requires informed cross-cultural analysis. With this information, religious groups will have research to prove the effectiveness of their ministry to sponsors and supporters.

**Mullane, Alexandra**

**Mentor(s) -- Ms. Tricia Kramer**

**Interning Throughout My College Career**

During my three years at the University of South Carolina and four years at college, I have interned at McGuireWoods Consulting for two and a half years. This experience has had me do everything from assist in lobbying affairs at the South Carolina State House to running social media campaigns for different types of organizations. I have learned so many lessons and met incredible role models along the way. The experience provided a variety of experience in different aspects of public relations, my major, and also introduced me to some of the people that lead the state of South Carolina.

Through this experience, I have found that leaders are not people who necessarily fit the ideal mold, but who are role models to other people and help the people around them strive to be better. I have learned the importance of appreciating each person's uniqueness, being patient and thoughtfully relating to others while communicating. These lessons have helped me to look outside of myself and be a better citizen in my society.

As I reflect on my experiences, I think about everything that I have learned through this experience and beyond, and how I will take these lessons and apply them to the way I live for the rest of my life.

**Mullane, Alexandra**

**Mentor(s) -- Ms. Sarah Gay**

**Studying Abroad in Europe**

During my three years at the University of South Carolina, I have been fortunate enough to study abroad twice. After my sophomore year, I spend a maymester in Italy, and the spring of my junior year I spent an entire semester in Ireland.

Both experiences were life changing and taught me so much about the world around me. My experience in Ireland especially helped me to become a global leader because it pushed me out of my comfort zone for four months. During these experiences and more, I learned the importance of appreciating subcultures, being independent and taking risks. I also got to meet a variety of interesting and impressive leaders that helped to make me a more globalized and open-minded citizen.

As I reflect on my time in Europe, I realize just how many unique experiences I had, and just how important it is to be a global citizen. I got the opportunity to see the entire world, not just my world. As I prepare to graduate, I know that I will take these lessons with me, and they will be extremely useful as I plan to make a positive contribution to not just my community, but the entire world."

Mumford, Joshua -- Mentor(s) -- Prof. Rui Qi, , , , -- Key Factors Influencing Tourist's Choice of E-tickets in Tourism -- This study is to investigate the key factors that influence tourist's decision

of using e-tickets during their travel. The data will be collected from the University of South Carolina, specifically from the School of Hospitality, Retail, and Sports Management. Our methodology would be the use of stratified sampling with the groups being the students and faculty specifically. The data collection technique that we will be using is survey through email. The implication of this research is to promote all aspects of tourism business to better utilize e-tickets for the benefit of the tourists.

**Muniz-Gonzalez, Mariela**

**Mentor(s) -- Dr. Stacey Lance, Dr. Kristina Ramstad**

**Examining the effects of natural and environmental stressors on *Ambystoma opacum***

Amphibian populations have suffered declines in recent years resulting from habitat loss, contamination, and diseases. Namely, organic pesticides have gained widespread use as part of agricultural practices and studies have suggested detrimental effects of these substances on amphibian populations subsequent to aerial drift, stormwater runoff, or direct application. One specific compound found in various herbicide types, glyphosate, has been linked to reduced growth and development and immune compromise of some amphibian species. Agricultural industries recently introduced a new formulation of glyphosate called AquaNeat that is registered for wetland use and recommended to be mixed with a nonionic surfactant such as Cide-Kick II. Although both have been approved for usage in wetlands, no studies have examined the effects of either product on amphibians. Additionally, not much is known concerning effects of contaminant exposure on pathogen susceptibility even though some emerging pathogens have been linked to global die-offs of amphibian populations. One such pathogen is ranavirus, an emerging disease of ectothermic vertebrates that can cause systemic infection and acute mortality. On the Savannah River Site ranavirus is known to occur in multiple species of amphibians and across wetlands. In addition, AquaNeat and Cide-Kick II are used regularly. We examined the effects of both products on ranavirus susceptibility in larvae of the marbled salamander, *Ambystoma opacum*. We exposed larvae to differing concentrations of AquaNeat and Cide-Kick II alone and in combination and then exposed them to ranavirus or a sham bath 48 hours later. Five days later we sacrificed the larvae, extracted DNA and quantified viral loads via qPCR. Data are still being collected and analyzed. Our results will help determine if these wetland-approved herbicides are safe for amphibians and contribute to the understanding of the interactions of multiple stressors on amphibian populations.

**Murphy, Taylor**

**Mentor(s) -- Dr. Joseph Quattro, Ms. Kathryn Levasseur**

**Does hatchling fitness have a genetic component?**

Assessing fitness variation within and among hawksbill turtle sibling groups.

**Murphy, Reagan**

**Mentor(s) -- Dr. Lara Ducate**

**Studying Abroad Yields Awareness and Abilities which Encourage Collaborative Solutions to Global Dilemmas**

Experiences abroad are widely recognized for their ability to alter the participant's perspective on society toward more tolerant tendencies, but through my engagement during my semester abroad in Costa Rica, I have unearthed additional layers of significance to developing a globally-oriented world view. By fulfilling the roles of student, intern, and traveler, I have not only increased my own cultural awareness but have also developed an understanding of global issues and their collaborative, personalized solutions, particularly within the context of environmental degradation and climate change. My experiences in Costa Rica – especially my work as an intern with the Nectandra Institute and my time living with a host family – have allowed me to more wholly comprehend the implications of issues introduced within my Environmental Studies and Global Studies coursework, and they have helped me draw connections between my learning within the classroom and my experiences combat-

ting real-world environmental and societal problems. Specifically, I have learned about and practiced diverse approaches to dealing with environmental collective action problems, and I have discovered the value in overcoming linguistic and cultural barriers in order to collaboratively pursue common objectives. Overall, I have learned that no matter how varied the cultural traditions and tendencies, there is always some degree of commonality to the human experience. Emphasizing these commonalities through empathy, compassion, and validation is an incredibly effective way to overcome misunderstandings and collaborate to achieve goals that are impactful on both local and global scales.

**Myers, Makenzie**

**Mentor(s) -- Dr. Jill Stewart**

**Test-retest reliability of a measure of corticospinal tract integrity after stroke**

Diffusion tensor imaging is a common tool for determining white matter structure and connectivity in the brain. A value referred to as fractional anisotropy (FA) is a measure of axonal orientation in one direction. FA of the corticospinal tract, the main motor pathway from the brain to the spinal cord, has been shown to be a predictor of functional motor potential in individuals with chronic stroke, however, the stability of this measure over time is not fully understood. The purpose of this study was to determine test-retest reliability of FA in the corticospinal tract after stroke. Twelve individuals with chronic stroke (mean age  $58.5 \pm 9.8$  years; mean time post stroke  $50.5 \pm 46.7$  months) completed two diffusion tensor imaging scans four days apart and FA data was calculated. Regions of interest were drawn on the corticospinal tract at the cerebral peduncles by a researcher blinded to patient information and day of the scan. Mean FA from this region was extracted. Pearson's correlation tests and Intraclass Correlation Coefficient (ICC) tests were used to determine the correlation and reliability between Day 1 and Day 4 data. Significant correlations ( $p < 0.05$ ) were found between Day 1 and Day 4 FA in lesioned ( $r = .698$ ;  $p = .012$ ) and nonlesioned ( $r = .730$ ;  $p = .007$ ) tracts. Moderate reliability (ICC between 0.4 and 0.75) was found for both measures: Lesioned FA (ICC=0.696), Nonlesioned FA (ICC=0.707). Reliability was slightly higher for FA ratio (lesioned FA/nonlesioned FA; ICC=0.773). Minimal detectable change FA ratio was found to be 10%. These results suggest FA measures of lesioned and nonlesioned cerebral peduncles over time are reliable. These findings have implications for predictive models of motor recovery after stroke and understanding the outcomes of studies that expect a change in FA over time by providing a baseline variance level.

**Nall, Heather**

**Mentor(s) -- Dr. Adam Pazda**

**Conspicuous conservation: Replication of Griskevicius et al. (2010)**

The focus of experiments in psychology has recently shifted to replication studies to ensure validity. This study is a replication through Open Science Framework's (OSF) Collaborative Replications and Education Project (CREP). This project allows multiple research groups to perform the same study and share their results for a final meta-analysis of all of the collected data to determine if the results of the previous study can be replicated. This study focused on the effects of priming on purchasing decisions, specifically if people choose certain products because of perceived status. Participants were recruited from the undergraduate psychology classes at USCA and were asked to complete a task on a computer in one of the computer labs on campus. The task completed includes reading a short scenario that may be a control or a status prime, then answering survey questions. The survey includes choices of purchase of common items such as a car or a household cleaner in either a luxury type or an environmentally friendly type (green products). Results were analyzed between control groups, product choices (through a chi-squared test), and status priming (using one-way between subjects ANOVA). This study considers the motives of individuals purchasing green products to determine if status plays a role in purchasing decisions for environmentally friendly products.

**Nall, Heather**

**Mentor(s) -- Dr. Derek Zelmer, Dr. Michelle Vieyra**

**Comparison of a prototype remote monitoring system with conventional video observations for rat drinking behavior**

We developed an automated monitoring system for rats with implanted with an RFID (radio frequency identification) chip using an Arduino platform with an RFID reader, variable resistor fluid sensor (Milon eTape) for volume measurements, and datalogger shield for real time clock reference and data storage. The software (created with the Arduino IDE) prompts recording of the RFID chip number, date and time, and average volume each 500ms for as long as the implanted chip triggers the RFID reader.

Two rats (IACUC 070815-BIO-07) with chips already implanted by the distributor will be housed together in one brooder size enclosure with the RFID reader in proximity to a drinking reservoir. Video data will be recorded via DVR from an Arlo Pro wireless camera mounted facing the reservoir. A colored float will be placed inside the graduated water reservoir to allow a visual reference for volume. Permanent marker will be used to mark the coat of the rats for visual identification. Initial recording will take place over 3 24-hour periods with the automated monitor and the camera. Subsequent trials (a minimum of 3) will last one week. Recorded data will be analyzed for device agreement and reliability between each trial. Device agreement will be determined by comparing the readings from the circuit to the recorded camera data. Time spent reviewing camera data and circuit data will be recorded to compare effort.

**Nall, Heather**

**Mentor(s) -- Dr. Alexandra Roach**

**Vascular Risk Factors and Diabetes in Late Adolescents and Young Adults, an Assessment of Working Memory**

Diabetes is a chronic condition causing hyperglycemia, which may lead to chronic kidney disease, retinopathy, neuropathy, and Alzheimer's disease. Studies on Alzheimer's disease and aging populations have demonstrated associations between diabetes and cognitive decline. One confounding factor of these studies is the natural cognitive decline associated with aging. This study focused on vascular risk factors and their influence on working memory in young adults, a population that has been understudied for cognitive deficits associated with vascular effects and diabetes. Early identification of risk factors that increase atrophy and neuropathy may allow young adults and late adolescents to engage in prophylactic measures such as losing weight, changes to diet, and increased exercise.

This study focused on vascular risk factors and cognitive function, specifically high blood pressure (BP) and glucose levels (BGL) and body mass index (BMI), and working memory. Working memory was tested using a computer-administered n-Back task. Participants also performed the Mini-Mental State Examination (MMSE), Trails A and Trails B, Digit Span Forward, Digit Span Backward, and provided basic demographic information on paper collection sheets. We analyzed the data for correlations between BP and working memory, BGL and working memory, and BMI and working memory. Prevalence of diabetes and vascular diseases in the United States remains high and is more concentrated in southern states such as South Carolina. This study provides insight into the potential predictors of cognitive decline in healthy young adults in a population at risk for developing diabetes and the resulting chronic illness and mental decline associated with it. Development of prescreening programs and behavioral interventions to reduce risk or prevent decline are of special importance to our local communities. This study provides an opportunity to identify methods of prescreening for young populations with subclinical presentations of vascular risk factors associated with diabetes.

**Namsinh, Amanda**

**Mentor(s) -- Dr. Howie Scher**

**Determining the Sensitivity of the Hf-Nd Proxy to the Pleistocene in the North Atlantic**

The history of the modern ice caps is incompletely known, though many have studied the glaciation of the northern hemisphere cryosphere there is intense debate of the timing. Ice sheet history can be reconstructed using geochemical proxies for continental weathering, particularly those proxies, such as the Hf-Nd proxy, that are sensitive to the mechanical breakdown of rocks and minerals that occur as ice sheets grind away the upper continental crust. The Hf-Nd proxy has not been previously applied to the late Pleistocene that dates the beginning and continuation of the northern hemisphere deglaciation. Application of the Hf-Nd proxy to the Pleistocene will further refine the proxy and provide insight on how this proxy operates in difference climate conditions. By measuring the authigenic and detrital Hf-Nd isotopic composition of sediment from the Bermuda Rise in the N. Atlantic abyssal plains, the deglaciation magnitude during the late Pleistocene will be assessed. The BOFS (Biogeochemical Ocean Flux Study) provided the cores in which sediment was used for this study. The authigenic fraction of the sediment was extracted from the sediment through a leaching process, while the detrital fraction was extracted from a bomb digestion of leached sediment. Column chemistry was used to isolate neodymium and hafnium to be measure on a mass spectrometer.

**Nanna, Alexis**

**Mentor(s) -- Mr. Rico Reed**

**Educating and Advocating for Diversity as an OMSA Peer Educator**

As a psychology major with minors in counselor education and social work, I've always been interested in the helping professions and especially with how diversity should be embraced in those fields. That interest led me to USC's Office of Multicultural Student Affairs (OMSA), and after getting involved with their programs, I became an OMSA Peer Educator (OPE). As an OPE, I acted as an ambassador for OMSA at events, and gave presentations to University 101 classes on the topics of diversity and LGBTQ related issues. I also facilitated a discussion group, Ace of Hearts, on the topics of Aromantic and Asexual identities. In this position, I helped to educate students at USC on how diversity is shown here on campus, and helped assist with making USC a more welcoming community for diverse students. I decided to become an OPE because I thought it would be a worthwhile experience that could help me learn how to advocate for vulnerable populations and educate others. Through my experience as an OPE, I learned that those tasks can be difficult at times, but it's a rewarding challenge that I enjoy. It reaffirmed my decision to go into the field of school psychology, because I feel like I can use the skills I developed for the benefit of LGBTQ adolescents in schools. I also became more self-aware of my own background and identities and how they may differ from those around me, which allows me to be more open to recognizing diversity and the areas that I need to learn more about. Being an OPE showed me that there are always still people to advocate for and there are always still inequalities that can be fixed. I learned that I can use my power and position in my life to help others who can't, and everyone should be made aware of that capability. I ultimately hope to use the skills that I learned educating others on diversity in my future career as a school psychologist, working with LGBTQ youth and how their well-being can be affected by school climate.

**Neal, Summer**

**Mentor(s) -- Prof. Jay Pou**

**Advocacy and Planned Parenthood**

As a Public Health major, I was always unsure of what exactly I wanted to do with my degree after my undergraduate education. After taking several Women's and Gender Studies courses, as well as participating in clubs sponsored by the Office of Multicultural Student Affairs, I finally realized that social justice was my ultimate passion in life. I slowly became aware of the inequalities that exist within our community, which stirred a want to help those who reside in disadvantaged populations. Taking this hunger for change and turning it into action was difficult at first, but I ended up finding an incredible internship with Planned Parenthood South Atlantic. As a Public Affairs Intern, I actively engage with low-income individuals in our area who may be unaware of the health services that Planned Parent-

hood offers. Community engagement is pertinent to our organization, and I am consistently tabling on college campuses and at local events in order to spread awareness about reproductive healthcare issues and advocacy efforts, as well as to build support for Planned Parenthood's goals. In a time where women's healthcare rights are uncertain, it is important that we step up and make a difference for generations to come.

## **Needle, Rose**

**Mentor(s) -- Prof. Karen Mallia**

### **Introverted and Innovative: How Introverts Function in the Creative Workplace**

Think Google, Spotify, Netflix and Apple--companies driven by creativity, with emphasis on collaboration and breakthrough ideas. At national headquarters, work spaces are colorful, open, and loud, filled with a bustling energy. The work spaces unequivocally cater to extroverts. However, research has shown time and time again that the majority of highly creative people are introverts; they work best alone, and prefer a quiet, private environment for the most productive and novel ideas. This study seeks to answer the question, "How do introverts function in the creative workplace, especially in a climate that increasingly caters to extroverts?" With emphasis on the physical work environment, the study utilizes survey results from participants in the creative industries to gauge introversion/extroversion, as well as work environment characteristics and productivity levels. The goal of the study is to create a more diverse creative work environment that caters to many personality types, especially to introverted employees who may not voice concerns about declining productivity in an extroverted workplace.

"Neitzel, Jessica -- Mentor(s) -- Ms. Theresa Harrison, , , , -- Experiencing My Own Future -- During the summer of 2017, I was fortunate enough to earn an athletic training internship with the Tampa Bay Buccaneers (Bucs). The Bucs are a professional football team in the National Football League. During the internship, I performed a variety of tasks including practice preparation, hydration/recovery, prevention, evaluation, and treatment of injuries, therapeutic intervention, functional return to play protocols, accompanied athletes to appointments, and advanced my interprofessional communication skills.

As an athletic training major at the University of South Carolina, the experience provided me with an important insight into my future career. A firm career goal of mine involves providing healthcare at the Division I or professional football level, therefore, the Bucs gave me the opportunity to get my foot in the door and learn the demands of working with the highest level of athletes. Not only did I learn a multitude of techniques used to treat common injuries (such as PRP intervention for muscular strains), I also learned how various professionals under the "umbrella of sports medicine" (athletic trainers, physicians, paramedics, nutritionists, etc.) worked together to provide the best possible care for the athletes. The involvement with other healthcare professionals specifically left a lasting impact on me, providing an example of collaborative care for future career interactions. Pursuing my internship confirmed my desire to work with elite football athletes and forced me to develop a rigorous but passionate work-ethic that will position me to be successful in my professional career endeavors. Following graduation, I hope to pursue a master's degree and work as a graduate assistant with a Division I football program.

## **Newell, Travis**

**Mentor(s) -- Dr. Karen Patten**

### **iIT Capstone Project: Advancing Development of SC Science Teachers**

Step Into Science Teaching (STEP) is an ongoing project, directed Dr. Steven Thompson from the College of Education at the University of South Carolina – Columbia, that is a collaboration between the USC College of Education, USC Center for Science Education (Arts and Science), and multiple

high-need school districts. STEP is centered on science teacher professional development that provides science related videos and other resources to better serve teachers. The team was tasked to improve the design, navigation, and overall experience that users have when they visit the STEP website. We also edited the current content and added more content like videos and improved text. With approval of Dr. Thompson, the team spent time with Dr. Thompson educating him on how to edit and manage the website by himself, so he can make slight changes at his will. In this presentation we will present all our changes made to the STEP website and explain how we educated Dr. Thompson on how to make changes on the website.

**Newell, Makayla**

**Mentor(s) -- Mrs. Anna Oswald-Hensley**

### **The Two Most Important Things You Need to Know about Makayla Newell**

University Ambassadors help during orientation and any time someone needs a tour of the campus. During orientation, we help students with knowing where certain places on campus are and where their advisor's office is, as well as, helping students register for class based off of what their advisor recommended for them. My main job that I did as a University Ambassador, was working in the main lab getting students ready to get their information in for their Carolina cards, their financial aid, and their multifactor security system. I also was the head University Ambassador, when it came to getting students registered for classes. I decided that I wanted to be a University Ambassador because it gave me the opportunity to help other students and it gave me a chance to help more students that as they came into the Financial Aid office. From this experience, I learned how to deal with different situations, as well as, difficult parents and students. The one thing that being a University Ambassador means to me is that I have done the very best I can in school, that I show signs of a leader, and that I am capable to help others. One of the things I want people to know about this is that yes it can be stressful sometimes when things go wrong, especially when you have difficult students and parents, but at the end of the day, you just helped a student with their first steps through college. I hope to when I go to Columbia that I will be able to be a University Ambassador up there as well.

**Nguyen, Kenny**

**Mentor(s) -- Dr. Raymond Thompson**

### **Does Exercise Affect Executive Function Immediately Post-Exercise?**

Introduction: First responders and Tactical Units make critical decisions during or immediately following strenuous physical exertion. Executive function improves several minutes post-exercise.<sup>1</sup> However, no data is available about executive function at the cessation of exercise when sensory feedback from physiological responses to exercise – such as increased heart rate (HR) and increased ventilation (VE) – remain elevated. Purpose: The purpose of this study was to determine whether executive function was altered immediately post-exercise. Methods: 25 male and female subjects completed 1 maximal and 2 submaximal treadmill tests. Immediately before (Pre-), immediately post (1m), and 5 minutes post (5min) exercise, subjects completed a Trail Making Test B (TMT-B). Subjects also completed 2 submaximal isocaloric bouts at 50% and 85% of VO<sub>2</sub>max with the TMT-B administered Pre-, 1m, and 5min. Results: The time to complete the TMT-B following the VO<sub>2</sub>max test increased significantly at 1m and then decreased significantly at 5min (Pre-: 25.9±1.4, 1m: 30.0±2.5, 5min: 24.0±1.5 sec, p≤.05). HR also increased at 1m and then decreased at 5min (Pre-: 87.7±3.1, 1m: 192.6±3.2, 5min: 131.1±4.2, p≤.05). Following submaximal exercise, there were no differences in the TMT-B time at 50% VO<sub>2</sub>max (Pre-: 28.5±2.6, 1m: 24.8±1.7, 5min: 24.8±1.8 sec, p≤.05) and 85% VO<sub>2</sub>max (Pre-: 27.2±2.2, 1m: 24.8±1.6, 5min: 23.4±1.1 sec, p≤.05) even though HR changed significantly at 50% (Pre-: 87.6±4.8, 1m: 127.5±6.0, 5min: 96.1±4.8 sec, p≤.05) and 85% (Pre-: 80.9±3.7, 1m: 158.2±6.1, 5min: 93.0±3.4 sec, p≤.05) VO<sub>2</sub>max. Conclusion: Executive function decreases immediate post-high intensity exercise that may induce fatigue, but non-fatiguing, low and moderately-high intensity exercise has no effect. Afferent feedback has apparently little effect on executive function.

**Nguyen, Tiffany**

**Mentor(s) -- Prof. Theresa Harrison**

**More Than Just Food**

For six months, I worked as a marketing intern for the South Carolina Department of Agriculture (SCDA). The mission of the SCDA “to promote and nurture the growth and development of South Carolina’s agriculture industry and its related businesses while assuring the safety and security of the buying public.” To promote the department and their mission, I created a social media campaign called “Farmers of South Carolina”. This campaign became my most notable contribution to the department by increasing our social media interaction by 250%, and quickly becoming one of the top performing posts. In addition, the campaign helped influence a larger multimedia campaign titled, Roots. I was responsible for all parts of the content creation: photographing farmers, interviewing, and writing social media entries. This experience has taught me many things, both professionally and communally. From a professional standpoint, the Farmers of South Carolina campaign taught me how to organize information and present it in an appealing manner, not only to my supervisor, but also to the general public. Furthermore, I have learned how farmers have the potential to impact the community as a whole. I plan to use this conglomerate knowledge in my future career by creating visually unique messages that engages the community at large.

**Nicholson, Maura**

**Mentor(s) -- Ms. Amber Fallucca**

**Effects of Global Learning on Global Projects**

In the Spring of 2017, I studied abroad at the Trinity College of Dublin in Ireland. I have always had a passion for learning about and experiencing differing cultures and traditions; and going to Ireland allowed me to form the cross-cultural relationships and knowledge I needed to proactively pursue my passion. The experiences and new, valuable information I learned abroad were then integral to my performance in a global Talent Management initiative for a Maryland-based company, W. R. Grace. The objective of the project was to create a global, standardized Human Resources website that would combine talent acquisition, onboarding, talent management, and succession information into one easy-to-use database. There were many aspects and moving parts to this project, and the most difficult, but rewarding, aspect of the project was the global standardization. W. R. Grace has locations in various countries around the world, and in order to get user-acceptance we had to work very closely with our partners in various regions, domestically and globally. This meant putting in long hours, either early mornings or late nights to accommodate the time differences. It also meant compromising on certain things because of differences in cultures. By participating in a global project, I was able to learn about the main obstacles facing international businesses, and also the over-looked complexities of efficiently running a business under various cultures and countries. Not only was it beneficial to analyze and participate in a global project, but it was also valuable to work with such a diverse group of individuals and employees, who came from many different backgrounds, cultures, and specialties. From my previous experiences abroad and classes I have taken here at USC, I could better see and understand how the differing cultures impacted how each member approached the project. By working in a team setting with such diverse people, it really opened my eyes to different ways of thinking, and just solidified my passion of global learning.

**Niles, Jake**

**Mentor(s) -- Dr. James Knapp**

**Magnetism and the Origin of Multicellular Life**

The magnetic character of sedimentary rocks may be an important new discovery in our understanding of the evolution of multicellular life on Earth. A fossil discovery (*Vermiforma antiqua*) 45 years ago along the South Fork of the Little River in the Piedmont of North Carolina was recognized at the

time as the oldest evidence for multicellular life in North America, in rocks ~620 million years (Ma) old. Subsequently, this biogenic origin was challenged, and the specimens were reinterpreted as features of tectonic origin. Even so, North Carolina is one of only 30 sites globally to host evidence for the earliest forms of multicellular life from the so-called Ediacaran period (635-541 Ma). As part of a group undergraduate research project in the School of the Earth, Ocean, and Environment, new geological and geophysical evidence suggests that the sedimentary rocks which host *V. antiqua* have a highly magnetic character, which is unusual for most rocks of sedimentary origin. Over 100 specimens, including the layered sedimentary rocks and surrounding volcanic rocks, were tested and recorded to confirm their qualitative magnetic character. Surrounding rocks of volcanic origin appear to be consistently non-magnetic. Comparison of the locations of these ancient sedimentary rocks with regional aeromagnetic measurements suggests that (1) this magnetic character may be a method to map the areal extent of the *V. antiqua* strata in a poorly exposed area, (2) these magnetic trends potentially describe the large-scale structural geology of the region, and (3) the origin of this magnetism is likely an important constraint on the environments and processes that led to the evolution of multicellular life.

**Nist, Laura**

**Mentor(s) -- Mrs. Katie Hopkins**

**Broadening My Perspective**

During the spring semester of 2017 I studied abroad in Glasgow, Scotland at the University of Glasgow. During these five months I traveled all over Scotland but also to eight other countries in Europe, getting the chance to experience nine different cultures in a short period of time. Before leaving I knew very little about any of them but when I got there I realized just how much they knew about where I was from. It became apparent that while Americans pay little attention to anything but themselves, other countries are actively aware of the politics and activities of the States. Everyone I talked to seemed to have an opinion on our current president while often I couldn't even name their leader, let alone have any opinions of them. The whole experience made me realize how ignorant I was about what was happening outside of the States. I remembered how I was never required until college to take a world history class, all we were taught was American history. Traveling across Europe, observing and embracing other cultures, and speaking to people of all different nationalities made me come to the realization that there is more than one way to live. It opened my eyes to so many different views and lifestyles and gave me the opportunity to learn about all the rich histories I had been missing out on. Americans often adopt the self-centered nature of our nation, only getting concerned about things that are directly affecting us, causing so many of us to overlook the bigger picture. Escaping the egocentrism in America for just one semester allowed me to broaden my perspective and see things in global terms not just in how it affects America and not just in how it affects me.

**Norris, Kristin**

**Mentor(s) -- Dr. Todd Hagstette, Dr. William Claxon**

**Female Soldiers in the American Civil War: A Novel Approach**

The American Civil War (1861-1865) has become an integral part of America's cultural and societal awareness. Though there is a comparative abundance of readily available information concerning male soldiers who fought during the Civil War, there is shortage of representation in both academic and creative circles regarding the women who disguised themselves to fight alongside their male counterparts. This dearth recommends the writing of a short story cycle on the subject, one that is heavily informed by the historical data available on the topic. Ultimately, my project will bring together a host of fictional female-soldier narrators to represent the myriad war experiences of their unsung historical counterparts.

**Norton, Callie**

**Mentor(s) -- Mrs. Moryah Jackson****GLD Presentation: Global Learning**

As an International Studies and German undergraduate student, my goal is to expand upon my interests in international affairs and cultural awareness in a way that allows me to make an impact on young people and encourage them to expand their view on the world and its differences. Through Graduation with Leadership Distinction's Global Learning pathway, I am hoping to showcase why it is so important to understand foreign perspectives and to actively strive to learn more about the world through opportunities that may otherwise be overlooked. By doing so, I aim to equip students with the tools and information they need to make the most of their international experiences, whether at home or abroad. I want to bring students to the realization that travel can be more than just an amazing experience, but also something that promotes acceptance and growth in every aspect of life.

**Nowling, Duncan****Mentor(s) -- Dr. Sofia Lizarraga****Cellular mechanisms associated with RAB3GAP1 dysregulation and relevance to Warburg Microsyndrome pathology**

Duncan Nowling<sup>1,2#</sup>, Mary-Kate Lawlor<sup>1,2#</sup>, Mara Cowen<sup>1,2</sup>, Pankaj Ghate<sup>1,2\*</sup>, and Sofia B. Lizarraga<sup>1,2\*</sup>

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Intellectual disability affects close to 6.5 million people in the US. The study of the etiology of intellectual disability has benefited from the study of rare neurogenetic disorders. Warburg Microsyndrome is a rare neurodevelopmental disorder characterized by severe intellectual disability and postnatal microcephaly. However, the mechanisms that underlie the pathogenesis of Warburg Microsyndrome are largely unknown. Genetic findings suggest that Warburg Microsyndrome is caused by mutations in genes associated with vesicle trafficking. Proper regulation of vesicle trafficking during development is essential for the establishment of neuronal circuitry. In particular, RAB3GAP1 has been identified as the most commonly mutated gene associated with Warburg Microsyndrome. We find that RAB3GAP1 interacts with the axon elongation factor-DOCK7; and with the golgi-trafficking regulator-TMF1. Therefore, RAB3GAP1 could be contributing to the development of human neuronal circuitry through its interactions with DOCK7 and TMF1. However, how mutations in RAB3GAP1 lead to deficits in neuronal connectivity associated with intellectual disability and postnatal microcephaly is not known. Using overexpression and knockdown approaches we begin to interrogate the molecular and cellular pathways associated with dysregulation of RAB3GAP1 in human cells.

**Nurse, Tamara****Mentor(s) -- Dr. Karen Patten****IIT Capstone Project: InfraGard's FBI/SC Cyber Public/Private Security Collaboration**

InfraGard is a cybersecurity information nonprofit organization that involves public-private collaboration with the FBI, other government agencies, and private enterprises to exchange security information and promote mutual learning opportunities relevant to the protection of our nation's "Critical Infrastructure." During our project, we assisted InfraGard by developing a fully functional website, where members and non-member could effectively communicate and collaborate. The functionalities of the website gave InfraGard multiple resources to use such PayPal, updated membership database, a page dedicated to past InfraGard Presidents, updated InfraGard sectors sections, updated contact page and an interactive map that shows different regions locations through South Carolina. During our Poster Presentation, we will describe our collaboration with the FBI and other association mem-

bers as well as demonstrate the upgrades to the InfraGard Website.

**Nye, Leigh**

**Mentor(s) -- Dr. Elise Lewis**

**Developing Skills Outside of the Classroom and Outside of a Major**

For the past three summers I have had the opportunity to intern for Lincoln Financial Group. Lincoln is a Fortune 250 company that provides a variety of financial services to consumers with the goal of empowering customers to take charge of their financial future. In my three summers at Lincoln I have worked in a variety of positions, from Relationship Management to University Recruiting to Life Insurance Marketing. Each of these roles gave me insight into how the financial services industry operates, as well as improving my technical workplace skills. I was able to directly contribute to the company through my major projects which included a comprehensive University Recruiting budget, a booth coverage model for a national sales conference, and a social media program that included training and content development for top wholesalers. As part of the Internship Development Program at Lincoln I also got the opportunity to network with influential executives and take part in a number of professional development seminars. My three summers at Lincoln have provided me with a set of skills completely outside of my Sociology major, and have expanded my horizons in terms of career choices. This experience has lead me to accept post-graduate employment in the Continuous Improvement department as part of Lincoln's Leadership Preparation Program.

**Nye, Leigh**

**Mentor(s) -- Ms. Asheley Schryer**

**Participant Observation: A Sociological Approach to Study Abroad**

During the spring semester of 2017, I studied abroad through the University of New Haven in Barcelona, Spain. In the four months that I lived in Europe, I witnessed my own transformation from an eager tourist fixated with the superficial beauty of Barcelona to a guest with a rich understanding of the culture of behind that beauty. Rather than working on my Sociology major while abroad, I chose to enroll in the International Business course program to expand my perspective, however I found myself learning about Barcelona from a sociological perspective. My approach to learning was reminiscent of the sociological approach of participant observation. This method is extremely valuable in qualitative research because it provides the researcher with close and intimate familiarity of the context in which the phenomenon they are observing occurs. In order to gain this understanding I took numerous courses focused on the culture of Barcelona, integrated myself into the culture of the city, and explored all areas of the city- especially non-traditional tourist locations. By combining an understanding of the cultural history of Barcelona with my own immersion into the setting I wished to learn more about, I gained an in depth understanding of the society I had become a part of. This holistic approach to learning about new cultural settings is something that has stuck with me following my experience abroad, and something I will carry with me following my graduation.

**Nye, Leigh**

**Mentor(s) -- Dr. Andrea Henderson-Platt**

**Reminders of the Past: Perceptions of Confederate Relics Among Young Adults**

Racism and discrimination are shown to be key social determinants in understanding racial health disparities in the United States. Although this growing research has contributed to our understanding of the interplay between race and health, less is known about the role of social and environmental structural determinants in the production of health disparities, including the effects of historical relics of the confederacy. One related phenomenon is the small, but growing, body of work on historical trauma. Defined as the "cumulative emotional and psychological wounding, over the lifespan and across generations, emanating from massive group trauma experiences." Historical trauma has been posited as a key determinate in understanding racial health disparities. The primary purpose of this project is to

explore the relationship between Confederate relics and health among young adults living in Columbia, SC. The study will rely on semi-structured, individual interviews with both black and white young adults in South Carolina as the primary source of data. Following the recording of data, interviews will be transcribed and analyzed so an appropriate conceptual framework will be developed. In the wake of the Charleston 9 massacre and the removal of the confederate flag from the State House grounds in 2015, residents of South Carolina may offer a unique perspective in attempting to understand historical trauma in relation to confederate relics. This research aims to expand existing sociological theory and related conceptual models to explore how historical relics may influence health, with a specific focus on health among race-ethnic minorities.

**Nystrom, Katy**

**Mentor(s) -- Ms. Hilary Lichterman**

**Gaining a Global Perspective**

My presentation will focus on my study abroad experiences. In May 2016, I spent a Maymester traveling around Costa Rica and studying environmental sustainability. I cleaned beaches, took eco tours, and lived in research centers in the middle of the rainforest. In Spring 2017, I spent 6 months living and going to school in Dublin, Ireland. I traveled Europe and gained a European view of my major. I chose to study abroad because I wanted to learn about other cultures and new perspectives. I wanted to adventure and become a more flexible and adventurous person. While I definitely gained those cliché personal growths, I also grew and learned in ways I did not expect. I became a more environmentally-conscious person. I learned that what is taboo in one culture is embraced by another. I learned that I am terrified of crocodiles and fascinated by snakes. I learned that the world is full of traditions and cultures I have never imagined. I want others to learn from my experience that you have to truly embed yourself in another culture to even get close to understanding the complexity of other people. Once I realized this, I decided I want to live everywhere in the world. I realized that there are parts of America I do not even truly understand yet. I hope to continue my study of other cultures by not just traveling, but moving to new places and continuing to learn more about new people.

**Odom, Hannah**

**Mentor(s) -- Dr. Giuliano Marodin**

**CHS Lincoln Supply Chain Evaluation and Redesign**

Background of the Project

We conducted an Operations and Supply Chain consulting project at Atrium Health to develop and implement a new distribution process for Linen and Med/Surg item deliveries to the CHS Lincoln Hospital. We have evaluated the current state distribution system in the Lincoln Hospital, measured the current state of other Atrium hospitals using the exchange cart system, and created two possible future states to implement at the Lincoln hospital. Following the creation of two possible future states, we performed a cost analysis to determine the best option.

Company Background

Atrium Health, formerly known as Carolinas Healthcare System, is a hospital network that owns and operates hospitals, emergency departments, urgent care centers and medical practices in North Carolina, South Carolina, and Georgia. Headquarters is located in Charlotte, North Carolina. The object of this project is to perform a cost analysis on the current and future states to determine the most efficient options for Linen and Med/Surg deliveries and calculate expected total cost savings.

Project Methodology and Outcomes

We were provided with the current state distribution of Linen and Med/Surg supplies in the CHS Lincoln hospital. We measured the distance and times of the exchange cart system in two other Atrium Hospitals to estimate the amount of time implementing the exchange cart system would take in the

CHS Lincoln Hospital. By evaluating the times of this job, we were able to perform a cost analysis on the current and future state and demonstrate the cost savings by CHS Lincoln for implementing this new system.

**Okuda, Brienne**

**Mentor(s) -- Ms. Lisa Camp**

**It's Not About What You Know, It's How You Know**

It's Not About What You Know, It's How You Know

Brienne Okuda

Graduation with Leadership Distinction Global Learning Pathway

Learning does not occur when individual ideas and opinions are substantiated. Learning occurs when our ideas about the world are challenged; it occurs in this tension, or collision of ideas. The Graduation with Leadership Distinction program challenges students to combine what they learn within the classroom with their beyond-the-classroom experiences. In the context of global learning, this learning occurs when knowledge within the classroom collides with experiences beyond the university and beyond geographical borders. I have experienced personal growth in the collision of ideas, through combining studies in international business and social sciences, as well as in multiple study abroad experiences. Through applying ethnographic frameworks for observation, reconciling theories of cultural intelligence with my own frustrations in adapting cross-culturally, and recognizing how critical lenses recur in different social systems than our own, global learning provided me with different perspectives and contexts for approaching problems and strategically crafting solutions such that it is not what you know, but how you know that defines individual points of view.

Using this knowledge, I outline the positive impact of valuing cross-disciplinary studies, measuring the contribution of other disciplines. I argue for increased breadth of study within individual colleges' curriculum and argue that the space where various disciplines interact provides the greatest opportunity for growth and building future leadership. I argue, how are we challenging students at USC, to create tension in their ideas, to learn?

Oliphant, Grace -- Mentor(s) -- Dr. Traci Testerman, Mrs. Yvonne Hui, , , , -- Indole-3-carbinol delays H. pylori-mediated gastric cancer in gerbils -- Helicobacter pylori (H. pylori) is a common pathogen that can cause peptic ulcers, gastritis, and gastric cancer. H. pylori pathogenicity is increasingly harder to fight due to antibiotic resistance. New treatments are being considered to lower H. pylori pathogenicity such as the use of Indole – 3 – carbinol (I3C) a Phytonutrient found in various vegetables including broccoli, kale, and Brussel sprouts. I3C, along with 3,3', Diindolylmethane (DIM), its acidic condensation product, has been proven in previous studies, to have anti-tumor effects against colon cancer, breast cancer, and prostate cancer. The objective of this research is to determine if I3C and DIM lessen H. pylori induced pathogenesis and I3C/DIM means of action. Young gerbils were infected with H. pylori and treated with I3C one week after H. pylori infection. Control gerbils included ones infected but not receiving treatment. The gerbils were killed 4, 8, and 16 weeks after infection. Tissue samples of the gerbil's stomach were collected, and immunohistochemistry was performed, using various primary and secondary antibodies, to see the expression of carcinogenic proteins and I3C/DIM.

**Orban, Elizabeth**

**Mentor(s) -- Mrs. Anna Oswald-Hensley**

**My Marvelous Time at USC Sumter**

Peer Coach for OSP

OSP Peer Coaches are hired by OSP, to be an extra layer of contact and interaction for first year

OSP students, new to the processes of college and OSP. This helps students by giving them a safe place to get advice from students, who are closer to their age and have had similar experiences. The role of a peer coach is to listen to the students' questions and concerns, while counseling them and documenting discussions. As one can see, peer coaching is a great way to gain work experience, confidence, and leadership. Reflection on this experience reveals many lessons learned in problem solving, time management, and mentorship. Others can see the impact of the time put into this commitment, which can be best summarized as the extraordinary rewarding feeling of being able to help someone, and the satisfaction of a job well done. I was able to draw on my strengths to show others how to succeed as a student on the campus of USC Sumter. While the door of this job will close when the semester ends, the students who have received my mentoring will still be able to draw upon my advice throughout their academic career. After transferring to USC Columbia, if the opportunity presents itself, I plan to do peer coaching again.

**Osborne, Allison**

**Mentor(s) -- Ms. Maegan Gudridge**

**Merle Norman Cosmetics**

A month after my high school graduation, my mother, a full-time nurse, purchased the Merle Norman (MN) Cosmetics studio in our hometown, and I attended management training at the Los Angeles corporate headquarters. When I returned to South Carolina, I swapped my orange for garnet and black and enrolled at USC Sumter, so I could continue to live at home, manage the studio, and be a full-time student. After my first semester, my mom had to unexpectedly take a job in Georgia. With my mom now working out of state, I was faced with the overwhelming responsibility of running MN as a freshman in college. Managing a cosmetic retail store and salon was not on my agenda, and my college life was not what I had imagined. I traded living in a dorm with my friends, sorority functions, and football tailgates for educational in-services for staff, hiring and firing, and being held accountable for daily sales goals. In the past four years, there have been times that I did not have any employees to assist me, and there have been times that I had reliable employees who allowed me to work part-time and participate in other activities like shadowing physicians, working as a lab assistant, and serving as USC Sumter's SGA Secretary/Treasurer. At MN, I have been given the opportunity to work with many diverse groups and all ages. I have provided facial services, makeovers, and spray tans for special events, such as the local body building competition, school and community pageants, proms, weddings, and military banquets. Despite the headaches and distractions, MN enhanced my communication skills, customer service skills, skincare knowledge, and leadership abilities that I will use daily as a physician. We have listed the studio for sale through the MN corporate office, and I am excited to pursue a career in medicine and transition from MN to M.D.

**Osborne, Morgan**

**Mentor(s) -- Dr. Daniel Freedman**

**Heart Work not Hard Work**

In my beyond the classroom experience activity, I will be presenting on a special activity during my alternative spring break in Aruba. During my time in Aruba, I was really thankful that we were able to focus specifically on volunteer opportunities, social justice and advocacy campaigns. As I have studied abroad for class credit as well, but I found when you are solely focusing on opportunities to engage in the community on a community service/service learning level abroad, one really gets a lot out of their experience.

On the second day of this weeklong trip, we went to the non-profit, Heart Centered Leadership Foundation in San Nicholas, Aruba. During this time we participated in, "The Power Within Me: Build Yourself Up," training focused on self-development leadership, personal responsibility and self-esteem. This training utilized self-empowerment activities such as a self-esteem check up, expressing you worksheet, my strengths and qualities worksheet and finally a match up pie worksheet where we

compared answers with the rest of the group.

I was so excited to engage on this level with a local non-profit to really see firsthand the difference they were making in their community and how I could incorporate this knowledge into my own career practice. What I did not expect was how much this training would impact myself. During and after this training, I reflected deeper into my leadership skills and passions as a person. This self-development exercise really empowered myself and helped me realize the importance of my voice. For, using your best qualities really can lead to making a difference in your community.

I definitely saw the need for more self-empowerment exercises when working with vulnerable populations and the difference this training made from start to finish in less confident individuals. My future plans from this exercise are to remember the importance of strengths-based approaches in my social work career and to remember everyone has positive qualities and strengths that can make a difference in their lives. With this consciousness of others, I will use a strengths-based perspective in my social work career as a peer leader and mentor.

**Padgett, Lucas**

**Mentor(s) -- Dr. Melanie Palomares**

### **The Effect of Gestalt Grouping on the Enumeration of Small Groups**

Our study seeks to determine how objects in the visual field are perceived. In order to accomplish this task, we rapidly presented an array of dots varying in quantity and asked participants to report the number of dots. This kind of task has been performed many times with dozens of variations. However, to our knowledge, no one has tried to connect the dots using the concept of uniform connectedness. Our experiment includes stimuli that are connected in the form of irregular polygons, and other stimuli connected towards the center of the group. We predict that estimation will be faster and more accurate for the connected stimuli. The results of this study could be used to develop a more concrete theory explaining the enumeration of small groups as a cognitive process.

**Padgett, Raymond**

**Mentor(s) -- Dr. Karen Patten**

### **IIT Capstone Project: Helping Boeing Soar Through the 'Cloud'**

In partnership with the McNair Center for Aerospace Innovation and Research and the Boeing Company, our team worked to remotely collect, store, and analyze data of the Kuka Induction Welding Robot on a cloud infrastructure. The purpose of the data analysis is to prevent malfunctions from happening in the future, saving the the Boeing Company time, money, and resources. To make viewing and understanding the data more intuitive, a visual dashboard was created which leads to better, more meaningful decision making.

**Padi, Akhila**

**Mentor(s) -- Dr. Susan Wood**

### **The Role of Resveratrol in the Cardiovascular Consequences of Social Stress**

Prior stress exposure is a common risk factor for psychological disorders, like depression, and psychopathology increases the risk of cardiac morbidity 2-3 fold. However, only a subset of the population is susceptible to depression while others remain resilient. The present study determined if resveratrol (RSV), a natural anti-inflammatory agent, could produce cardio-protective effects in the face of repeated stress exposure. Using a resident-intruder paradigm we have previously identified that passive coping rats exhibit increased susceptibility to depressive-like behaviors while active coping rats are resilient. Moreover, our previous findings indicate that RSV can inhibit the development of depressive-like behaviors in the susceptible subset of rats. In the present study we used this same resident intruder paradigm of social defeat to examine whether individual differences in coping behavior were associated with differing cardiovascular and inflammatory responses, and if RSV shifted any of these consequences. Rats were implanted with a cardiovascular telemetry device and following recovery,

subjected to a resident-intruder paradigm (7 daily, 30 min exposures) or control. Treatments consisted of either doses of vehicle (0), 10, or 30 mg/kg RSV starting 7 days before control/defeat exposure and ending on the last day of defeat. Five days after the last defeat, rats were administered an injection of isoproterenol (0.02 mg/kg), a non-selective  $\beta$ -adrenergic agonist. Cardiovascular telemetry indicated a higher arrhythmic burden in active animals during stress, and RSV reduced arrhythmic burden in both active and passive animals. After an isoproterenol injection, animals treated with resveratrol compared to vehicle treated animals did not demonstrate a difference in arrhythmic burden. This suggests that resveratrol could produce a cardio-protective effect during acute stress exposure. Ongoing studies are assessing the effect of resveratrol, when combined with stress, on the maintenance of circadian rhythms, as well as with inflammatory responses. These findings recapitulate the increased vulnerability that a subset of the population has to developing stress-induced comorbid depression and cardiovascular disease. Using a model that reveals distinct differences in susceptibility to social stress comparable to individual differences in stress responsivity in humans, this study suggests that resveratrol is a useful targeted therapeutic to protect against stress-induced cardiovascular dysfunction.

**Palmer, Erin**

**Mentor(s) -- Ms. Asheley Schryer**

**Global Learning and Exploration through Working Abroad**

The summer after Junior Year I interned at a small portfolio management firm in Madrid, Spain where I lived with family friends for two months.

. Even though it was a financial business, As an intern, I worked primarily on business development tasks centered around client acquisition. I researched a lot of characteristics of today's marketplace for financial services, and wrote plans for how to appeal to different client segments. Additionally, I designed the interface for an intranet application for the company.

I wanted to work abroad because I've always felt like it's important to experience new cultures first-hand and make yourself uncomfortable. I also have been learning Spanish for 7 years and wanted to finally have a extended, immersive experience where I would be surrounded by the language being spoken by native speakers, instead of the flat Chicago accents I had become accustomed to.

Having social anxiety, I've always worked hard to avoid missing out on things because of fear. I've always been fascinated with new places and I wanted to take advantage of working abroad when I got the opportunity. It forced me to trust myself it gave me reassurance that I wanted to work in the financial field, and that I would be successful in that environment.

In the future, I hope to continue working or studying abroad and having experiences in diverse environments. I've now spent a significant amount of time in Europe, so I'd like to expand my scope and look for opportunities on other continents.

**Paramore, Mary Copeland**

**Mentor(s) -- Mrs. Elise Lewis**

**Rhetoric and Patient Care**

Over the summer I worked as a veterinary technician with Long Animal Hospital and Emergency center. I was excited to get hands on experience with veterinarians and learn more about my future career, but while I was there I attained an even more valuable skill. I learned how to communicate with clients effectively. Having so much one on one time with clients was great experience for my future career, and it taught me that the appropriate rhetoric can save you patients life. Sometimes it's not the content of your message, but the delivery of it that really resonates with the client and helps lead to your end goal. As a vet tech I talked to clients a lot about life saving preventative care, I was the person who talked to the client before and after their pet underwent surgery, and I was the communication bridge between client and doctor. These skills will be vital in my future career as a veterinarian. I hope to own my own practice, and know that the communication skills I learned this past summer

will help me to communicate with my employees and be a better leader.

**Parmar, Sonali**

**Mentor(s) -- Dr. Susan Richardson**

**Investigation of Sucralose Concentrations within Sewage Overflows in the Residential Lakes of Columbia, SC**

Since the historic flood of 2015, the city of Columbia has experienced twenty sewage overflows that have released over 10,000 gallons of raw or undertreated sewage in Columbia. This study aims to investigate the composition of this sewage water in Lake Katherine and Gills Creek, looking specifically for sucralose, a compound that acts as a good marker of human waste. Water samples at six different points of the lake were collected, and these samples were analyzed using liquid chromatography-mass spectrometry (LC-MS) in order to assess their composition and measure sucralose concentrations. By focusing specifically on the quantification of sucralose, humans' contribution to contamination in Columbia's residential lakes and creeks can be evaluated.

**Passerini, Sophia**

**Mentor(s) -- Dr. Magdalena Grudzinski-Hall**

**Enrichment Through International Exploration**

Through the experiences the University of South Carolina has provided me with, I have seen the importance of understanding and appreciating different cultures in both a professional and personal setting. Traveling to other parts of the world as an actively engaged participant rather than as a by standing tourist, has changed the way I think in a multitude of ways. An increased knowledge of other countries business practices, way of life, and communication styles enable global companies and the individuals within them to operate in a more efficient manner. This is increasingly important in the world of Global Supply Chain and Operations Management, my academic focus. It is essential for effective communication between suppliers and distributors in different countries, creating and maintaining strong relationships, as well as global expansion and outsourcing. The collaboration between expatriate and local management within an unfamiliar country is an area where cultural awareness is a key element. I believe that international travel, cultural immersion, and actively learning from locals are some of the best practices to developing open mindedness, gratitude, and enrichment of personal development. Taking the time to understand how those from different cultures behave, communicate, and interact will give you key insight when working with or getting to know them. It is not only a sign of respect but will also offer a more meaningful connection. The growth made on a personal level will affect professional lifestyles and benefit the workplace environment. I believe the maximum potential of global businesses can only be reached if those within them have cross-cultural exposure, awareness, and appreciation. I will be discussing personal discoveries made through international experiences that have had a profound impact on the shaping of my perspective, my professional goals, and my desire to continuously learn through others. Studying abroad is a fundamental part of preparation for engaging in a global society and my findings will conclude how I have developed personally, professionally, and culturally.

**Patel, Karan**

**Mentor(s) -- Dr. Eugene Reeder**

**Accuracy for Medicare Part B influenza vaccination billing amongst urban and rural SC pharmacies in 2014**

In 2010, the South Carolina Pharmacy Practice Act was amended to authorize Pharmacists to administer influenza immunizations to patients aged 12 and older without a prescription.<sup>5</sup> While this protocol expansion increased patient access to influenza vaccinations, it also increased revenue opportunities for community pharmacies by administering and billing for vaccines. Billing for immunizations occurs in two steps. The first, is to bill for the vaccine itself; the second, is to bill an administration

fee.<sup>6</sup> This study focuses on the billing accuracy amongst rural and urban community pharmacies in South Carolina that administer influenza vaccinations to the Medicare Part B population. Our urban and rural designations were based on the zip code of the pharmacies. The United States Postal Services (USPS) designates zip codes in each state as rural.<sup>9</sup> Everything else is presumed to be urban. In South Carolina, the geographic distribution of pharmacies per the USPS zip code designations shows that there are 566 urban pharmacies and 133 rural pharmacies according to the USPS. Extracting influenza immunization records from the Centers for Medicare and Medicaid Services (CMS) and statistical analysis performed by SAS provided the necessary data. The results of the study show that South Carolina pharmacies billed more frequently for the administration fee alone than both the administration fee and vaccine. Results show that vaccines were billed 136,237 times and administration fees were billed for 140,311 times. Fourteen pharmacies billed more for the vaccine than the administration fee. Regardless of which component the pharmacy failed to bill, it resulted in lost revenue. Our analysis shows that urban South Carolina pharmacies failed to collect \$92,731.21 in revenue and rural pharmacies failed to collect \$17,797.84 in revenue resulting for a total of \$110,529.04 in lost revenue. The implications of improper immunization billing are vast but the most immediate one is lower revenue for pharmacies. As the Medicare population continues to grow in South Carolina, these improper billing practices may continue to grow and cause pharmacies to lose money if gone unnoticed. Care should be taken to ensure that both the administration fee and the vaccine are properly recorded and billed.

**Patel, Janu**

**Mentor(s) -- Dr. Dawn Wilson**

### **The Relationship between Parent Feeding Practices, Parental Monitoring, and Restrictive Feeding Practices and Adolescent Dietary Outcomes**

Inadequate dietary intake has been associated with an increased risk of obesity among adolescents. African American adolescents are at particularly high risk for obesity and could greatly benefit from increasing healthy lifestyles related to dietary intake. Parents, being one of the most influential people in an adolescent's life, may play a particularly important role in assisting adolescents with healthy dietary habits. Previous studies have found that parenting practices are least effective when the parent exhibits a high level of control and has little involvement in their children's lives. This study examines how parent feeding practices including parental monitoring, responsibility, and restrictive feeding practices on adolescent dietary outcomes from the Families Improving Together (FIT) for Weight Loss randomized controlled trial. Project FIT tests the efficacy of a family-based weight loss program in overweight African American adolescents and their parents. Data were collected from 232 adolescents (64.2 % female; ages 11-16 years). Dietary data were assessed through validated self-reported surveys. We hypothesized that more positive parent feeding practices would be associated with higher intake of fruit and vegetables and more frequent family mealtimes in the home. Correlation analyses showed that frequency of family meals at home was positively associated with more positive parent feeding practices including parental responsibility for meals ( $r=0.27$ ;  $p<0.05$ ), parental monitoring of adolescent eating ( $r=0.24$ ;  $p<0.05$ ) and parental restrictive eating practices for adolescents ( $r=0.23$ ;  $p<0.05$ ). Adolescent reported fruit and vegetable intake was also positively associated with more positive parent feeding practices including parental responsibility for meals ( $r=0.20$ ;  $p<0.05$ ), parental monitoring of adolescent eating ( $r=0.27$ ;  $p<0.05$ ), and restrictive eating practices ( $r=0.14$ ;  $p<0.05$ ). These results indicate that positive parenting practices that help to teach weight control skills among adolescents play an important role in promoting healthy eating habits such as increasing intake of fruit and vegetables as well as family meals in the home.

**Paulk, Madelyne**

**Mentor(s) -- Ms. Maegan Gudridge**

### **Beyond the Pillars**

A student's transition to college is a very critical time. They are relearning who they are, where they want to go, and what they want to do. Coming to a large school like the University of South Carolina it is sometimes difficult to have a smooth transition especially coming from out of state. As an extended orientation mentor for Pillars for Carolina I had the opportunity to help that transition. In only a week we are able to expose incoming freshman to leadership and service opportunities on campus, help them learn their new environment, prepare them for diversity, and assist the rediscovery of their values. I choose to be an XM because the Pillars Program helped me confirm my decision to attend USC. In the program I was able to meet life-long supportive friends that were leaders on campus and in the community. When I came to campus I knew where to go to get involved and had upper-classman friends I could talk to for advice. Being a participant and a XM, I have learned how to be a friend and mentor. I have learned to actively listen to experiences that have shaped people and how to communicate my values. Without Pillars I would not have known about all the opportunities available for me when I arrived on campus. Pillars showed me the importance of diversity, learning about others, and understanding their stories. It is hard to create a community without knowing the stories of the people around you. With this presentation, I hope to encourage people to step out of their comfort zone and meet people they rarely talk to. I will take the lessons and skills I have learned from being involved with Pillars as I transition in the professional world. I plan to use my active listening, reflection, and team work skills to help me build a community in the teams I work with and promote efficiency and team work among my co-workers.

**Payero, Lisette**

**Mentor(s) -- Dr. Nathan Hancock**

### **Homologous recombination repair facilitates replicative transposition of the mPing element from rice**

Transposable elements make up large portions of plant genomes and influence the overall phenotype. These mobile segments of DNA induce mutations, and thus, are powerful agents in genome evolution. Class II transposable elements use a "cut and paste" mechanism in which the element is excised and reinserted elsewhere in the genome. The rice element mPing has been shown to increase in copy number over generations, suggesting the presence of a replicative transposition mechanism. We tested if homologous recombination (HR) repair, a mechanism in which homologous sequences are used to repair double strand breaks, facilitates mPing replication by repairing excision sites with an mPing containing sequence. We measured repair of mPing excision sites in yeast using a reporter system wherein mPing disrupts the ADE2 gene, preventing cell growth until mPing excision and repair of the ADE2 gene. Previous results showed higher ADE2 restoration in haploid cells than in diploids, suggesting that HR repair occurred more frequently in diploids. To confirm the role of HR repair, transposition assays were performed in HR deficient strains lacking the RAD51 gene. In HR repair deficient strains, ADE2 restoration was equal or higher in diploids, suggesting HR repair was responsible for the discrepancy observed in earlier assays. To directly identify cases of replicative transposition, insertion sites from haploid and diploid strains were sequenced to determine mPing copy number. Results showed extra copies of mPing in HR competent diploid strains, supporting the hypothesis that HR repair functioned as a mechanism for replicative transposition.

**Peagler, Lindsay**

**Mentor(s) -- Dr. Teresa Moore**

### **Energy Expenditure in Whitewater Kayaking**

Whitewater kayaking is an extreme, outdoor sport that involves hours to several days of paddling and hiking in remote, wilderness terrain. This level of activity places a huge metabolic demand on the human body requiring adequate nutritional support to sustain several hours or days of intense activity. Without the proper nutritional support, performance will be compromised, possibly leading to serious injury or death. The objectives of the study are to determine whether two Actigraph accelerometers

are necessary to accurately record physical activity while kayaking or if a single accelerometer can be used on either the upper arm or lower arm. The second goal is to determine the energy expenditure of whitewater kayaking, including the combined activities of portage to the water and paddling in Class 1 to Class 3 whitewater. In this study, we are recruiting four to six experienced whitewater kayakers, ages 18-70. The participants weight, height, age, and gender will be recorded. The kayaking gear specifications will be recorded for weight, make, model and material composition. Each participant will wear an ActiGraph that is housed in a waterproof, crushproof case, and is attached to their arm and secured to the PFD with a locking carabiner. The case will also be covered with a compression sleeve to eliminate the possibility of snagging. Each kayaker will then walk (portage) to the water carrying their equipment and begin paddling. Once the session is complete, they will walk back to the initial starting point for final measurements. Research assistants will record the activities that take place during the session, including portage time, active paddling, perceived intensity levels and any rest taken. Data will be analyzed to compare the results between the ActiGraph accelerometers and to determine the average energy expenditure for whitewater kayaking. This will lay the ground work for future studies in energy expenditure and development of nutritional guidelines for whitewater kayakers.

**Pelfrey, Jessica**

**Mentor(s) -- Mr. Simon Tarr**

**Global Learning: A Journey to the Top of Many Mountains**

Throughout my college career I have been a Capstone Mentor, a leader in the student organization Off Off Broadway, and studied abroad twice, a Maymester in Greece and a semester in Mannheim, Germany. I did this to broaden my knowledge and cultural awareness. On my journey I learned more things than I could imagine I would.

What you may think is unheard of may be commonplace in another country. For example, Germany does not have air conditioning, or in a more business sense, supermarkets. You must anticipate these differences through ample research, online and by talking to others, to have a successful international experience.

Business is largely shaped by politics. This was apparent during my maymester in Greece when we talked to Coca-Cola and how they were combating the economic crisis. You must know the political climate of another country if you want to do business in it.

A leader must have empathy and use it to build relationships. Many times people will make cultural faux pas, but to maintain the relationship you must use empathy to relate to them, teach them, and move forward.

These experiences opened my eyes to new understandings and the desire to always dive deeper and connect more.

I plan to use what I learned to start a cultural blog. This blog will contain facts about different countries, such as their culture and political situation, posts from different people sharing their stories, and tips on how to learn more about the people around you.

**Pendergraft, Noelle**

**Mentor(s) -- Prof. Amir Karami**

**Computational Analysis of Insurance Complaints: GEICO Case Study**

Online environment has provided a great opportunity for insurance policyholders to share their complaints with respect to different services. These complaints can reveal valuable information for insur-

ance companies to improve their services; however, analyzing a huge number of online complaints is not an easy task for humans, so computational methods are needed to create an efficient process. This research proposes a computational approach to characterize the major topics of a large number of online complaints. Our approach is based on using text mining techniques to disclose the semantic layers of complaints. The proposed approach deployed on thousands of GEICO negative reviews. Analyzing 1,371 GEICO complaints indicates that there are 30 major complaints in four categories: (1) customer service, (2) insurance coverage, paperwork, policy, and reports, (3) legal issues, and (4) costs, estimates, and payments. This research approach can be used in other business applications and industries to explore a large number of reviews in text format.

**Perez, Christopher**

**Mentor(s) -- Mr. David Deweil**

### **Leadership Lessons From a University of South Carolina Experience**

Pursuing Graduation with Leadership Distinction (GLD) in Professional and Civic Engagement allowed me to engage in three beyond the classroom experiences that have come to inform my leadership development at the University of South Carolina. Each of these experiences has taught me a unique lesson about effective leadership.

The first of these experiences was the first internship I completed as a Sport and Entertainment Management major. During the Summer of 2016, I interned at the United Soccer League, where my work as the League Strategy Intern primarily revolved around researching and analyzing potential league expansion markets. This experience taught me that analytical reasoning allows for true engagement with the deep complexities of a subject.

The second of these experiences was my role as University 101 Peer Leader, in which I worked with a co-teacher in leading an extended orientation class. In this role, I aimed to develop ice-breakers, games, and activities to impart knowledge on time management, study skills, self-awareness, University traditions, and many other topics. This experience taught me that development does not happen overnight, but rather slowly and steadily.

The third of these experiences was my Vice President position in the Carolina Service Council, a position that gave me the opportunity to lead a team of students on an Alternative Spring Break trip to Quito, Ecuador. In Quito, we worked in conjunction with the Center for Working Families to help a family in need build a home. This experience taught me that human needs vary by degree, not kind.

My presentation further explores each lesson learned in conjunction with the specific experience from which it came, and it is my hope that the reflective nature of this presentation will allow me to share the leadership lessons I have learned from my GLD experience in a way that others will be able to apply these lessons to their own leadership development. Additionally, I hope to carry these lessons with me to law school, as I aim to continue developing in order to positively impact the people around me through future leadership in sport and entertainment management.”

**Petta, Jamie**

**Mentor(s) -- Ms. Ivy Sibley**

### **Teaching Sustainability in Local Schools**

During the past two years I have had the privilege of being an intern for the University of South Carolina's student organization Sustainable Carolina as part of their K-12 Outreach Team. The mission of the team is to influence children and teens in local Columbia schools about the importance of environmental and social sustainability. My team teaches self-prepared lessons plans to students on topics such as gardening, repurposing, refugee aid, pollination, and other life-science topics. It allows our

team members to hone our public speaking and organizational skills, while informing the upcoming youth about taking care of our planet and each other. We were also able to organize a field trip for a class of elementary schools students to attend the University of South Carolina's 'Earthstock' event where the kids were able to participate in hands-on environmental activities, learn about stress management, and tour the gardens and hydroponics center. Participating in this internship has opened my eyes to how I can incorporate my background in public health with environmental aspects and education. I have found that the younger generation is eager to learn about sustainability and is displaying a want for improvement in the future. Through this internship, I have learned how to connect to different audiences, market environmentally-friendly practices, and deliver quality presentations. I plan to continue building these skills as I continue throughout my career in health promotion and education.

**Phillips, Paige**

**Mentor(s) -- Dr. Sarah Keeling**

**My Time Spent as a Medical Scribe**

During my sophomore year of college, I decided that it was time for me to start exploring professional opportunities that would expose me to the work that I aspire to do one day. I heard about a job opening through the Office of Pre-Professional Advising that would allow me to become a medical scribe. I interviewed for the position with ProScribe in January and received my offer letter just a few weeks later. After accepting the job, I had to complete a week of classroom training that entailed learning the charting system that the medical practice I would be working for utilizes, as well as learning an abundance of medical terminology that I would use on a daily basis in the workplace. When I passed my classroom training, I continued on to clinical training where I was placed with a doctor that I would be working with every day. While working with this individual doctor, I learned how he liked his medical charts to be completed. After completing clinical training, I was able to work one-on-one with the doctor. Working as a scribe has solidified my dreams of becoming a physician. It has shown me every side of medicine. I have had the chance to work one-on-one with doctors and that has been very beneficial for me. It showed me that being a health care provider is hard work and you have to love what you do in order to succeed as a doctor. Being a scribe also taught me excellent time management skills, as I had to complete multiple tasks at one time. This internship gave me advantages that I would not have had otherwise, such as learning how to complete a medical chart. It taught me leadership skills and showed me how valued the patient is to the physician. Scribing has played a vital role in my decision to apply to medical school and has prepared me for what to expect after becoming a physician.

**Phillips, Katherine**

**Mentor(s) -- Dr. Scott White**

**Branching Out and Meeting New People**

In the Spring of 2017 I studied abroad with the Danish Institute of Study Abroad. Despite the name, they had very recently started a program in Stockholm, Sweden and that's where I ended up for three months. In this program I studied and interacted within Swedish society, exploring all the culture that the city of Stockholm had to offer. The concept of homogeneity is that people tend to gravitate toward people who are just like them. In Sweden I was surrounded by people who were very different from me, and interacting with them taught me a lot of things I never would have known if I hadn't. Spending time with people just like us makes us feel safe and comfortable, but it also narrows our ability to see the world from different perspectives. It's nice to have your beliefs and knowledge confirmed by other people with the same beliefs and knowledge, but it can also be an enlightening experience to have a discussion with someone who does not think the same way you do. Arguing for your beliefs gives you a greater understanding of your own reasons for thinking the way you do, and it can also allow you to find common ground with people you previously believed you had nothing in common with. From my experience in Sweden, I learned how to open myself up to ideas and opinions I had not previously

considered. Trying new things is the best way to meet new people, and meeting new people is the best way to learn new things.

**Phillips, Patricia**

**Mentor(s) -- Prof. Anna Oswald-Hensley**

**Patricia's Path**

Work study Student

As a work study student, I am a student/teacher assistant at the Adult Education Center. As a student/teacher assistant I help tutor the students, as well as, assist the teacher with specific tasks that he or she is in need of. I found out about this opportunity from a friend, that was a former work-study student. I received this opportunity in December of 2016, and will continue until May of 2018. This opportunity helped me to acquire better communication skills and patience when working with others. I have learned different ways in which I can present information to students, in order to help them best understand concepts. Work study gave me the opportunity to maintain a job, while being a full-time college student. Work study, grants students the flexibility to balance school life with work life due to the goal of putting education first. Through this experience, I have acquired greater engagement in my community, as well as greater awareness of our community needs. I have gained professional experience and I have come to understand appropriate work-place behaviors.

OSP Representative

OSP, stands for Opportunity Scholars Program. As an OSP Representative, I have had the opportunity to attend conferences, on behalf of the Opportunity Scholars Program. This program grants students, which are first generation college students, have learning disabilities, and/or fit within a specific income bracket or any combination of these criteria, to achieve their collegiate goals. This program has been very beneficial for me and my success here at college. I found out about this program due to my older sibling's involvement with this program. My involvement in this program has helped me to be successful through the advisement, resources, and tutoring opportunities. This experience has helped me to be more involved socially through its activities on campus, as well as, in the community. I have gained a greater appreciation for our community and better understanding of our community's needs, through engaging in OSP activities.

**Pieper, Lawrence**

**Mentor(s) -- Ms. Venice Haynes, Mrs. Heather Brandt**

**Examining the role of the social environment and support systems for health behavior intervention sustainability**

Background: The social and physical environment plays an important role in the maintenance of healthy behaviors that help prevent, control, and eliminate chronic diseases. Using a community-based participatory approach, the Dissemination and Implementation of a Diet and Activity Community Trial In Churches (DIDACTIC) project, focuses on dissemination and implementation of the evidence-based Healthy Eating and Active Living in the Spirit (HEALS) intervention among 27 African-American churches across South Carolina. A supplementary study assessed the role of the social environment to maintain healthy lifestyle behaviors post-intervention.

Methods: One-on-one interviews were conducted with one member from each participating church that met 60% attendance criteria across 12 weekly and nine monthly sessions. Interviews were administered using a semi-structured interview guide and lasted 30-45 minutes. Participants were asked about the influences of family, friends, co-workers, church members, and others to maintain the healthy lifestyle behaviors learned during the HEALS intervention.

Results: Fifteen interviews have been conducted with HEALS participants across the Midlands area. Most participants reported having a positive support system helped them maintain their healthy lifestyle post-intervention and having a good support system improved motivation and maintenance. One person reported issues with keeping up with lifestyle changes while needing to cook for other people

in the family but has been able to sustain some healthy behaviors because of positive influences in her church. The church community is almost always the most positive influence, acting as a source of accountability and positivity to continue healthy behaviors. A few participants reported negative characteristics of their support system – at home, work, and church – with mixed success navigating negative social influences.

Conclusion: Having a good, or bad, support system within one's social environment affects maintenance of a healthy lifestyle post-intervention. Information obtained from this study can be used to inform strategies for maintaining long-term behavior change within a variety of social conditions. Having a supportive home and work environment that promotes healthy habits has a positive impact on sustaining diet and physical activity knowledge as a lifestyle.

**Piltzer, Jenna**

**Mentor(s) -- Ms. Theresa Harrison**

**Open Ears, Open Eyes; University 101**

University 101 (U101) is a program that aims to create successful transitions for all first-year students at USC. U101 created a family for me during my transition to USC and provided me with social and academic support. This positive experience motivated me to become a Peer Leader myself and help incoming students find their home at Carolina. In my role I collaborated with my co-instructor to create a beneficial syllabus, facilitated classes on various topics including alcohol safety, study abroad, and professional presentations/development, and acted as a role model and mentor for students. I have been fortunate enough to take advantage of many of the social and service opportunities this university has to offer and through my role as a Peer Leader, was able to connect students with outlets on campus that met their variety of interests and passions. From my students, I have learned the importance of diversity and about a person's ability to positively impact those around them. My presentation will describe key insights that I discovered through my involvement in this program and how the leadership skills I gained will help me to better a community in need next year as an AmeriCorps member.

**Pizzuti, Adam**

**Mentor(s) -- Dr. Brandon Bookstaver, Dr. Bryan Love**

**Views of Social Media for Education Use in Healthcare**

Background:

Approximately 75% of Americans who are online say they are influenced by information on social media. Social media has an increasing presence in healthcare curriculums including medical, pharmacy and nursing schools and postgraduate residency programs. Additionally, social media, specifically Twitter®, has become a landing spot for healthcare organizations to host collaborative, online discussions on a "hot" topic. Little is known however on the perceptions of social media use among healthcare professionals. The purpose of our research was to identify perceptions and use of social media as a potential educational tool for healthcare practitioners.

Methods:

This was a cross sectional, survey-based study administered to physicians, nurses, nurse practitioners, physician assistants, pharmacists, and healthcare administrators. The study was given exempt status by the University of South Carolina IRB. The survey tool consisted of sixty-eight questions that inquired on respondent use/views of social media for educational purposes. Seventeen of the seventy questions were initially displayed to all survey participants. Branching logic was used which accounted for the additional fifty-one questions that a survey participant could potentially receive based on selective answers. Question types included Likert scale, yes/no, multiple choice, drop-down boxes, matrix, and short answer. The survey instrument also addressed if social media access is allowed in the workplace. The tool was developed and distributed electronically using the online database REDCap®. Survey responses were anonymous, but survey respondents were incentivized with the opportunity for a random drawing for 1 of 4 available gift cards. The survey was distribut-

ed via email to three hospital systems and affiliated health science schools in Wisconsin, Maryland, Georgia, and South Carolina. The survey launched in January 2018. Survey recipients will have 6 weeks to collect survey responses from the date of initial distribution. A preliminary data analysis in April 2018 will be conducted.

Conclusions:

This study will capture data of current practitioners' views of social media and show the need for future studies analyzing ways to continue to grow this type of healthcare resource.

**Poplin, Nathan**

**Mentor(s) -- Dr. Thomas Makris, Ms. Courtney Wise**

### **Reduction potential measurements of cytochrome P450 OleT**

The cytochrome P450 family of enzymes all contain a thiolate-ligated heme-iron cofactor. P450 peroxxygenase OleT performs decarboxylation reactions on long chain fatty acid substrates to produce alkenes. Upon substrate-binding, P450s undergo a spin shift where two of the d-electrons of the ferric iron are promoted from the low-spin state with  $S = \frac{1}{2}$  to the high-spin state with  $S = \frac{5}{2}$ . This electronic reconfiguration is accompanied by a spectroscopic change, as well as a positive increase in iron reduction potential, which is essential for the first reduction step of catalysis. Despite a substantial spin-shift of >90% upon substrate binding, the redox potential of high-spin OleT reportedly remains unchanged versus the low-spin form of the protein. This is atypical for P450 enzymes undergoing significant changes in spin state. Additionally, the redox potential of both spin states is reported to be -100 mV, which is unusually high for a low-spin P450. Our preliminary measurements of the low-spin potential of OleT indicate a more expected value of ~-300 mV. Data collection on the high-spin form of the enzyme, however, has proven more problematic due to the peroxygenase nature of this protein and the generation of peroxide by many useful reductants. In order to accurately evaluate the potential of high-spin OleT, development of new methods are necessary. We detail three different means of obtaining redox parameters for OleT. One is a classical anaerobic spectroelectrochemical titration, but in the presence of catalase. Another is performed similarly, but in the presence of catalase and carbon monoxide, allowing for formation of an immediate irreversible CO-adduct to the iron upon reduction. A third, and more novel, technique utilizes the light source of a stopped-flow spectrophotometer along with a photoreductant as electron donor to collect a potential 1,000 full spectra detailing the reduction process. This allows for more efficient data collection on shorter time scales versus the two former equilibrium-style approaches. Results and future directions will be discussed.

**Potter, Ansley**

**Mentor(s) -- Dr. Amit Almor**

### **Spatial Language and Reference Tracking**

Repeated proper name references to the most salient previously mentioned referent in the discourse are read slower than pronoun references to the same referent. Previous fMRI research suggested that the brain regions underlying this effect are the same regions engaged by the brain to track objects in space. Here I test the hypothesis that linguistic reference tracking engages spatial cognitive processes and that pronoun and repeated proper names engage these processes differently, with pronouns utilizing spatial neural circuits more efficiently. I will be reporting the results from an experiment in which participants read three-sentence discourses about visual displays. The discourses referred to either spatial or visual-non-spatial aspects of the displays. The critical third sentences used either repeated proper name or pronoun references to refer to one of the shapes. The dependent measure was the critical sentence reading times.

Preliminary analysis indicates that pronouns were read faster than repeated names in both spatial and non-spatial discourses but the difference between the two forms was smaller in the spatial than in the non-spatial conditions. This result is inconsistent with the hypothesis that pronouns have a greater advantage over repeated names in spatial descriptions. Overall, while these results indicate that ref-

erence tracking associated with different forms is sensitive to whether the discourse is spatial or not, the specific prediction that pronouns are more efficient in utilizing spatial circuits is not directly supported. Ongoing work is addressing some concerns about accuracy differences between conditions in the first study.

**Powlen, Megan**

**Mentor(s) -- Prof. Drew Newton**

### **Bringing Patient Advocacy to Life**

Providing an environment where people feel safe and relaxed is essential to a healthy nurse-patient relationship. This fact became very clear to me throughout my nursing classes here at USC - especially during NURS 431, where we talked in depth about the importance of knowing the population you are working with so you can adequately take care of their needs. Over the summer, I was given an opportunity to work as a caregiver at St. Joseph's Hall in Morristown, NJ. St. Joseph's Hall is an infirmary where around 40 sisters of the Religious Teachers Filippini reside. The sisters of the Religious Teachers Filippini vowed to live a life of poverty and teach children to become confident in their abilities and grow in their knowledge of the Catholic faith. My responsibilities as a caregiver were to care for 5-6 sisters and assist them with everyday tasks, such as showering, getting dressed, and feeding. Even though I had an assignment everyday, the other caregivers and myself would work together to ensure every sister would be taken care of. Working with this population showed me the importance of truly understanding the population you are working with so you can give them the best care. When providing care for your patients, it is important to stand up for their wants and needs even if others do not agree. My experiences at St. Joseph's Hall provided an invaluable hands-on opportunity to serve as a patient advocate.

**Pradhan, Ipsita**

**Mentor(s) -- Dr. Mohamad Azhar**

### **The Role Of Mesodermal-Produced TGFbeta2 In Congenital Heart Defect**

Background: Congenital heart defect (CHD) is abnormalities in the structure of the heart at birth. Some common areas of the heart where CHD can be seen are the walls, valves, and arteries and veins of the heart. The most common types of CHD are ventricular septal defect (opening between two ventricles) and abnormal heart valves development (thick or fused valves) that make it difficult for the heart to function properly. CHD is the most common type of birth defect in the world with a total of more than 35,000 babies born with CHD in the US each year. Because CHD is such a prevalent disease in the human population and the genetic mechanisms underlying the disease are poorly understood, it is important to study it and find new cures for it. Transforming growth factor beta (TGF $\beta$ ) is homodimer signaling protein of three TGF $\beta$  isoforms and it is important for heart development. TGF $\beta$  regulates cell proliferation, differentiation, apoptosis and other functions in embryonic and adult cells. Loss of function mutation in TGFB2 observed in human with congenital heart defects, however, little is known about the cell-source of TGFB2 involved in heart development.

Research question: The aim of my study is to determine how the heart will develop in the absence of the TGF $\beta$ 2 produced by cardiac progenitor or mesodermal cells with a particular focus on its impact on heart valves and the right side of the heart.

Material and method: For this study, genetically engineered mice model with Tgfb2 gene deletion in the mesodermal cells was generated. Genotyping was performed to sort control and experimental group and histological staining was used to characterize the heart defects in this mouse model.

Results and conclusion: Mesodermal deletion of Tgfb2 resulted in ventricular septal defect (VSD), overriding aorta, and thickening of heart valves (mainly pulmonary and aortic valve stenosis). In addi-

tion, these mice developed thicker, more muscular, and small right ventricle. CHD patients with Tetralogy of Fallot (TOF) exhibit these clinical abnormalities in the heart. In conclusion, our results indicate an important cell-specific function of TGF $\beta$ 2 in the pathology of TOF.

**Pugh, Katlin**

**Mentor(s) -- Dr. April DeLaurier**

**Understanding the function of kdm1a using CRISPR/Cas-9 in zebrafish**

Previous research has alluded that Pottocki-Shaffer Syndrome (PSS), a syndrome that involves physical anomalies, especially in the craniofacial region, and mental deficiencies, is caused by a mutation or nonfunctional gene in the phf21a complex. One of the genes in particular kdm1a, is important in the neural systems of the brain, pituitary development, and gastrulation in embryogenesis. We hypothesize that kdm1a and other genes in the phf21a complex, if not kdm1a itself, is the cause of PSS. Our goals are to genotype the F2 generation to determine the zebrafish that are heterozygous, or wildtype for kdm1a using the fin clipping technique. We also hope to incross the F2 generation to create an F3 generation which should approximately have a 25% homozygous recessive mutants. We also plan to genotype the F3 generation through histological staining. An F0 generation was created using CRISPR/Cas-9 to implement gRNA's to the kdm1a gene site in order to knockout the gene. An F1 generation was created from the founders and screened for mutations. An F2 generation was then created by incrossing F1 siblings. Genotyping for the F2 generation is still in progress using fin clipping and hot shot lysis. The F2 zebrafish that have been identified as heterozygous are being crossed to make an F3 generation. Once the F3 generation has been finclipped and undergone histological staining, we will be able to see further whether craniofacial and other abnormalities are present, and to have more evidence to suggest that kdm1a is the cause of PSS.

**Pusey, Heather**

**Mentor(s) -- Dr. Nina Moreno**

**¡Enseñame inglés!**

During my Spring semester of my Sophomore year, I took a course titled "Working with Hispanic Clients" (SPAN 305), which included an internship component that was part of the course grade. For the internship, we could choose any opportunity that helped the Columbia community using our Spanish-Speaking abilities and complete at least 20 hours throughout the semester. I worked with the English for Speakers of Other Languages (ESOL) Program at Pineview Elementary School, where I completed 30 hours. Some examples of my duties as a tutor were translating homework directions from English to Spanish, teaching class material in Spanish, and even teaching students how to read in English. This was such a rewarding experience because I taught them while they were teaching me. I was able to help them in their courses and give them more self-confidence while they were helping my Spanish-speaking and teaching abilities. My favorite part of being their tutor was being their mentor at the same time. Some students struggled in class due to their language difference, and other students in the class would make fun of them. I assured them that they were ahead of everyone else because they spoke two languages and that it will get better once they brush up on their English skills. I loved this opportunity because I was able to touch the lives of multiple Elementary School students and boost their confidence in their schooling endeavors. This experience has helped me become a better teacher and communicator in multiple languages and have more awareness of different cultures.

**Pye, Sarah**

**Mentor(s) -- Dr. Maksymilian Chruszcz, Ms. Swanandi Pote**

**Structural and functional studies of 4-hydroxy tetrahydrodipicolinate reductase from *Neisseria gonorrhoeae***

*Neisseria gonorrhoeae* is an obligate human pathogen which is responsible for gonococcal infections,

and which is a leading cause of transmissible infectious diseases worldwide. Gonococcal infections are currently treated using combination antibiotic therapy, yet the rate of their successful curing is decreasing. This is a result of the rapid development of antibiotic resistance by the pathogen, and this trend necessitates the development of alternative drugs or novel drug targets to combat these infections. Bacteria use lysine or meso-diaminopimelate to crosslink the peptidoglycan monomers in the bacterial cell wall. This pathway, while essential for the survival of most bacteria, is not found in mammals, which may allow antibiotics targeting it to be more selective to the pathogen. 4-hydroxy tetrahydrodipicolinate reductase (DapB), an important enzyme in the meso-diaminopimilate (lysine) biosynthetic pathway, is a promising target for the development of new antibiotics. Thus, we hypothesize that blocking the activity of DapB will induce defects in the bacterial wall similar to those caused by  $\beta$ -lactam antibiotics [1]. This study describes the structural and functional characteristics of DapB from *Neisseria gonorrhoeae* as determined by protein crystallization and enzymatic function studies.

[1] Pote, S., Pye, S., Sheahan, T., Majorek, K., & Chruszcz, M. (2018). 4-hydroxy-tetrahydrodipicolinate reductase from *Neisseria gonorrhoeae* - structure and interactions with coenzymes. Manuscript in preparation.”

**Quan, Nicolas**

**Mentor(s) -- Mr. Adam Denton, Dr. Rosemarie Booze**

### **The Effects of Escitalopram Treatment on Prepulse Inhibition of Acoustic and Visual Startle in HIV-1 Transgenic Rats**

According to the World Health Organization, approximately 37 million people are living with HIV as of 2015. While treatment with combination antiretroviral therapy (cART) has been largely successful in reducing viral load, significant functional impairments remain. Roughly half of all HIV seropositive individuals develop some degree of serious clinical depression and HIV associated neurocognitive disorders (HAND). Research with the HIV-1 transgenic (Tg) rat has indicated functional impairment in both dopaminergic and serotonergic neurotransmission. Alterations in activity of the serotonergic and dopaminergic systems have been demonstrated to play a highly pronounced role in the pathogenesis of clinical depression. Moreover, pre-pulse inhibition (PPI) deficits have additionally been reported in the HIV-1 Tg rat, suggesting impairments in cortico-striatal-pallido-thalamic pathway function. With this in mind, the present study seeks to examine the efficacy of the SSRI medication, Escitalopram, in ameliorating sensorimotor deficits in the HIV-1 Tg rat. A 2X2X2 factorial design was used to elucidate the effects of sex (male/female), genotype (HIV-1 Tg/F344 control) and drug treatment (Escitalopram/placebo) upon sensorimotor gating. PPI was conducted inside of a 10 cm-thick 81 X 81 X 116 cm isolation cabinet. A 36 trial startle test with a 5 minute acclimation was used for habituation. Testing occurred one day following habituation, for a period of 30 minutes. Approximately 72 trials with variable inter-trial intervals were performed across the testing period. In summary, the present study used pre-pulse inhibition to evaluate the therapeutic efficacy of Escitalopram in attenuating sensorimotor gating deficits in the HIV-1 Tg rat.

**Quarles, Bradley**

**Mentor(s) -- Dr. Patrick Hickey**

### **A healthier Columbia**

As I began the process of drafting my GLD, I decided to reflect on the experiences that I've obtained throughout my time at the University of South Carolina. One of my greatest experiences can be seen in my key insight titled "Diversity enhances productivity". This key insight focuses on my role as President of Men in Nursing as it relates to recruiting members, the strategies that I used and some of our successes.

For the purpose of this abstract, I will discuss my beyond the classroom experience which was our

Men in Nursing brochure. Our main resource and attraction point was the brochure that we created, which consisted of every single nursing course a student in the College of Nursing would take with tips on how to be successful in those courses. What I learned was to recruit members, you have to have a major selling point as to why they should join my organization. We offered all members free membership upon joining as either a mentor or mentee depending on your status within the College of Nursing and a leadership position for those that are mentors. Within days we had over one hundred members due to the brochure which attracted those that were underclassmen and many mentors because they could claim on their resume that they're a leader for those that were once like them.

In conclusion, my experience as President of Men in Nursing along with the brochure we used to recruit members matters because in advertising a product or business you have to have a selling point that makes you stand out from your competition. We were the only organization to offer free membership and leadership positions to those that weren't elected which caught many students by surprise. I plan on using the lessons I learned as President of Men in Nursing to create an organization that focuses on bringing community health leaders together in an effort to improve the health of the citizens of all ages in Columbia, SC.

### **Quattlebaum, Anniebelle**

**Mentor(s) -- Dr. Kathleen Smith**

#### **The Women Behind the Witches: A Study and Response**

This project delves into the roots of the early modern period's witch hysteria and illuminates how female gender roles contributed to the accusations. The response play compares a present-day witch hunt (sexual assault allegations) to early modern cases.

### **Quirk, Lucy**

**Mentor(s) -- Dr. Susan Richardson**

#### **A quantitative analysis on the relationship between terrestrial input and DBP formation in source water.**

Disinfection byproducts (DBPs) are chemicals that are harmful to human health. These chemicals are often toxic and are the unintentional byproduct of the disinfection process of water. DBPs form by the interaction of organic materials in the source water with chlorine, ozone, and chloramines. Rain events introduce additional terrestrial, organic, material into river systems. The relationship between DBP formation and the added terrestrial material into river systems by rain events was studied. To study DBP formation, one water sample was taken from the Congaree River after a large rain event, and one water sample after a period of no rain. The samples were chlorinated, resembling the disinfection process at the drinking plant. Following EPA procedure for extraction, the DPBs were removed from the water samples. Finally, the samples were run through a Gas Chromatography and Mass Spectrometry instrument to quantify and identify the chlorinated, brominated, and iodinated organic halogens in the samples. This method allowed for a side-by-side comparison of DBP formation in two water samples from the same source. Additional terrestrial material in the river may result in higher concentrations of DBPs formed during the disinfection process. Studying the relationship between DBP formation and terrestrial material in source water is important for understanding how human health is tied to the environment.

### **Raghavan, Rahul**

**Mentor(s) -- Dr. Susan Lessner**

#### **The Effects of Apoptosis on the Development of Aortic Aneurysms**

Marfan syndrome is a connective tissue disorder which affects the strength and elasticity of blood vessels. One part of the body where the effects are extremely profound is in the aortic wall where the weakened tissues could lead to the development of an aneurysm (blood vessel enlargement). This

event is dangerous because an aortic rupture may result. It has been noted that there is a significant decrease in cell count in the aortic tissues of mice with Marfan syndrome when compared to their wild-type counterparts. The number of cells in the aortic wall represents a balance between cell proliferation ( $k_p$ ), cellular apoptosis ( $k_d$ ), and cell migration ( $k_{mig}$ ). This can be illustrated as  $dN/dt = k_p - k_d \pm k_{mig}$ . This states that an increase in the number of cells in the media over time would be due to proliferation while a decrease would be due to apoptosis. A discrepancy between total cells numbers, apoptotic cells, and proliferating cells would suggest cell migration as the contributor. Image Pro was utilized to count the number of nuclei in the aortic media of 16 different mouse samples to study whether cells decreased or increased over time. A graph of the number of nuclei counted vs. mouse age was generated to show a linear regression of -41.433 with an R value of 0.845 for mutant mice and -33.872 with an R value of 0.498 for wildtype mice, respectively. Due to this result, we analyzed apoptosis to determine if it is the causative agent in aortic cell loss. We optimized a working terminal deoxynucleotidyl transferase dUTP nick end labeling (TUNEL) assay protocol to test this. If this is found to be the primary agent in decreased cell count and aneurysm development, an extension of the study could be to slow the cellular mechanisms associated with the process. This could potentially serve as a non-invasive treatment for Marfan syndrome. Additional avenues of research of this project includes analyzing the proliferation hypothesis to determine if cell migration out of the aorta can explain the decreased cell count.

### **Rago, Avram**

**Mentor(s) -- Dr. Caryn Outten**

#### **Checking Yap5 and AFT1 Interaction using Bimolecular Fluorescence Complementation**

Iron is an important trace element and participates in critical cellular processes like oxygen transport, respiration, photosynthesis, DNA synthesis, repair and redox catalysis. Due to its crucial role in cellular pathways, levels of iron need to be regulated. In model eukaryote *Saccharomyces cerevisiae*, iron homeostasis is regulated by transcription factors Aft1 and Yap5. Under low iron conditions Aft1 activates the iron regulon leading to expression of iron uptake genes. Upon receiving an inhibitory signal via cytosolic protein complex, Aft1 is exported to the cytosol thereby restoring the cellular iron levels. In contrast, Yap5 is constitutively localized in the nucleus but is transcriptionally active only under iron excess conditions when the genes controlled by Yap5 lead to storage and utilization of the excess iron. Results from a large scale yeast two hybrid experiment suggests a physical interaction between Aft1 and Yap5. Here we are using an in vivo bimolecular fluorescence complementation (BiFC) approach to confirm this interaction. The existence of such an interaction could suggest a possible cross talk between the high and the low iron sensing pathways in *Saccharomyces cerevisiae*. Knowledge from this research will contribute filling the gaps in iron regulation and thereby help in the treatment of iron related disorders.

### **Rammacher, Connor**

**Mentor(s) -- Dr. Carol Boggs**

#### **Comparing researcher surveys with camera trapping in terms of the ability to capture species diversity in pollinator data.**

Camera trapping as an alternative or supplemental means of data sampling can be a useful tool to researchers. The methods of researcher surveys versus camera trapping were compared using pollinator network data gathered from the McCrady training center at Fort Jackson, South Carolina. By using two indices of species diversity as methods of comparison, it was found the camera data showed a Simpson index of 0.1950 and a Shannon- Wiener index of 0.2200. The researcher data was shown to have a Simpson index of 0.1731 and a Shannon- Wiener index of 0.2750. Both methods capture a similar level of species diversity in regards to pollinators studied.

### **Rank, Marisa**

**Mentor(s) -- Dr. Sarah Keeling,  
Working at the Student Success Center**

Being a Peer Consultant at the Student Success Center has been rewarding in so many different ways. The Student Success Center itself is an incredible office filled with enthusiastic staff ready to assist students in any way possible. There are various resources the SSC has to offer, including Transfer student services, Veteran services, Course-Specific assistance, financial assistance, etc. My role as a Peer Consultant (PC) falls under the Success Connect team, which is an early-intervention program that reaches out to students in need of academic assistance. As a PC, I have worked in many different roles: answering the phones, working the front desks, calling students, and meeting one-on-one with students to discuss academic success strategies. I have always enjoyed helping others be successful and it is truly satisfying to be able to assist students with their academics-not just in a particular class, but with skills that will carry them through life such as time management skills. There are many lessons I have learned during my time as a PC. For one, success starts with you. You have to be the one to take the initiative if you want to be successful. Another lesson is to remember that people come from all walks of life. I have met with a variety of different students who come from a variety of different backgrounds and I have learned that one cannot assume anything about a person, especially because we do not know with what they are dealing. These are both important lessons that I can take with me as I continue on in life, and I hope to be able to continue helping others, using what I have learned at the SSC.

While I am graduating and leaving my role as a PC, the Student Success Center continues on, always improving, especially as the Peer Consultant role is rapidly growing to meet students' needs. I know that I have acquired many valuable life lessons and skills that I would not have gotten if I had not worked at the SSC.

**Ravan, Joseph  
Mentor(s) -- Dr. Minsub Shim**

**The Role of Cycooxygenase-2 (COX2) in Fat Loss during Cancer Cachexia**

Cancer cachexia is a complex metabolic condition characterized by loss of fat and skeletal muscle. It is estimated that approximately 2 million people die annually worldwide due to the consequences of cancer-related cachexia. Although many studies have focused on the loss of skeletal muscle during cancer cachexia, accumulating evidence suggest the important role of fat tissues in cancer cachexia. This study aims to elucidate a novel role of COX2 in cachectic fat loss in association with cancer, through the use of an in vivo model. Our preliminary studies have indicated that CT26 carcinoma cells induces the loss of fat when co-cultured with 3T3-L1 induced adipocytes, and that COX2 expression levels are upregulated in these instances.

**Reagin, Jacob  
Mentor(s) -- Dr. Clint Page, Dr. Nathan Hancock**

**Developing a yeast one-hybrid assay for evaluating protein binding to the mPing transposable element**

The overall goal of this study is to determine the mechanisms that regulate the transposition of the mPing element from rice. In order for mPing transposition to occur, it is hypothesized that the terminal inverted repeats of the mPing sequence must bind to a protein complex composed of ORF1 and Transposase (TPase). The exact manner by which ORF1 and TPase interact with the mPing element is unknown. To test the interaction between the proteins and the mPing sequence, we are using the yeast one-hybrid system. This employs a Gal4 activation domain conjugated to the protein of interest and a bait sequence inserted in front of a reporter gene in the yeast genome. When the bait sequence is bound by the prey protein, transcription of the reporter will occur allowing for growth of the yeast on selective plates. To facilitate our experiment, mPing was PCR amplified using primers with restriction sites and cloned into the Gateway™ compatible plasmid p5e-MCS. Following sequence verification,

an LR clonase reaction was performed to move mPing into the plasmid pMW2, which contains the reporter gene HIS3. Our mPing bait plasmid will be transformed into yeast strain YM4271 and tested with varying concentrations of the HIS3 competitive inhibitor 3-aminotriazole. Once a baseline concentration of the inhibitor is established, yeast one-hybrid assays will be performed to test mPing as a bait against wild-type and mutant ORF1 and TPase prey proteins. These efforts will allow us to deduce the role of each DNA-protein interaction in transposition complex formation.

**Rennie, Nicola**

**Mentor(s) -- Ms. Moryah Jackson**

### **Discovering Italy and Pushing Comfort Zones**

My entire pathway of distinction of my graduation with leadership distinction focuses on is global learning and will demonstrate my links between studying in Italy and how my perspective on the world changed. Getting out of your comfort zone is key when trying to look at a goal, product, culture, person, etc. from an outsider's point of view. My key insights are Foreign Linguistics in the Collegiate Level Classroom, Airplane Mode – Explore the Unknown, and Synergistic Solutions. As you, the reader, dive deeper into my insights, you will discover there is so much more to me than my majors. I am so much more complex than my experiences and education on my resume. I have not morphed myself around marketing and finance, rather, I have transformed my degrees around myself. If you take away the pieces of paper that certify that I can do from my 16 years of schooling say I can do, I will continue to stand. I am not bound by the years I spent sitting at a desk, learning from a book or listening to lectures. No, I am far much more than that. These majors are just my fundamental necessities to opening pathways for potential career choices. They give me the solid basics to understanding problems and solutions on a hypothetical level.

**Reszczyński, Natalie**

**Mentor(s) -- Prof. David Hudgens**

### **Sophomore Slump: a Study for Correlation Between the Mental Health of Second-Year College Students and Their Surroundings**

The “Sophomore Slump” is a phenomenon seen during the second experience of an endeavor, specifically in relation to college students. This phenomenon ranges from an athlete's second season to that of a television show, and exerts a global presence. In psychological studies, the “Sophomore Slump” is hypothesized as the perception of a second occurrence failing in comparison to the first. For college students, sophomore year becomes dull without the excitement of new opportunities, and stressful with the pressure of finding one's self with a rapidly approaching concrete-future. Faced with the decisions of adult life and a lack of general attention, students are unconsciously regressing to the average. Ridden with hopelessness, students' lives become a routine of anxiety-ridden monotony, often resulting in serious mental health concerns including depression, anxiety, bipolar disorder, eating disorders, sleeping challenges, ADHD, addiction, and psychotic disorders. Further, these afflictions are becoming increasingly prevalent in college students, with one in four students having a diagnosable condition for which they often never seek medical attention. This study analyzes correlations between sophomore college students' mental health and their surroundings. Looking at variables such as pressures to pay for college or keep a scholarship, housing situation, extracurricular activities, employment, relationship-status, physical activity, eating habits, and post-graduation plans, this research will find the strongest correlation between mental health and students' activities to depict the best and most harmful combinations. The conclusions of this study suggest to student affairs the best way to minimize mental afflictions in college students', as well as determine the activities that should be encouraged. Thus, universities can provide more accessible and new opportunities to aid sophomore college students with overcoming or entirely avoiding the slump of the second-year. Developing better initiatives for second-year students will allow them to focus their attention towards their coursework and crucial decisions for their future. Universities will show higher-scoring statistics and greater

goodwill from its attendees to increase interest. Of greatest importance, second-year students are in need of an initiative to diminish the universal slump and encourage them to exceed potential.

**Reynolds, Lance**

**Mentor(s) -- Dr. William Jackson**

**Expression of pro-apoptotic Bax in an HIV-1 dependent lentiviral vector**

Human Immunodeficiency Virus (HIV) is a retrovirus that integrates into the host's genome and remains for the entirety of cell life. HIV deteriorates the immune system and causes Acquired Immunodeficiency Syndrome (AIDS). One method of treating HIV is to selectively eliminate cells infected with the virus via expression of a pro-apoptotic gene. We have used the pro-apoptotic Bax gene, as well as an HIV inhibitory sequence, INS2, to selectively induce apoptosis in HIV-infected cells. The INS2 inhibitory sequence prevents gene expression in the absence of two important regulatory HIV proteins, Tat and Rev, and makes vectors HIV-dependent. An HIV-dependent vector can be used to selectively express a pro-apoptotic gene in HIV-infected cells, while leaving uninfected cells unharmed. In a previous study, Bax was cloned into a plasmid containing the INS2 sequence to create pBaxTNG(INS2)R. The objective of this study was to amplify and verify the presence of a fusion gene with Bax and eGFP from pBaxTNG(INS2)R.

**Reza, Abigail**

**Mentor(s) -- Dr. Tia Andersen, Dr. Deena Isom**

**The Association between Perceptions of Anti-White Bias and Violent Offending**

Previous research indicates that white Americans, particularly men, believe that they are victims of progressive attacks on white privilege and the patriarchy, and as a result feel that they are heavily discriminated against. This perception of anti-white oppression existed before the manifestation of the political climate under President Donald Trump, and now we have reason to believe that the relationship between perceptions of anti-white bias and violence will, in fact, be amplified by the increasing tensions caused by this political and social climate. The first part of this study will comprise of a survey which examines the prevalence of perceptions of discrimination and attitudes about race relations. This survey will be administered by KnowledgePanel to a nationally representative sample of 1,000 adults in the U.S. Currently, no nationally representative data has been collected on the impact of perceived reverse racism. Results from this portion of the study will provide a comprehensive understanding of whites' perception of reverse racism and anti-white bias, which will later connect to how these perceptions contribute to violent criminal offending.

**Rich, McHale**

**Mentor(s) -- Dr. Virginia Shervette, Dr. Kristina Ramstad**

**Determination of invasive lionfish species composition in the Western Atlantic waters**

Marine biodiversity is under threat from non-native species. Lionfish are popular home aquarium fish because they are ornate, gregarious, and hardy because they can survive in sub-optimal conditions. These attributes have allowed lionfish and other non-natives to thrive in new geographic locations once introduced. Invasive lionfish occur at relatively high densities in the nearshore coral reef systems and their presence as a non-native species has severe negative impacts on native coral reef fish communities. Invasive lionfish were first seen in Florida, resulting from six fish accidentally released from an aquarium in 1992. Lionfish populations in the Atlantic exhibit extremely low haplotype diversity - evidence supporting a founder's effect of only a few individuals initiating the invasion. Lionfish were first documented in Bermuda, Carolinas, and Georgia in 2000, Bahamas in 2004, and Honduras in 2009. Individuals have been caught as far north as New York and as far south as Brazil. At first, marine scientists assumed that one species of Indo-Pacific lionfish (*Pterois volitans*) established itself in the western Atlantic, but from 2004-2006, 57 lionfish samples from offshore North Carolina were identified as *P. miles*, a second species that is morphologically similar. In spite of several genetic

studies on lionfish in the invaded range, no one has published on the genetic composition of lionfish populations in South Carolina, Georgia, or Florida. Also, since the original 2004-2006 collections of the second species, no scientists have published on the current species composition of the lionfish populations in North Carolina. The main goal of my study is to address this gap in our knowledge of lionfish biology and ecology in the invaded range, by determining if the second lionfish species *P. miles* has made it to waters of South Carolina, Florida, and Puerto Rico. I will also collect information on the haplotype diversity of lionfish from these waters. If new haplotypes are found then this could indicate that additional introductions of lionfish have occurred since 2009. My preliminary findings indicate that *P. volitans* and *P. miles* occur in my sample areas and that haplotype diversity differs among the Carolinas, Florida, and Puerto Rico.

### **Richardson, Cooper**

**Mentor(s) -- Mr. Drew Newton**

#### **Looking Beyond the Details**

Spending six months living in and traveling across Europe was a dream come true, and seemed like one long vacation. It certainly was a change from the norm - no day was the same, and I spent nearly half of my weekends country-hopping. However, studying abroad is no joke, and the spring of my sophomore year was one of the most personally and academically demanding semesters of college. Living in Paris, France reinforced many of the lessons I learned growing up and during the first half of college, and drove me to challenge myself in ways I never had before. I faced these challenges in the classroom, where my American Foreign Policy professor structured the class so students would teach one another by preparing and leading discussions. Professor Ekovitch emphasized the importance of the “big picture”: knowing facts and history is good, but in political science it is useless if you cannot then answer questions like, “Why is this important? What does this mean in the bigger picture?” As I strengthened this way of thinking in class, I was simultaneously experiencing the big picture in my daily life through exposure to language and cultural barriers as well as a unique moment in world politics (my semester abroad occurred during the U.S. election season, which was big news everywhere, and shortly after ISIS attacks in Paris in November of 2016). To process this and manage the stress it caused, I considered the small inconveniences and fears I encountered within that larger framework of questions - “Is this important? How is this going to affect me in the bigger picture?” The classes I took and the experiences I had while in France transformed my way of thinking and taught me to synthesize - a valuable skill in any professional industry. Not only can I expand on what I learn in my classes to see how it fits into the bigger picture, but I am able to apply my knowledge base across all of my academic classes, in my work, and in my extracurricular activities to produce better results across the board.

### **Ridley, Bethany**

**Mentor(s) -- Prof. Romando Reed**

#### **Personal Growth Through Professional Engagement In Healthcare**

Throughout my time in college, I have maintained a job at Folline Vision Center where I have gained experience and skills needed to pursue a career in the medical field after attending medical school. Now with several locations in the Midlands, Folline Vision Center is an optician owned practice that provides quality eye care and eyewear. While working with the company, I have traveled to all four locations filling in and serving our patients with several opticians and optometrists. On a daily basis, I answer the phones, schedule appointments, and file paperwork. When the optometrist is in the office, I acquire family histories, take blood pressures, and pretest or auto refract our patients before the doctor performs the examination. While aspiring to go to medical school to learn about healthcare, to help others in need, and to lead a team of professionals, I applied for the job at a doctor’s office to gain needed healthcare experience, as well as to affirm my aspirations of attending medical school. Originally, I never imagined gaining more than experience with this job, but in hindsight, I realize I

have grown as a person while gaining experience. As I now help new employees learn the daily tasks of our office, I get to enhance my leadership skills through leading and managing the team, especially when the store managers are out of the office. Through different situations that arise within the office, I have learned how to handle problems and make important decisions in a timely and efficient manner. Also, I have enhanced my communication skills by learning how to converse with professionals, as well as patients of all cultures and backgrounds. While applying to medical school, I plan to further enhance these skills and continue to expand my knowledge as I take other jobs in the medical and healthcare fields and volunteer at our local hospitals.

**Ripley, Anna**

**Mentor(s) -- Dr. William Jones**

**The importance of Zoos and Aquariums fostering connections between society and exotic animals.**

Why have exotic animals in human care without a greater meaning behind it? Through my experiences at Riverbanks Zoo and Garden as a dive volunteer and mammal keeper intern I have come to a greater understanding of the potential for Zoos and Aquariums to reach the public and teach important environmental issues. These facilities provide a way for us to bring the exotic and underwater worlds into view of people and helps society to develop an appreciation for animals they might not naturally interact with and influences them to consider those ecosystems in their conservation choices. I have grown from a simple volunteer to an advocate for learning in order to insure that I encourage the greatest number of people to appreciate and learn about the animals they are viewing.

**Risher, John**

**Mentor(s) -- Dr. Wei-Kai Lai**

**On Some Inequality Problems with Cyclic Fractions**

In Cvetkovski's book "Inequalities: Theorems, Techniques and Selected Problems"□, we noticed a pattern of several inequalities with cyclic fractions. Using AM-GM inequality and mathematical induction, we proved these patterns while the exponents in the inequalities are integers. Furthermore, using rearrangement inequality, Chebyshev's sum inequality, and a weighted Hölder's inequality, we successfully generalized these results to the case when the exponents are real numbers. In this talk, we will first introduce these patterns we found, and then we will prove the generalized version of these patterns.

**Rizor, Elizabeth**

**Mentor(s) -- Dr. Jill Stewart**

**Functional Neural Correlates of Hand Motor Function Differ Based on Level of Motor Severity in Individuals Post-stroke**

The neural correlates of motor function after stroke may differ based on motor deficit severity, supporting the need for investigation of brain-motor behavior relationships in functional subgroups. Resting-state functional connectivity (RsFC), a measure of brain function, and diffusion tensor imaging (DTI), a measure of brain structure, may be useful tools for exploring these relationships. The objective of this study was to identify the structural and functional predictors of hand function after stroke, and whether these differed based on level of motor severity. Sixty-three individuals (age in years=60.3 ± 9.51; months post-stroke=54.2 ± 54.4) with chronic, left-hemisphere stroke completed fMRI, DTI, and three measures of hand function: Box and Blocks (BBT) test, Grip Strength, and Stroke Impact Scale (SIS) Hand Domain. BBT performance was used to separate participants into three functional levels: Low (no blocks moved with paretic hand; N=13), Moderate (>0% but <90% of blocks moved with paretic versus non-paretic hand; N=27), and High (≥90% of blocks moved with paretic versus non-paretic hand; N=23). RsFC between motor regions (primary motor cortex, primary sensory cortex, premotor cortex, and supplementary motor area) within each hemisphere (intrahemispheric) and

between homologous regions (interhemispheric) was extracted (Fisher's Z). Structural integrity was extracted from the corticospinal tract (CST) and the body of the corpus callosum. A stepwise linear regression analysis was conducted to examine behavioral, structural (DTI), and functional (RsFC) variables as possible predictors. Structural integrity of the CST (the primary descending motor pathway) and RsFC between the two hemispheres were found to be robust predictors of hand function across all groups ( $R^2=0.468$ ,  $p=0.001$ ) and for the Moderate group only ( $R^2=0.204$ ,  $p=0.010$ ). In contrast, only within-hemisphere connectivity was identified as a significant predictor of hand function in the Low group ( $R^2=0.515$ ,  $p=0.003$ ). No significant predictors were found for the High group. Predictors of hand function varied based on motor functional group. These findings suggest optimal approaches for upper extremity rehabilitation may differ based on level of motor severity.

**Rizzo, Monica**

**Mentor(s) -- Dr. William Jones**

### **Take A Risk Today For A Reward Tomorrow: Don't Be Afraid Of Change**

College presents a lot of opportunities to develop oneself, but it is on the individuals to take advantage of these chances. Life never follows a simple plan. My experience has shown me that no matter how hard you plan, circumstances change as well as opinions. I started my undergrad as a Film Studies major and I'm now graduating in May as a Criminal Justice major. Different courses and the various people that I have surrounded myself with helped lead me towards my upcoming career. Different opportunities from an internship with Senator Tim Scott, a managerial opportunity in a vending machine business, volunteer experience in the community, as well as leadership on campus has taught me different interests that I have that I had never considered before. Giving different opportunities like jobs, internships, and organizations has allowed me to learn more about what I like and what I do not have as much interest in. Learning to adapt and be open to new opportunities was something that I have never been good at, but as I reflect it has become one of the most important traits that I have developed. The opportunity to serve on the USC Connect Advisory council was something that I never even knew existed. Taking a chance and applying for this position has allowed me to feel connected and aware of important things going on around campus. Most importantly it has brought me to a community of people that have allowed me to learn a lot about becoming a well-rounded individual. Without having taken a chance on this unknown opportunity I wouldn't have found a place that has allowed me to grow significantly over the past year. Various opportunities like this and many others have allowed me to continue to grow and learn more about myself.

**Roberts, Amber**

**Mentor(s) -- Ms. Theresa Harrison**

### **How I Made My Impact at The University of South Carolina Through Mentoring**

I strongly believe that to positively impact future generations you must pass knowledge to the people who come behind you. The best way to do this is through mentoring, and that is how I made my impact at the University of South Carolina. I began working with incoming freshman students when I became an orientation leader. I lead incoming students through their very first college experience, aiding in their transition to the university. Some of my students came to me asking if I would mentor them through their first year as students, which I happily obliged. Enjoying the mentoring role so much, I decided to find a way to give back specifically to the minority community. I visited the Office of Multicultural Student Affairs and discovered the Multicultural Assistance Peer Program. This program offered me the opportunity to mentor incoming freshman minority students through the entirety of their first year. Not only was I a mentor, but I was a coordinator for the program. In this role, I implemented new community service programs, planned informational sessions vital for student success, and explored my creative side by designing flyers and t-shirts! I began this experience with the expectation of passing down all I had learned from my experiences as a student at USC, but my mentees gave to me almost as much as I gave to them. Everyone has something to contribute, the

mentor and the mentee, and when all are open to sharing knowledge our experiences are so much fuller.

**Roberts, Amber**

**Mentor(s) -- Dr. Cheryl Armstead**

**Cardiovascular Responses to Vicarious Micro-aggressions and Overt Racism Among African American Millennial Women**

Essential hypertension represents 90% of all hypertensive cases that are seen, creating a public health challenge and a major cause of morbidity/mortality among African American compared to White women. Even though clinically significant cardiovascular disease reveals itself during middle adulthood, developmental processes related to essential hypertension may have been at work as early as childhood and in college aged cohorts among African American women (AAs). Millennials, whom we define as those ages 18-34 in 2015, now number 75.4 million. Black female millennials are heavily represented in universities and may be under racial stress due to gendered burgeoning Black privilege within this cohort. These students are currently exposed to gendered-racial stressors in the forms of: overt racial stressors (ORS's) and everyday microaggressions (e.g. mistreatment, implicit bias, stereotyping, or offenses toward AAW). The relative impacts of ORS's versus MAS's are poorly understood regarding how these forms of stress affect cardiovascular stress reactivity and recovery from stress. After designing, pilot testing and filming stimuli with a videographer vicarious racism and neutral film clips for the laboratory session were finalized during Fall 2017. For both studies one and two, a convenience sample of sixty AA female undergraduates, ages 18 to 34 years will be recruited from the psychology and African Studies courses, and by word of mouth. Random assignment to one of two conditions: watching overtly racially provocative film stimuli or watching ethnic microaggressions in film stimuli occurs in both phases of the study. All participants will view(ed) clips depicting a race and gender-neutral film stimulus while blood pressure and heart rate are continuously measured by a Contec Ambulatory Monitor. Preliminary findings in study one supported the original hypotheses. Study two is under continuance. We hope this study will be about health promotion and social consciousness raising, allowing young adult AAW to take proper steps necessary to prevent future cardiovascular issues later in life. In addition, study findings will give insight into how AAW cope physiologically and regulate their emotions during subtle and overt forms of gendered-racial stress and during neutral stimuli.

**Robinson, Petra**

**Mentor(s) -- Dr. Amber Fallucca**

**What do you love about your neighbor?**

I belong to the minorities. I am an African American female that attends a predominantly white institution. Although I have enjoyed my time at USC, there have been many times where I have come against adversity because of the color of my skin. USC puts forth great effort to combat issues of discrimination while also encouraging cultural differences. I had the opportunity to go on an alternative spring break trip in 2016. My trip was geared toward to the idea of making the world a more sustainable place. Prior to this trip I did not have much experience with sustainability or even an idea of what made up the concept of sustainability. To my surprise, I was not alone. Aside from one other girl in my group the rest of the students who went on the trip had never made the initiative to learn about sustainability. My group member consisted of four students who identified as Christian, one homosexual student, one atheist, six blacks, two whites and one Indian, eight students and one professional staff. As you can imagine there were many cultural differences. That experience was impactful for me because I shared the same unfamiliar space with people who were unfamiliar with each other. At times our personalities and backgrounds clashed but we all went away from the situation leaning more about ourselves, sustainability and being able to coexist with people who are not like ourselves. This is just one experience that I had at USC that showed me the importance of embracing and un-

derstanding different cultural backgrounds. In the professional world, there will be many times where you are forced to work with people of different cultural backgrounds. You must make the decision to take approach each opportunity with an open mind or limit yourself to interactions that only fit in your comfort zone. I can testify that the second option will bring you many hardships and will make it hard for you to advance in your career. Take time to find beauty in your neighbors differences.

**Rodgers, Jonathan**

**Mentor(s) -- Dr. Michelle Vieyra**

**The Effects of Caffeine and Sugar Consumption with and without Exercise on Muscle Growth and Bone Density in Rats**

The purpose of this study was to look into the effects of high sugar and caffeine diets with or without exercise on the development of muscles and bones in rats. Thirty male Sprague-Dawley rats were used in this study. These rats were randomly placed into one of 6 groups containing 5 rats each.

These groups were designated the sugar, sugar + exercise, sugar and caffeine, sugar and caffeine + exercise, exercise, and control groups. After 16 weeks of caring for the rats, they were euthanized and the rear limbs were removed for testing to be performed on the muscles and bones to check for developmental differences between the groups.

**Rogers, Peyton**

**Mentor(s) -- Dr. Emily Mann, Ms. Ashley White**

**Acceptability and Use of Long Acting Reversible Contraceptives (LARC) among Low-Income Women in South Carolina**

Background:

Having the freedom to choose whether and when to have children is an important dimension of reproductive health and rights; however, nearly half of the pregnancies that occur in the United States are unintended. In South Carolina, and throughout the United States, higher rates of unintended pregnancies are especially prevalent among low-income women when compared to women with higher incomes. To address this reproductive health issue, health care providers and public health advocates are increasingly encouraging the use of long-acting reversible contraceptives (LARC), which include the intrauterine device (IUD) and the arm implant, among women who want to prevent unintended pregnancy. LARC methods are highly effective (99.5%) contraceptive methods that last between 3 and 10 years. This study addresses low-income women's experiences, concerns, and use of LARC methods.

Methods:

Individual, in-depth interviews were conducted with 30 low-income women, ages 18-34, about their experiences with contraceptive counseling, views about LARC, and use of LARC. To be eligible for the study, participants had to have had at least one live birth within the past two years; be a resident of South Carolina; and have Medicaid for their health insurance. Data was collected between November 2016 and January 2018. Interviews were audio-recorded, professionally transcribed verbatim, and analyzed using a modified approach to grounded theory.

Findings:

Nearly all participants received contraceptive counseling, including a discussion of LARC, from their healthcare providers; however, many of the participants expressed concerns about negative side effects, shared stories about their negative experiences with prior contraceptive use, and highlighted horror stories from trusted friends and family members about LARC methods. These factors informed their views about the acceptability of LARC and their willingness to use a LARC method. While nearly all the participants wanted to avoid unintended pregnancy, most did not find LARC acceptable and declined to use a LARC.

Interpretation:

The findings suggest that low-income women in South Carolina tend to rely on and trust non-medical sources of information about contraceptives more so than health care providers, which shape their willingness to use a LARC method.”

**Ruiz, Paula**

**Mentor(s) -- Dr. Bentley Coffey**

**Student Teaching Takeaway**

Throughout my time in USC's early childhood education program, I have always had a heart for working with families. During my student teaching semester, this passion grew tremendously. In my classes, I loved learning and discussing how to help families through different resources and techniques, then in my internship classroom I was able to put my knowledge to work as I built relationships with many different families and helped them navigate the first semester of kindergarten. The majority of the families that I developed close relationships with were Hispanic, and many of the parents spoke little to no English. As a native Spanish speaker, these parents immediately were drawn to me, because I could actually understand their needs and questions, unlike other teachers and staff who often had to use their 5-year-old child to translate between them. Throughout the course of the semester, I translated parent-teacher conferences, sat in on IEP meetings for moral support with parents who were overwhelmed, answered simple questions about lunch accounts and field trips, and translated documents school-wide in order to give Hispanic parents a fighting chance at understanding what was going on at Springdale Elementary. All of these things were done outside of my normal student teaching requirements, but I loved it. I learned a lot from teaching my students during the day, but my most important take away from that semester is that public schools need more minority languages represented on their staff and faculty. As an intern, I was able to be a “full time” translator, but many schools do not have that option available to them. Going forward, I plan to advocate strongly for minority families in the school system and work towards a future where every school has at least 1 full-time translator present during the day.

**Russell, Kenyot'a**

**Mentor(s) -- Mrs. Anna Oswald-Hensley**

**Ken for the Win!**

USC Ambassador

Hey you! Yes you!! Let me tell you a little bit about my role as a USC Ambassador. First and for most, this position is meant to be very professional. However, as you can see, I'm extraordinary. Instead of preparing lunches for potential students, showing them around campus, or leading them to their advisor, my job was to lead a computer lab of students by demonstrating how to set up their student emails, DUO Authentication, and their Blackboards. I was placed in the computer lab because I was great at effectively explaining the enrollment process all the while entertaining the students. I was inspired to become an ambassador because I wanted to help create a welcoming atmosphere for the potential incoming students. From this experience I have learned that it is always important to be yourself and be comfortable with who you are because people will love you for you. I plan to continue as an ambassador and representing my school the best way I can.

OSP Peer Coach

Now that you know a little more about me, the second position that I have at USC is being an OSP Peer Coach. OSP stands for The Opportunity Scholars Program and I advised the students that were in said program. I advised them on the pressures and hardships of school, the best courses to take for the major, and on everyday life. I was motivated to be a peer coach because, as a freshman, I had a wonderful peer coach that helped to make my experience here at USC Sumter great. As a peer coach I have learned the value of time management as well as organization through constantly logging hours and messages. Through this experience I hope to teach others that helping others feel welcomed as well as through many situations can help strengthen their overall experience. In the

future, I hope to find other roles similar to this one where I can advise others and lead them on the easiest as well as best path for them.”

**Saba, Kat**

**Mentor(s) -- Mr. Brett Gunn, Dr. Jeff Holloway, Prof. Robert D. Moore**

**The Influence of Attention Deficit Hyperactivity Disorder on Concussion Symptoms Throughout Recovery**

Objective: The symptoms of concussion include cognitive impairment, inattentiveness, restlessness, anxiety, and depression. Currently, clinical recovery from concussion is determined by symptom presentation, however symptoms may be moderated by preexisting conditions. Accumulating evidence suggests Attention Deficit Hyperactivity Disorder (ADHD), a common neurodevelopmental disorder, may moderate concussion outcomes. However, few studies examined symptoms beyond ADHD and concussion symptom scales. Accordingly, we sought to expand the extant knowledge by evaluating the influence of ADHD on multiple domains of functioning following concussion.

Methods: As part of a larger study on Post-Concussion Syndrome (PCS). One-hundred forty participants were assessed using a comprehensive clinical concussion assessment developed by the Concussion and Health Neuroscience Lab at the University of South Carolina (USC). Each evaluation began during the initial doctor visit following the injury and approximately every other week until receiving medical clearance to return to play. This evaluation included metrics to determine somatic, psycho-affective, cognitive, physiological and behavioral symptoms of concussion. Self-report questionnaires included the ADHD Self-Report Scales (ADHD-RS IV), Behavior Rating Inventory of Executive Function (BRIEF), Beck Depression Inventory (BDI), and Beck Anxiety Inventory (BAI). Symptoms of concussion were assessed by the Rivermead Post-Concussion Symptom Questionnaire (RPCS-Q). Athletes completed these measures within one-week of injury and again at two-week intervals until receiving medical clearance to return to play.

Hypothesis: We predict that concussed individuals with ADHD will exhibit poorer outcomes compared to those without ADHD as indexed by greater and longer-lasting symptom burden.”

**Sabbagh, Maya**

**Mentor(s) -- Ms. Theresa Harrison**

**From University 101 to Healthcare**

The University 101 Programs (U101) office provides academic courses, leadership opportunities, and instructor development in order to foster student success and support their transition to the University. Beginning my sophomore year, I have worked as a Student Assistant for the office where I help prepare for and implement their courses, workshops, and trainings. When I became a U101 Peer Leader my junior year and started co-teaching one of their courses, I became more involved in the program and my contribution at work increased to speaking at University events, helping edit their textbook, and sitting on award and scholarship committees. Being a Public Health major planning on going to Physician Assistant school, I was under the impression that my college extracurricular activities would only be relevant if related to healthcare. However, going out of my comfort zone and applying for this part-time job helped prepare me for my medical career in a unique way as well as made me a more well-rounded student and applicant. The office also pushed me to challenge myself more and, as a Peer Leader, I learned how to reach out and help strangers without taking on their burdens as my own – something that I struggled with but will greatly help me as I work in healthcare. I have learned how to build community in my work environment, interact with professionals and supervisors, and practiced mentorship, all of which I can translate to working in a hospital or clinic and use to better myself as a medical provider.

**Sadek, Alia**

**Mentor(s) -- Dr. Jane Roberts, Ms. Shannon O'Connor**

**Touch Response Latency and Sensory Processing in fragile X syndrome and Autism Spectrum Disorder**

Fragile x syndrome (FXS) is a genetic disorder characterized by predominantly cognitive, behavioral, and developmental delays similar to those exhibited in Autism Spectrum Disorder (ASD). Autism co-morbidity within the FXS population is ~40% and often results in overlapping phenotypes. Thus, the use of physiological biomarkers for understanding underlying mechanisms involved in their occurrence is ideal. One of the most predominant biomarkers of developmental delays are sensory abnormalities. These have been postulated to hold the most potential for understanding the genetic basis of certain shared characteristics between both conditions. Sensory processing is the reception and interpretation of sensory stimuli and has been found to be a marker for cognitive and social neuronal deficits in both populations; although it has only been thoroughly researched and understood in the context of ASD. Present in early childhood, sensory disabilities serve as “core phenotypic markers of autism,” confirming later clinical diagnoses and offering insight into the genetic expression of shared deficits found in FXS. This study will examine sensory processing using observational data collected during pre-recorded Laboratory Temperament Assessment Battery (Lab-TAB) episodes which assess early temperament from children’s behavioral responses. In fearfulness episodes, children are presented with a vibrating toy spider intended to elicit a behavioral or sensory response. Touch latency response, or the amount of time it takes a child to touch the spider, will be the primary parameter measured within this study to identify variances in responses between individuals and groups of children typically developing compared to those diagnosed with FXS, ASD and FXS+ASD. Differences in touch response latency to the toy spider will be examined as a potential measure of early deficits in sensory processing. Longitudinal touch response latency data collected yearly from 12-48-month old assessments will be compared to assessment scores such as the Mullen Score of Early Learning (MSEL) to observe and control for the effect of intellectual development on sensory processing. Parent reported measures, such as the Vineland Adaptive Behavior Scale (VABS), will also be used to provide insight on fine motor development skills, a necessary component to understanding the motor aspect of response within sensory processing.

**Salada, Lucas**

**Mentor(s) -- Dr. Amber Fallucca**

**Diversity and Sequential Thinking as Tools for Peer Leadership**

As a senior, I became a Peer Leader in the Student Success Center and served as both a Supplemental Instructor for Philosophy 114: Introduction to Logic, and a tutor for a variety of economics courses. This decision was driven by my interest in logic as a tool for thought, as well as my ability to relate my perspective in economics to other students. Logic and economics are both subjects that require similar methods of thinking, with sequential interpretations of mechanisms and similar implications for arriving at the truth. This experience was significant for me because I could apply what I have learned in both subjects, using this idea of sequential thinking to help students become more effective at understanding their own thought processes. It was interesting to see concepts from a different vantage point, but it was also unintuitive and foreign to what I knew. This challenged me to adapt to new perspectives in order to be an effective peer leader, sharpening an element of my critical thinking that had previously gone unacknowledged. Through these experiences, I have learned much about how I think relative to other points of view, and this insight will improve the way I critically think throughout my professional career in the legal field.

**Salters, Scott**

**Mentor(s) -- Prof. Maegan Gudridge**

**Toolbelt of a Community Leader**

The Medical Experience Academy is partnered with Greenville Health System. The competitive program selects students to learn about the field of medicine. The clinical activities included in this academy are professional guest speakers, research on medical policy, and medical application workshops. As a student of this program I was given the opportunity to build relationships.

This past summer, I indulged in this immersive experience. We worked on applying for medical school, talked to the Dean of Admissions, and conversed with medical students about the application process. We also had 10 full day opportunities to shadow a variety of physicians within the hospital system. To name a few, I observed surgeries, traveled with medical doctors on rounds, and sat in on patient-physician conversations.

The purpose for my involvement in this internship is to obtain a better understanding of life in the medical world. I also gained insight into what the medical school looked like and learn how those students fit education into their lives. As a future physician, the tools gained from this experience will equip me for success as a medical student, and competent physician.

What stands out the most for me in this experience, is observing the patient-physician relationship. I saw how important this relationship is to the treatment plan. The foundation of trust within this relationship is inspiring. Having the ability to make these strong connections is important to the health of the population. By way of these connections, I hope to utilize empathy and compassion when caring for my future patients.

By incorporating necessary qualities of a physician into practice, the community around us can grow exponentially. Working in a fast-paced environment can be challenging. However, being able to connect with another human is the first step to healing. Understanding your role within the community as a student or professional opens up a pathway towards development.”

**Sander, Brittany**

**Mentor(s) -- Dr. Daniel Freedman**

**Practical Experience is Key**

From the time I started at the University of South Carolina, the emphasis was put on out of the classroom experiences. My professors encouraged me to volunteer, take leadership positions on campus, and earn internships. Working in the classroom with industry professionals taught me so much, but nothing compared to the practical experiences I had. I had the opportunity to work in a variety of internships including a start-up, a non-profit, and in collegiate athletics. These positions gave me the confidence I needed to enter the industry and taught me the importance of relationships. I discovered it was all about who I knew in the industry and their connections to help me build my own connections. I also had the opportunity to serve on my sorority’s executive board which taught me many lessons. Working with others taught me the value of teamwork and communication. Being a part of a team with other leaders in my sorority made me a better leader since I was able to learn from others and their experiences as well. This presentation will highlight how my experiences in my time at USC have helped me become the leader I am. My practical experiences, the relationships I have built, and the lessons I have learned working as a team have helped me complete my leadership pathway in Professional and Civic Engagement.

**Sanner, Michaela**

**Mentor(s) -- Ms. Rachel Bridges, Dr. Scott Decker**

**ADHD in university settings: Differences in alpha wave qEEG coherence**

Research has demonstrated distinct patterns of electroencephalography (EEG) coherence in children with Attention-Deficit/ Hyperactivity Disorder (ADHD). Namely, abnormal alpha wave activation pat-

terns have been seen in children with ADHD due to alpha wave's effects on inhibitory attention. Yet, studies investigating coherence measures in college students with ADHD are limited. The current study investigated alpha wave activation in college students with and without an ADHD diagnosis. Quantitative EEG (qEEG) analyses were performed in 33 college students with an ADHD diagnosis and 35 control students. Differences between groups were examined using t-tests and additional exploratory analyses. Results showed abnormal activation of alpha in ADHD participants compared to the control group in the frontal, central, and parietal regions. These findings suggest that alpha activation could be a significant diagnostic marker for ADHD.

**Sasser, Bryant**

**Mentor(s) -- Mrs. Hayley Efland**

**Green Office Certification Team**

Our Discovery Day presentation will give the audience an insight into the Green Office Certification team. The team consists of Sustainable Carolina interns as well as student volunteers. Our mission is to educate and certify offices all over campus to find easy ways to become more sustainable in the day to day functions of their jobs. We have created two training manual presentations and have hosted a Lunch and Learn to inform offices across campus about our certification process. This is a growing program and our purpose is to expand and educate individuals all over campus. We have explored various aspects of outreach and communication including how to get offices involved, having them take our survey, and presenting them with the certification itself. We utilize our presentations to reach a vast variety of offices here at the University of South Carolina, from Green Quad and the Office of Sustainability to the office of the Provost. Currently, we have certified 23 offices and have a dozen others already involved in the process. Our team is also working with dining to use more sustainable practices such as reducing straw usage and having zero-waste catering along with designing a trophy to be given to our designated "Green Office of the month" to further promote the program. Through presenting at Discovery Day, we aim to further spread the knowledge of our team to allow us to continue to grow.

**Saukas, Amy**

**Mentor(s) -- Dr. Amber Fallucca**

**Helping the Homeless**

I have spent over 350 hours over the past year volunteering with an organization called Patriot Villas. Patriot Villas is a housing facility for homeless veterans that is located in North Charleston, SC. Through the partnership of the facility, myself, and the Summer 2017 Carolina Agency class, a grand opening was hosted on behalf of Patriot Villas. Not only was I instrumental in the grand opening of Patriot Villas, I am also the Executive Director of Community Outreach, Volunteer services, and Donations. This position has made me responsible for coordinating all volunteering activities, monitoring all donations, and connecting with the community in order to get community members to help the veterans to assimilate to civilian life. This complex has help de-stigmatize homelessness in Charleston by encouraging community members to help those in need by volunteering their time, money, clothes, and by getting to know these people and understanding their stories. Through this experience, I also directly observed the positive impact of providing homeless individual with careers a means to earn their own incomes on their confidence and determination to rise above their situations. Though having the opportunity to open a veteran's housing facility, I have sought out opportunities to interact with members of homeless communities, in order to learn their stories and understand their situations for myself, just like my all journalism class have encouraged me to do throughout my time here at the University of South Carolina. The class I have taken have urged me to get to know my community in order to serve, and better it through reporting. From this project, I have learned the importance of giving to those who need help in my local community while also learning how to integrate veterans who need assistance into civilian life.

**Saxon, Rachel**

**Mentor(s) -- Dr. Kristina Ramstad**

**Mitochondrial DNA analysis of nest parasitism in American wood storks**

The American wood stork (WOST; *Mycteria americana*) is a large, non-migratory wading bird that nests throughout the wetlands of the southeastern United States (US), Central America, South America, and the Caribbean. It is the only stork that breeds in North America, and has been protected under the Endangered Species Act since 1984. Because of the proximity to a high number of potential nests, colonial nesters like the WOST may employ a strategy of nest parasitism, where a female lays eggs in another female's nest and thus avoids the high cost of defending and feeding chicks for up to 55 days until they fledge. The possibility of nest parasitism in US WOST has not been investigated. However, understanding the mating dynamics in these colonies, and how that relates to population vital rates (e.g., hatching success and fledging success), is crucial to conserving US WOST. In this project, I am using blood and pin feather samples from all the chicks found in a total of 119 nests from five WOST colonies in Georgia, South Carolina, and Florida. I extracted DNA from these samples, and will sequence approximately 460 base pairs of mtDNA to determine the haplotype of each chick. Because mtDNA is maternally inherited, my data will indicate if more than one female WOST parent-ed chicks within nests. Further sequencing will complement this mtDNA dataset with nuclear DNA data to estimate relatedness amongst nest mates.

**Scandariato, Madeline**

**Mentor(s) -- Ms. Tricia Kramer**

**Leadership Through Professional and Civic Engagement**

Getting involved on campus is one of the best things students can do to make the most out of their time at the University of South Carolina. By joining a Greek organization, students have the opportunity to build long lasting relationships, develop a support system, get involved with philanthropic causes, and take advantage of leadership opportunities while being apart of a special community of students. Becoming a sister of Kappa Kappa Gamma sorority was one of the most significant events of my college career. I threw myself into my organization throughout my four years at the University of South Carolina. I was elected onto the finance committee then later to the standards committee, served on the sisterhood committee and a new member retreat leader and later became the sisterhood chair. Serving on these committees helped me to gain experience in budgeting, event planning, conflict resolution, and of course, leadership. Additionally, Kappa granted me the opportunity to become a Pi Chi Sorority Recruitment Counselor. These experiences, in combination with many more discussed within my portfolio, greatly enhanced my college experience by teaching effective communication skills, critical thinking and problem solving, and most importantly, invaluable leadership skills. My presentation will further describe insights I have gained about my leadership capabilities and give a deeper description of what my time at the University of South Carolina has meant to me.

**Scaturro, Resa**

**Mentor(s) -- Prof. Jay Pou**

**Assessment of Inquiry of Teaching**

Upon entering my new internship in a third-grade classroom, I knew that all twenty-two of my students were state identified as gifted and talented. Knowing this, I thought that this class would have all the basics down already. Within the first two weeks, I noticed that a small group of students were consistently having trouble remembering to capitalize and punctuate sentences, dates, etc. I began to wonder if I work each day with selected students, will that help transfer their knowledge into action? This wondering led to my inquiry question, how can I make capitalization and punctuation habitual? Throughout my education courses, I have learned the process of the responsive teaching cycle and am able to apply it through my internship by analyzing data and taking action.

**Schmelz, Rachael**

**Mentor(s) -- Dr. Kimberly Shorter**

**Does high folic acid alongside a gene knockdown of MTHFR induce histone modifications and altered neurobiology in a human neuronal cell line?**

Autism spectrum disorders (ASD) are characterized by epigenetic changes and changes to neuro-morphology (e.g. increased dendritic spine density). Epigenetic modifications such as DNA/histone methylation are accomplished through dietary folic acid (FA); FA is metabolized to methyl groups that are added to DNA and/or histones. This pathway involves the synthesis of 5-methyltetrahydrofolate and is promoted by 5-methyltetrahydrofolate reductase (MTHFR). Pregnant women with an MTHFR mutation are told to consume FA supplements up to 10x the regular FDA recommended daily amount to prevent neural tube defects, a mechanism that is not understood. We question if FA over-consumption is linked to the rise in ASD rates. Previous experiments in our lab indicate an MTHFR knockdown with 10x FA supplementation decreases MECP2 expression, which is linked to increased dendritic spine density. We knocked-down MTHFR in a human neuronal cell line (SHSY5Y) and exposed cells to 10x FA. We isolated histones and used an ELISA histone modification array to test for specific histone modifications such as acetylation and methylation. We stained cells with vibrant Dil stain and DAPI to visualize the dendritic spines. Our results indicate changes to histone modifications and dendritic spine densities in the knockdown with 10x FA in comparison to controls.

**Schultz, Katherine**

**Mentor(s) -- Dr. Carol Boggs, Dr. Thomas Syfert, Ms. Audrey Jones, Mr. Matthew Kipp**

**Pollination Pockets: Promoting Community Engagement and Pollinator Abundance**

Behind the Green Quad, the Sustainable Farm and Gardens currently provides habitat for a variety of pollinators. This is owing to the sheer number of nectar flowers there, but also to the native plants they grow (like passion vine) which are suitable for caterpillars to feed on. There is quite a difference in the abundance of pollinators in the gardens compared to other areas on campus, where pollinators like butterflies are rarely seen. The same holds true for two city parks, Maxcy-Gregg and Olympia. In the Sustainable Farms and gardens, I regularly see students watching and wondering about the butterflies, thus feeling the urge to engage with the natural world. In order to increase the abundance of butterflies across campus, I am planting butterfly gardens on campus and in local parks to act as 'pockets' of habitat in the city. I am including mostly native plants which are able to serve as host plants for butterflies in the area. I am hoping to attract butterflies which are known to be present at Congaree National Park, and include signs explaining the importance of these beautiful plants as food for butterflies and caterpillars. In doing this, I hope to create opportunities for USC students and Columbia citizens to further consider and engage with both the natural and human-influenced environment. In order to create multiple butterfly gardens, I am collaborating with the USC Landscaping department as well as the City of Columbia Department of Parks and Recreation.

**Schweiss, Julia**

**Mentor(s) -- Dr. Conor Harrison**

**Ecovillages vs. Urban Villages... Is there a comparison?**

I began researching sustainability during my semester abroad in Florianópolis, Brazil in spring of 2016. My research began with comparing sustainable cities within the United States and abroad with regards to the food-water-energy nexus in cooperation with the GREENS research center at Universidade do Sul de Santa Catarina and the Cambridge Institute for Sustainability Leadership. When I returned to the United States, I continued my research on sustainable cities and sustainable living models in cooperation with Dr. Conor Harrison. I applied for and received the Magellan Research Grant Award with a proposal to compare ecovillage and urban village models. I spent two days at

Dancing Rabbit Ecovillage in northern Missouri, interviewing members (or “Rabbits”, as they’re called) and getting a grasp on the ecovillage concept and best practices. I then spent four days in Seattle, Washington exploring their urban village strategy and interviewing government employees in the department of city planning and sustainability. Although I hypothesized that ecovillages could be considered micro versions of urban villages, I ultimately concluded that, in reality, there is no comparison between ecovillages and urban villages. Ecovillages are about community, environmental sustainability, and well-being and they require a radical change in lifestyle that is not for the average person. Although the urban village model does focus on sustainability, the city’s end goal is economic prosperity by way of sustainability with the average person in mind. While both models have their merit in regard to environmental sustainability, each appeals to a different type of person and neither can be considered “better” than the other.

**Schweiss, Julia**

**Mentor(s) -- Prof. Ryan Lloyd**

**Studying Abroad in a Less Traditional Location**

In the spring of 2016, I studied abroad at the Universidade do Sul de Santa Catarina in Florianópolis, Brazil through International Studies Abroad. I chose Brazil because I wanted to put myself out of my comfort zone and visit a less traditional country. I had always studied Spanish in school, but never Portuguese, so I arrived a month early for an intensive Portuguese program to gain a basic knowledge of the language. By the end of my semester, I had learned enough Portuguese to be mistaken as a local Brazilian. During my semester from March to June, I studied business, having the opportunity to take on real world projects such as producing and pitching the projects to an entrepreneur seeking to invest in a new venture. Throughout the semester, I blogged about my experience to reflect and expose the culture to others who may not have the chance to visit Brazil. Because I pushed myself to study abroad in a less traditional location, without the crutch of friends nearby or a common language, I gained the confidence to know that I can navigate cultures vastly different than the United States, and I encourage others to do the same. Although studying abroad is not easy, especially in a less traditional location, I attribute this challenging experience to who I am today – a confident global citizen with a fervor for travel and a desire to work in an international corporation that bridges cultural and geographical gaps to solve global problems.

**Scott, Moeshia**

**Mentor(s) -- Ms. Katherine Hopkins**

**Leaders are created not born**

Being a resident mentor was a growing experience both academically and professionally. Resident mentors are responsible for helping foster a healthy relationship with mostly incoming freshmen, by creating a safe space for students, while upholding the housing policies. In my role I was able to apply my skills learned in the class room to create an environment that residents would like to call home. I took this role because it was a great way to gain and develop my communication, decision making, and conflict resolution skills. I also enjoyed being a part of making first year students feel at home by creating a community they could call home. I learned through the resident mentor position that the first-year experience can have a great impact on a student’s entire college experience. My experience as a resident mentor has helped me find my passion of wanting to go into Higher Education/Student Affairs to continue to work with first year college students.

**Scott, Jacob**

**Mentor(s) -- Dr. Stephanie Milling**

**Community Activation and Cohesion for a Common Cause**

I will be presenting on my experiences working with the University of South Carolina Relay for Life and Sustainable Carolina organizations. In Relay I worked as the logistics chair with my fellow di-

rectors, exec, and committee members to fundraise for the American Cancer Society and plan our annual Main Event. In Sustainable Carolina I work on the garden lead team to maintain and expand the Green Quad garden. I also am in charge of staffing, setting up, and executing the weekly farmers market. The most important takeaway I have gained from these experiences is the value of community and teamwork. Getting community involved in working together for a common cause is a powerful thing and when promoted well enough, can achieve any goal. Community activation is not just important when working for a world with less cancer and more sustainability, but also for any noble purpose. It is important for society to work together to better itself and make this world a more habitable place for future generations to come. The teamwork and leadership skills I have acquired from my time with Relay and Sustainable Carolina will be essential to my future pursuits and careers. In addition, I have met many wonderful people along the way that share the same passions as me, and helped motivate and guide me to the place I am now. One day when I am doctor working in a practice, I will understand the value of teamwork and community and their application to making a healthier society. With these skills I have learned I am better equipped to work toward my goal of one day making the communities in South Carolina healthier and more sustainable.

### **Selesky, John**

**Mentor(s) -- Mrs. Theresa Sexton**

#### **Students in the Political System**

This past year I have been the director of a program called the Legislative Action Network, a small organization within our Student Government. The Legislative Action Network, also referred to as LAN, attempts to engage legislators on the local level. This means we work with both Columbia City Councilmen and South Carolina State-House Representatives. We have engaged primarily through researching policies we would like to see passed into law and then attempting to actually make them law. Thus far we have had incredible success. In the city of Columbia we have worked with legislators to reduce drunk driving and improve local parking concerns. On the state level our efforts have seen one bill pass through the entire South Carolina House and move into the Senate, where it is currently (as of March 2nd, 2018) awaiting a committee hearing. That bill, H.4078 - The Military Priority Registration Act, aims to have schools in our state offer an optional priority class registration to those that serve or have served in our nation's armed forces. We are also continually meeting with legislators on our other proposals and have established a significant student presence on both levels. Through this experience I have learned a lot about not only what it takes to pass legislation into law, but also about being a leader in a process that can be incredibly frustrating. This presentation will discuss the experience my team and I have had and will highlight the lessons I learned in this past year.

### **Shealy, Stephanie**

**Mentor(s) -- Dr. Bryan Love**

#### **Prevalence and clinical characteristics of patients with non-alcoholic fatty liver disease (NAFLD) from the National Health and Nutrition Examination Survey, 2013-2014**

##### **Purpose**

Increasing rates of obesity and changes in dietary composition are believed to play a central role in non-alcoholic fatty liver disease (NAFLD) development among adults. Medications from the statin and thiazolidinedione class of drugs have been shown to provide benefit in patients with NAFLD, and may be implicated in use in patients with significant fibrosis. The purpose of this study was to evaluate the overall prevalence and compare clinical characteristics of patients meeting NAFLD criteria according to an established risk score.

##### **Methods**

Each patient's fibrosis score was categorized into one of three categories: absence of significant fibrosis (score  $\leq -1.455$ ), presence of significant fibrosis (score  $\geq 0.675$ ), or an indeterminate score (-1.

455 to 0.675). Clinical characteristics including body measurements, labs, exposure to metformin, thiazolidinediones, or statins, and history of metabolic disease were collected. Exclusion criteria included diagnosis of hepatitis B/C and ongoing alcohol consumption greater than 21 or 14 drinks on average per week in men and women, respectively.

## Results

Data were analyzed on 10,175 patients representing 236.1 million (weighted estimate) respondents of the 2013-2014 NHANES survey. NAFLD risk scores indicating significant fibrosis were found in 11% of respondents. Patients with significant fibrosis were older (66.6 vs. 39.6 years;  $p < 0.001$ ), more likely to be non-Hispanic whites (74.2%), and have a diagnosis of diabetes (93.5%). Patients with scores indicative of significant fibrosis were more likely to be prescribed a statin therapy (50.8% vs. 7.8%;  $p < 0.001$ ), metformin (24.6% vs. 2.2%;  $p < 0.001$ ), and a thiazolidinedione (2.5% vs. 0.05%;  $p < 0.001$ ). Patients in the fibrosis group had higher levels of triglycerides (143.1 mg/dL vs. 110.7 mg/dL;  $p = 0.02$ ) and fasting plasma glucose (147.4 mg/dL vs. 98.9 mg/dL;  $p < 0.001$ ).

## Conclusion

The results of this study suggest that NAFLD associated fibrosis is present in a significant proportion of US adults. Earlier clinical studies demonstrated benefits for vitamin E, statins, and pioglitazone; however, these medications appear to be underutilized in patients with significant fibrosis due to NAFLD. Identification of patient characteristics associated with presence of fibrosis could lead to more efficient diagnosis of NAFLD and appropriate management of this syndrome.

## Shepard, Sarah

**Mentor(s) -- Dr. Andrew Kaczynski, Ms. Ellen Stowe**

### **It Starts in Parks: Analyzing Average Park Quality for Park Prescription Programs in Greenville County, SC**

**Background:** 1 in 4 adults and 1 in 6 children are obese in Greenville County, South Carolina. Research has shown that local parks are a low-cost outlet for individuals to meet the recommended 150 minutes of physical activity per week. Park Rx is an organization that encourages physicians to prescribe parks to patients as a treatment to help reduce the symptoms that accompany chronic illnesses. However, parks must be analyzed to ensure that they are accessible and safe. The objectives of this project were to: 1) Provide detailed, current information about Greenville County parks for Parks Rx and 2) Analyze parks to find their Park Quality Index (PQI), including variations by individual agency/municipality.

**Methods:** Publicly-accessible parks and recreation facilities in Greenville County ( $n=115$ ) were audited in Spring 2017 using the Community Park Audit Tool (CPAT). The PQI (max=100) was calculated from 6 variables: 1) Park Access Sum (transit stop) 2) Park Facilities Sum (playground) 3) Park Amenities Sum (restroom, lights) 4) Park Aesthetic Features Sum (landscaping) 5) Park Quality Concerns Sum (graffiti) 6) Neighborhood Quality Concerns Sum (litter, heavy traffic).

Excel was used to calculate the PQI, and the associated measures of minimum and maximum.

**Results:** The average PQI across the county was 53.3 (s.d.=10.6). Mauldin had the highest average PQI (61.4), while Fountain Inn had the lowest (49.3). Greenville and Mauldin had the highest access score (40) and Greer the lowest (18.8). Simpsonville had the highest facility score (29.5), while Fountain Inn had the lowest (16.4). Greenville, Mauldin, and Taylors had the highest amenity and score (86.7), while Fountain Inn had the lowest (30). Again, Greenville, Mauldin, and Taylors had the highest quality score (100), while Traveler's Rest had the lowest (75). Traveler's Rest had the highest aesthetics score (40), and Taylors the lowest (17.1). Simpsonville had the highest neighborhood score (92.5), with Greer having the lowest (85.6).

**Discussion:** Overall, the city of Mauldin has the best options for public park usage for patients, while

Fountain Inn needs the most improvement. Equal accessibility and quality across cities needs to be emphasized to offer the best opportunities for residents.

**Sherman, Tahrea**

**Mentor(s) -- Prof. Northrop Davis**

**Grant Research for Manga Expansion at USC**

I was USC Media Arts/SVAD Professor Northrop Davis's undergraduate research assistant on his paper "Peak TV and Anime: Why It Matters" which was published on March 11, 2018 in the respected International Journal of Comic Art (pages 311-340). My intention for this project was to help improve his manga creation classes at USC via research. I also assisted him on researching grants from Japan (this paper's research was funded by a Tokyo foundation founded by Japan's NHK TV network-- his co-PI is Associate Professor Mariko Koizumi of the world's top manga program -- Kyoto-Seika University in Japan). From the data that I have collected so far, I have learned that many of the grants require an extensive amount of time to apply for, a detailed description of what one plans to do with the grant money, and a budget sheet.

I also observed how to incorporate research materials into an academic paper, and the process for citing website links. In Nov 2017 Professor Davis was invited on an all-paid trip by a Japanese university in Tokyo to present this paper where he met with Warner Brothers and Sony anime company Aniplex, which proposed inviting him back to teach their anime writers American style of screenwriting. He presented his USC grant funded manga to top Tokyo publishers. A goal of a new grant I researched he is applying for is to go to Japan and learn manga drawing techniques from mangaka (Japanese comics creators), and teach those techniques to USC students.

**Sherrod, Lacey**

**Mentor(s) -- Mrs. Anna Oswald-Hensley**

**A Journey in Public Service**

As a USC-Sumter Student Ambassador for the campus, I helped new students become acclimated to USC Sumter. I gave tours, helped with registration, and answered the hundreds of burning questions as well as, consoled the anxious hearts of new students. Initially, I was told that I should do it because it would look great on my resume, however once I got into it, I realized that student ambassadors are some of the most important people, especially when you are a representation of the university. Ambassadors are the first people that a new student meets, and they give an overall impression of the college. This job is so integral to the survivability of the college, and I learned that I personally, had to demonstrate exactly what this college had to offer and be that smiling helpful face that a new student could connect with. I realized that I need to put my best foot forward every day and have every new experience with someone to be the absolute best representation of myself. Although I am no longer a student ambassador, I will definitely apply that mentality for the rest of my life.

**Shirer, Catherine**

**Mentor(s) -- Dr. Cynthia Phillips**

**Association of treatment complexity with length of hospital stay in type 2 diabetes**

Type 2 diabetes mellitus is a multi-faceted chronic disease that is complicated by a potentially complex medication regimen leading to the probability of polypharmacy, medication errors, and an increase in readmissions with hospitalization. This single-health system, retrospective, observational cohort study is intended to determine whether antidiabetic polypharmacy in type 2 diabetic patients results in a longer hospital length of stay. Overtreatment due to polypharmacy can lead to severe hypoglycemic episodes, escalation of care, and increased healthcare costs. The American Diabetes Association currently recommends titrating patients up to a triple medication regimen for uncontrolled hyperglycemia. Patients are treated with various combination regimens that could increase risk for polypharmacy. Therefore, this study will examine any difference in outcomes between patients admit-

ted on four or more antihyperglycemic medications as compared to patients on three or less. Moreover, this project regarding antidiabetic polypharmacy is part of a larger study that investigates the effect of pharmacist centered medication reconciliations on transitions of care in patients with type 2 diabetes. A retrospective chart review of adult type 2 diabetic inpatients admitted between January 1, 2016 and December 31, 2016 at Palmetto Health Richland in Columbia, SC will investigate medication history, length of stay, escalation of care, and readmission rates in order to determine whether antidiabetic polypharmacy results in increased length of stay. Data collection will occur through use of REDCap, an electronic HIPPA-compliant database. It is anticipated that univariate analysis will detect an increased length of stay in patients with four or more antihyperglycemic medications. Identification of patients with antidiabetic polypharmacy will alert the healthcare team to improve medication management.

**Shuster, Mareena**

**Mentor(s) -- Dr. Bryan Love, Dr. Zaina Qureshi, Dr. Joey Mattingly, Dr. Caroline Derrick**

**A systematic review of chronic hepatitis C virus (HCV) treatment in patients receiving opioid substitution therapy**

Hepatitis C virus (HCV) is a blood borne virus that causes acute and chronic hepatitis, ranging in severity from mild illness of a few weeks to a serious, lifelong infection. In developed countries, HCV is most commonly transmitted through injection drug use. In addition to HCV, many injecting drug users also suffer from illicit opioid use and addiction. Opioid substitution therapy with either methadone or buprenorphine provides illicit drug users with a replacement drug, which is effective in substantially reducing illicit opiate use. Many injecting drug users would likely have minimal contact with healthcare services, but these substitution programs subsequently act as a gateway to other services, such as for the treatment of HCV infections.

The objective of this research study was to perform a systematic review of HCV treatment with directly acting antivirals in patients concomitantly receiving opioid substitution therapy. The protocol was approved and registered with PROSPERO (CRD42018087453). The search was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement in PubMed and Scopus using a combination of search terms for HCV, directly acting antivirals, and opioid substitution therapy. Titles, abstracts, and full text articles were screened for inclusion based on relevance and study design by two independent reviewers in parallel. A third reviewer addressed disagreements on inclusion criteria. Two independent reviewers assessed articles that met the inclusion criteria for quality and risk of bias. Data extracted will include the type of study, population characteristics and size, treatments assessed, number of patients achieving sustained virologic response at 12 and 24 weeks post therapy, and treatment adherence or completion rate.

**Sindel, Brooke**

**Mentor(s) -- Dr. Bryan Love**

**Frequency and characterization of hepatic and renal dose recommendations for common outpatient medications**

Background: The liver and kidney play critical roles in drug metabolism and clearance. In patients with renal dysfunction, providers can make medication dose adjustments using calculated creatinine clearance based on routinely available clinical and laboratory parameters (age, sex, height/weight, and serum creatinine). The Food and Drug Administration guidance for pharmaceutical manufacturers recommends the Child-Turcotte-Pugh (CTP) classification of cirrhosis severity to guide hepatic dosage adjustment. However, several components of the CTP classification are subjective clinical endpoints and are not readily available for pharmacists to perform hepatic dosage adjustment. The aim of this study was to compare the relative frequency of recommended hepatic and renal dose adjustments for commonly used outpatient medications according to tertiary references (i.e. Lexicomp) and the product information.

**Methods:** A listing of commonly used drugs (n=311) in the outpatient setting list was obtained. Topical medications without an oral equivalent were excluded, and primary components of combination products were analyzed individually. A classification system was developed and used to evaluate renal and hepatic dosing recommendations: 0 = no adjustment, 1 = use with caution, 2 = dose adjustment required, 3 = not recommended, and 4 = contraindicated. Three co-investigators recorded renal and hepatic dosing recommendations for a sample (n=100) of medications, and a kappa interrater agreement was calculated in order to ensure similar ratings for the drugs. Descriptive statistics were analyzed using StataMP (StataCorp, College Station, TX).

**Results:** After applying exclusions, 266 drugs were analyzed. For both renal and hepatic dose recommendations, the percent agreement exceeded 80% and kappa exceeded 0.74 ( $p < 0.001$  for all comparisons) indicating substantial agreement. Approximately 60% of medications included some recommendations regarding renal or hepatic dose adjustment. "Use with caution" was more likely to be recommended in patients with hepatic dysfunction (24.4% vs. 18.4%). "Use contraindicated" was encountered nearly three times more often for patients with hepatic disease (12.8% vs. 4.9%).

**Conclusion:** In this sample of commonly prescribed outpatient medications, renal and hepatic dosage adjustments were frequently recommended. Sampled medications were more likely to have uninformative hepatic dose recommendations ("use with caution") and contraindications in patients with hepatic disease.

**Sjolund, Carly**

**Mentor(s) -- Prof. Magdalena Grudzinski-Hall**

### **The Power of One**

My most significant contribution to the University of South Carolina has been my commitment and involvement with Dance Marathon at the University. USC Dance Marathon plays a huge role both on University of South Carolina's Campus and also in Columbia's community as a whole. The main focus of USC Dance Marathon is to fundraise for the local Children's Miracle Network Hospital in Columbia. USCDM holds a 14-hour Main Event each year where all participants stand and dance in order to help raise money for the children who are currently being treated at Palmetto Health Children's Hospital. The Child Life Program at Palmetto Health Children's Hospital is fully funded by USCDM. The Child Life Program helps children through their treatments by providing support and coping mechanisms as well as giving them access to games and toys that help make their time in the hospital feel as normal as possible. I started my involvement with USCDM freshman year as a participant. Throughout the years I have grown more and more passionate about this organization and have continued to get involved by taking on leadership positions. Through hitting the goal of \$700,000 in 2017 and raising our goal to \$1 million in 2018, I can truly say being apart of USCDM has completely transformed my college experience. It has inspired me to continue to get involved and to help others because you can, not because you are required to. Each dollar USCDM raises makes a huge difference in every hospital patient's life and it is incredible that I was able to be a part of that while at Carolina. My presentation will discuss the impact that being apart of USCDM has made on me personally and how it has transformed me into the leader I am today.

**Slane, Amelia**

**Mentor(s) -- Dr. Karen McGee**

### **Behavior Issues in Frail Elders with Dementia**

**Research Question:** How strong is the correlation between a diagnosis of dementia and behavior issues, and which behavior issues are most prevalent among this population according to caregivers? In addition, what has been found to alleviate those behavior issues most consistently?

Study Design: Multi-center, case-control survey.

Methods: Patients aged 65 and older with classification of mild to severe dementia at the four locations of Palmetto SeniorCare (PSC), an adult day care facility, as of May 1st, 2017 were included in this survey. A RedCap survey was designed with various questions in regards to behavior issues including; agitation, anxiety, anger, aggression, and restlessness/wandering, along with questions regarding activities targeted at improving these behaviors. Some of the activities included in the survey are utilizing music, aroma-therapy, baths, and winding down before bedtime. The ability of caregivers to maintain their loved ones in a community outpatient setting were also assessed. Patients attending PSC, but residing in long term care facilities were not to be included in this study.

Results: Overall, 78 patients at PSC with a diagnosis of mild to severe dementia have been included. It is unclear how long dementia has been present before a diagnosis was documented, however, 76 (97.4%) participants began exhibiting behavior issues after or around time of documented diagnosis. Behavior issues expressed included restlessness/wandering (39.7%), agitation (84.6%), anger (52.6%), hitting/aggression (41%), and anxiety (78.2%). As for methods of reducing behaviors, utilizing music to soothe and winding down before bedtime were found to be most helpful. Surprisingly, watching TV before bedtime was used successfully to help with behavior issues by many of the caregivers.

Conclusion: Data shows, there is a strong presence of behavioral issues in this population, not present prior to documented diagnosis of dementia. The promotion of activities helping with winding down at night and music therapy is important when targeting night time behavior issues. Providing loved ones with a routine throughout the week, such as PSC, was also found to be helpful in reducing behavior issues. As a result of this survey, educational programs will be offered to caregivers at Palmetto SeniorCare.

### **Smith, Leighton Gray**

**Mentor(s) -- Dr. Hilary Lichterman**

#### **Empowered to Lead and Serve**

As my senior year comes to an end, there is tremendous room for reflection and appreciation for the growth in leadership, confidence, and education I have gained at the University of South Carolina. One of my life-changing experiences has been serving as Secretary for the Delta Zeta Sorority. As Secretary, I found the confidence to lead 353 amazing women and found the voice I never knew I had. I will reflect upon the ups and downs during my term as well as how theories on motivation, attitude, and emotion contributed to my development and understanding of my role.

### **Smith, Hailey**

**Mentor(s) -- Ms. Laura Albert**

#### **Support Encourages Progress**

For two years of my college career, I have worked in the Student Success Center as a peer consultant. In this role, I facilitate one-on-one meetings with students of all backgrounds to discuss academic improvement strategies like time management, attention and concentration, prioritization, procrastination and exam preparation. When asked about my job description, I often say I am the equivalent of a peer-to-peer guidance counselor; in order to get to the root of what might be causing academic issues for a student, we must first talk about their life in general. The true beauty of these conversations is that even if a student has no one else to talk to, for that hour they have my support, and for their four years at the University of South Carolina, they have the Student Success Center. Being a member of this support system has allowed me to connect with and help students from all over the world

and develop my own leadership and communication skills. My presentation will explore the insights I have gained through this experience, specifically regarding my belief that supporting each other is the key to progress both at the university and on a larger, societal scale.

**Smith, Jenna**

**Mentor(s) -- Dr. Abigail Hogan, Dr. Jane Roberts**

**Physiological and Emotional Regulation to Frustration in Toddlers with Fragile X Syndrome**

Frustration is an emotional response that begins to develop during infancy in response to the interruption of a task or the blocking of a goal. Effective emotional regulation in reaction to frustration during infancy is associated with fewer behavioral problems in addition to improved communication and motivation in childhood. The autonomic nervous system (ANS), which regulates sympathetic and parasympathetic reactions to external demands, mediates behavioral and physiological responses to emotional arousal. Fragile X syndrome (FXS), the leading cause of inherited intellectual disability, is characterized by dysregulation of the ANS and abnormal emotional regulation. The objective of this study is to analyze physiological and behavioral responses to frustration-inducing tasks in toddlers with FXS and typically developing (TD) toddlers between the ages of 12 and 36 months. In this study, a heart-monitoring device was used to record respiratory sinus arrhythmia and heart rate during a frustration-inducing task in which the toddler was restricted from playing with a toy. Changes in cardiac activity were analyzed during the frustration-inducing portion of the task and during the recovery period. Behavioral responses to frustration were evaluated using parent-reported frustration and soothability measures from age-appropriate Rothbart temperament questionnaires. We hypothesize that caregiver-reported behavioral responses to frustration and soothability measures will be correlated with physiological changes during frustration reactivity and frustration recovery respectively for both groups. Frustration regulation is expected to improve with age for each group. However, toddlers with FXS are expected to show poorer reactivity to and recovery from frustration-inducing tasks at each age and show less improvement in frustration regulation with age compared to TD toddlers.

**Smithwick, Sabrina**

**Mentor(s) -- Prof. Nina Moreno**

**Study Abroad Changed Me**

Through my international business major at University of South Carolina, there is the requirement to study abroad the spring semester of your junior year. Through a tough application process, I was accepted into the study abroad program at Bocconi University in Milan, Italy. People say going abroad “changes people” and I’ll help show you how. I had the opportunity to live in Milan for four months in the spring of 2017. I was able to travel to different cities and countries every weekend. I got to try new food, experience new cultures, and meet so many new people. I have always loved to travel and knew that I wanted to grow and experience more. I learned a lot about how to adapt to new situations, think on my feet, be open to every experience and challenge myself. I experienced traveling alone and the thought that goes into that, as well as paraglide when I am afraid of heights. My study abroad experience is so crucial to my individual growth and my increased desire to do more and see more. It is so easy to be scared while you’re away in a different country by yourself but the strength you get out of every experience is incredible. I plan to start working at Ernst and Young, LLP this upcoming summer on a large international client where I will hopefully gain travel opportunity.

**Sneider, Isabel**

**Mentor(s) -- Prof. Anna Oswald-Hensley**

**Confidence And Patience Make All The Difference**

As an Ambassador, I represent USC Sumter by guiding incoming students and helping them sign up for classes on orientation days, and I help with other events on campus. Ambassadors are typically the first students the incoming students come in contact with, which is why Ambassadors are wel-

coming and convey a positive image through involvement on campus and good academics. I want to graduate with as many experiences as I can, so when I go to get a job, I have a lot of different experiences that I can reference. I love being an Ambassador, because I am always learning how to respond and interact with people. My leadership and social skills have grown so much since I started as an Ambassador. I think the biggest thing I can take from my experiences as an ambassador is that, if you are patient and willing to listen and learn, interacting and helping other people is not very hard. All people are different. When interacting with large numbers of people you learn a lot of social skills, and also how to better interact with people. When I transfer to USC Columbia, I plan on getting involved with Chi Alpha, by doing that I will continue to meet large groups of people who come from all over the US and even other countries, which will help me to understand how to continue to better the way I interact and respond to people.

**Snell, Margarete Ruth**

**Mentor(s) -- Prof. Ernie Grigg**

**Girls With Purpose**

Girls With Purpose works to empower girls of all ages by engaging in service-based activities benefiting childhood cancer research. It is a program under our parent organization, With Purpose, based in Charleston. With Purpose uses youth-led activism, academic partnerships, and community partnerships to support the sorely lacking childhood cancer research space.

We focus on female empowerment, leadership and mentorship to target our college female audience here at USC and at other neighboring universities in Columbia. We believe that Girls With Purpose will be a successful program nationally and that Columbia is a great example of how this program will thrive.

Girls With Purpose is part of the PRSSA Bateman Competition, a national competition where teams around the country work to build the best PR campaign for the client. The goal of the competition is to “increase awareness of the problems surrounding childhood cancer treatment in the U.S. ... teams will achieve this goal, in part, evaluating the current awareness level of childhood cancer treatment and will find creative ways to recruit young people to engage in the organization.”

We began in Fall 2017 researching our audience’s awareness of childhood cancer research, their interest in service and demographics in our target market. We then developed a strategic plan (both long-term and for our 4-week execution period) and executed from February 15, 2018 - March 15, 2018.”

**Snyder, Madison**

**Mentor(s) -- Ms. Sarah Gay**

**Living Like a Local**

In the Spring of 2017, I studied abroad in Verona, Italy for five months. While there, I took international business classes taught by teachers from all over the world, visited local businesses, took classes on the local culture and cuisine, and became friends with many of the locals. I have always been intrigued by other cultures and the way other people live so I always knew I wanted to study abroad to see the different ways people go about their lives. I picked Verona with the intention of immersing myself into the local culture, because it was a smaller town with some tourism but still a strong local atmosphere. I wanted to feel like a local, rather than a tourist constantly on the outside looking in. While attempting to live like the locals I learned that the more effort I put forth, the more respect I gained. I tried to speak Italian, use the same hand gestures, match the style of clothing they wore, eat the same things they ate, and mimic certain ways they acted. Even when I failed miserably, I earned a lot of respect for trying. I noticed many people who came into Verona as tourists were easily ripped-off

by different vendors and tourist traps, and were often scolded by the locals. Instead of being treated the exact same way as the other tourists, I was treated like a friend and taught things only known by locals. Once I saw how much of an impact this made on my experience in Verona, I attempted to do the same when I traveled outside of Verona as well. During my time abroad, I ended up traveling to 8 countries and over 25 cities throughout Europe. I found that no matter where I went, it was important to first learn certain attributes of that culture, and then attempt to fit in. This resulted in an experience that helped me best understand and appreciate the European cultures from an insider's point of view.

**Soherwardy, Aalia**

**Mentor(s) -- Dr. Kate Flory**

**Professional Development through the Project to Learn About Youth**

Through the Exploration Scholar Grant from the Honors College, I was a part of the second stage of the Project to Learn About Youth under the guidance of Dr. Kate Flory. This CDC-funded research study aimed to determine the prevalence of mental health concerns in children in elementary through high school of the Kershaw County School District. While working on this project, I administered surveys to participants, actively recruited participants, and was responsible for areas of data processing. While acquiring these critical skills, I also improved interpersonal skills from my work with participants in the field and learned how to more effectively communicate with team members. I also learned the most critical ways to adhere to principles of ethics in a research study, through ensuring confidentiality and receiving consent from participants. After the project ended, I continued to work under Dr. Flory on a research paper about insufficient sleep based on the data I helped to collect during the project. Assisting with this paper has furthered my research skills as well, giving me professional writing experience. My presentation will include a synopsis of the Project to Learn About Youth and will detail how working on the project has given me invaluable research experience and professional skills.

**Souza, Emily**

**Mentor(s) -- Dr. Linda Shimizu**

**Design, Synthesis, and Assembly of a Macrocyclic Framework with a Hydrazone-based Framework**

The deliberate design of self-assembled functional materials is gaining traction among researchers due to the wealth of applications including guest storage, photocatalysis, transistors, and organic sensors (1). The Shimizu group investigates self-assembled bis-urea macrocycles, which assemble with high fidelity through bifurcated urea hydrogen-bonding interactions resulting in porous nanotubes consisting of stacks of "donut-like" macrocycles (2). When assembled, they form nanotubes with pores of about 5-10 Å wide, into which guest molecules (anything from solvents, alkenes, or other small molecules) can be loaded. Due to the size of the pores, the guest molecules are confined resulting in increased selectivity of photoreactions carried out inside the tubes in the solid-state. The purpose of this project is to design, synthesize, and assemble a macrocycle with a hydrazone-based framework. Two equivalents of a benzophenone linear analog will be tethered together via a "click reaction" of the benzophenone carbonyl with a hydrazine group using a known procedure (3). The macrocycle will be isolated and assembled in the solid state. Upon assembly, a unique grid-like structure is expected rather than a tube. The size and optimum geometry of the macrocycle will be investigated using Spartan '10 in order to determine if computations support urea-urea assembly and if the cavity will be large enough to support small guest molecules. Once synthesized the photophysical properties of the macrocycle will be investigated in order to determine how assembly impacts function of the materials.

(1) Martínez-Abadía, M.; Giménez, R.; Blanca Ros, M. Self-Assembled a-Cyanostilbenes for Advanced Functional Materials. *Adv. Mater.* 2018,

(2) Shimizu, L. S.; Salpage, S. R.; Korous, A. A. Functional Materials from Self-Assembled Bis-urea

Macrocycles. Acc. Chem. Res. 2014, 2116-2127.

(3) Schmitt, E.; Landelle, G.; Vors, J.; Lui, N.; Pazenok, S.; Leroux, F. A General Approach towards NH-Pyrazoles That Bear Diverse Fluoroalkyl Groups by Means of Fluorinated Iminium Salts. Eur. J. Org. Chem. 2015, 6052-6060”

### **Spires, Mckenzie**

**Mentor(s) -- Dr. William Jackson**

#### **Cloning Vif-resistant APOBEC3G into the lentiviral vector pLRed(INS2)R**

HIV-1 is a lentivirus encoding 15 proteins, which include three structural proteins (Gag, Pol, and Env), two regulatory proteins (Tat and Rev), and four accessory proteins (Nef, Vif, Vpr, and Vpu). This study focuses on the Viral infectivity factor (Vif), and how it interacts with Apolipoprotein B mRNA editing enzyme, catalytic polypeptide-like 3G (A3G). A3G induces extensive cytosine to uracil mutations, resulting in guanine to adenine substitutions, while Vif prevents A3G incorporation into virions by inducing A3G ubiquitination and proteasomal degradation. The goal of this project is to create a HIV-1 dependent lentiviral vector that expresses a fusion gene incorporating the Vif-resistant D128K A3G and the selectable marker puromycin-N-acetyltransferase using the *Thosea asigna* virus T2A peptide cleavage sequence. The fusion gene will be cloned into pLRed(INS2)R, which we have shown to express genes in a HIV-dependent manner. For this, puromycin-N-acetyltransferase was amplified from pSuper.Retro.puro and used as a template onto which the T2A was added in-frame at the 5' end. This sequence was cloned into pLRed(INS2)R creating pLTP.R. Correct cloning of the T2A/Puro gene was verified by sequencing. The plasmid was linearized for the next cloning step. Subsequently, D128K A3G was amplified from pHA3G-D128K using primers that eliminated the stop codon. A second PCR was used to add a 5' HA tag to A3G to aid in future analyses of expression. The resulting HA-tagged A3G fragment was cloned into the linearized plasmid generating a HA-tagged A3G/T2A/Puro fusion gene under transcriptional control of the HIV-1 LTR. Current studies are underway to verify all cloning steps and test expression of the fusion gene.

### **Stansell, Sydney**

**Mentor(s) -- Mrs. Katie Hopkins**

#### **Medical Internship Experience**

During the Fall of 2017, I worked as an intern at Palmetto Health Richland in Cardiopulmonary Rehabilitation. I was able to do many things during my internship including teaching education classes, patient and insurance paperwork, create exercise prescriptions, and most importantly patient interaction. This experience gave me the opportunity to develop skills that I will use on a daily basis in my future career. As an Exercise Science major and Psychology minor, this experience matched my educational emphasis perfectly. I was able to interact with people while they exercised as well as create their individual exercise prescriptions. Participating in this internship really showed me how much I desire to work in the field of medicine and work to help others live higher quality lives. I hope to continue gathering medical experience and develop myself into the best medical professional I can be.

### **Start, Ethan**

**Mentor(s) -- Dr. Joan Culley, Dr. Abbas Tavakoli**

#### **Impressions of Participants in a Chemical Mass Casualty Exercise**

Background: Validating Triage for Chemical Mass Casualty Incidents, a current study funded by the National Institutes of Health and the National Library of Medicine, examines the effectiveness of triage algorithms in handling a sudden influx of chemical-exposed patients. After reviewing medical records from the 2005 Graniteville chlorine spill, the Irritant Gas Syndrome Agent (IGSA) triage algorithm was created to triage suspected chemical victims.

**Purpose:** On April 4th, 2017, the USC College of Nursing held a one-day chemical mass casualty exercise, using junior and senior nursing students as mock patients. The purpose of this exercise was threefold: 1) education of nursing students in mass casualty scenarios; 2) testing application of the IGSA triage algorithm; and 3) testing effectiveness of decontamination methods.

**Methods:** Prior to the event, students completed a training course on mass casualty response. On the event day, students were assigned one of two activities: Emergency Department (ED) and Decontamination (DECON). ED students were sent through a mock emergency department triage, where they portrayed assigned symptoms either from a victim of the 2005 chlorine spill or a non-exposed patient. DECON participants were sprayed with fluorescent powder, then photographed before and after decontamination. After the exercise, all students were given a questionnaire sampling their impressions of the event and difficulties they experienced.

**Results:** On average, students agreed that the experience was valuable (3.8 / 5), peaked an interest in emergency response (3.9 / 5), and they would participate again (66%). However, the DECON group reported higher scores in these three areas (4.2/5, 4.0/5, 84%) than the ED group (3.9/5, 3.75/5, 0.61%).

**Discussion:** Students appreciated the experience, finding it valuable and interesting. The higher levels of participation and more physical nature of the DECON activities likely gave the DECON students a greater appreciation for the drill.

**Stevens, Scott**

**Mentor(s) -- Prof. Rui Qi**

**NFL Tourism: In-Season vs Off-Season**

With our research topic being about how NFL teams impact the local city we are seeing that there is a direct influence between NFL being in season and having a major boost on the local tourism and economy.. If you are a sports fan you know how big the NFL has become and how big of an impact it has in the surrounding area. There are thousands of fans that go to each game of the year. When thinking about people coming to an NFL game you have to think about several different aspects of it affecting tourism. You have people staying in hotels, eating at restaurants, shopping at local stores, and doing different activities throughout the city. We have already found an article that talks about the lodging impacts on NFL games, and the numbers are profits are very big for most teams. The NFL is one of the most popular sports in the world and it only makes sense that cities are impacted greatly from a NFL game. There are many articles that prove what our research question talks about. Our sample will be chosen from the articles we read because our style of gathering information is best gotten from the data. We have chosen that our sampling method would be cluster because with our large population size cluster seems like the best fit. Our data that we have gathered from interviewing and observation, we have a few people we are talking to and we are observing people to gather data. Our research has direct implications for the cities DMO because they can take this information and share it with local hotel's and business's. They will be able to adjust their operations to best fit game day and get the most out of having the extra tourism.

**Stevenson, Aida**

**Mentor(s) -- Dr. Joe Jones**

**How Does Social Equality Play A Role in Happiness Levels (in Iceland)?**

This project helped to establish the relationship between social equality and happiness in an economically sustainable country (Iceland). This project was used to help improve the aspect of social sustainability. The word sustainability has three facets, social, environmental, and financial. Social sustainability deals with how our interactions with ourselves and others can improve the world around us.

Iceland is ranked the 2nd country for happiness in 2015 per the World Happiness Report released by the Sustainable Development Solutions Network. The rankings are collectively based on reports from leading experts in economics, psychology, survey analysis, national statistics, health and public policy. The project was created to see if social equality was the primary reason behind this increased trend in happiness in Iceland since they are one of the only nations that has almost equal representation in Parliament and has established equal pay for men and women as well as maternity and paternity leave. If social equality was the reason behind the prosperity of the country, the idea was to bring some of those ideas back to the US and see if any of them could be implemented; however, reasons other than social equality were also investigated. Research was performed in the capital of Iceland, Reykjavik. 12 people were asked a total of 8 questions which ranged from demographic questions to in depth short answer questions. The results led to the conclusion that while social equality does lead to an overall sense of happiness, there were many other factors that do play a role in the overall state of the country such as environmental sustainability, the sense of community and the economic system that prevails there.

**Stitzlein, Kristin**

**Mentor(s) -- Prof. Laura Kissel**

### **Telenovelas in Colombia: Cultural Identity & Globalization**

Colombia is often dubbed a country “noveldero.” In other words, Colombians love telenovelas and the stories they tell. Telenovelas are a widely popular form of entertainment that has intermingled with the culture of Colombia from the mid-twentieth century to today. Throughout this period, certain themes of telenovelas have remained consistent, while others have changed and developed along with the cultural identity of the nation. All of this affects how both foreign viewers and Colombians themselves perceive and identify with Colombian culture. As a visual communications major with a minor in Spanish, I am deeply interested in how media forms both interact with the cultures to which they are distributed and reflect the cultures in which they are produced, and this specific project allowed for the analysis of both of these areas of study.

My research consisted primarily of interviews with native Colombians with various positions and relationships to telenovelas - producers, different demographical audiences, and cultural media specialists. These interviews together tell the story of the impact and intrigue of the telenovela in Colombia, as well as its perception abroad.

Many of these interviews did match my expectations. I hypothesized to see different themes and events in Colombia's history play out in telenovela content, and they often do. However, I was surprised to discover that despite a decreasing viewership amongst younger Colombians in the wake of new forms of online streaming, there was still a unanimous belief that telenovelas themselves will never disappear from Colombia entertainment landscape entirely, demonstrating the resiliency of this form of media due to its deep-rooted cultural ties. An interesting further study would be to analyze how and if, in the increasingly globalized media context of the world today, cultural themes from major media producing countries begin to find themselves even in such a culturally specific media as telenovelas.

**Stone, Haley**

**Mentor(s) -- Dr. C. Nathan Hancock**

### **Altering mPing transposition behavior using different plant promoters**

mPing is a tourist-like miniature inverted repeat transposable element that is actively jumping in the rice genome. The Ping or Pong transposable elements serve as the source of the ORF1 and Transposase proteins that mobilize mPing. Our goal is to develop the mPing element into an effective transposon tagging tool for gene discovery in plants. To be most effective, it is desirable to have transposition occur only in the gametes. This ensures that the resulting mutations will be heritable and affect the entire plant. We are testing if it is possible to induce pollen specific mPing transposition

in Arabidopsis by using the DLL promoter to express the ORF1 and Transposase. Green fluorescent protein, GFP, will be used as a reporter gene to indicate when and where mPing transposition occurs. Expression constructs with either a GmUbi, CaMV 35S or DLL promoters driving expression of Pong TPase T2A ORF1 SC1 ONE, which contains both Pong ORF1 and Pong TPase, were made. The floral dip method was used to transform Arabidopsis containing the mPing:GFP reporter construct. Transgenic lines were selected and fluorescence microscopy is currently being used to assess GFP expression. If the DLL promoter is only producing pollen specific expression, we expect to see little to no GFP expression for the T1 generation compared to the GmUbi and CaMV 35S controls. However, we anticipate that after going through pollen formation the DLL promoter may produce plants with full GFP expression in the T2 generation.

**Stottler, Kristin**

**Mentor(s) -- Dr. Madison DeMello Kindred, Dr. Bernardine Pinto**

### **Association between Responses to Recruitment Methods with Age and Education among Breast Cancer Survivors**

Introduction:

A critical step in any successful research study is the recruitment process to accrue and retain participants, especially when recruiting from clinical populations. The purpose of this study is to explore if there is a difference among recruitment methods (i.e., mailing vs media) with age and education. We hypothesized that there would be a significant difference in age of breast cancer survivors who responded to the two types of recruitment methods, with no significant difference in years of their education. That is, younger women would be more likely to respond to the study through media outreach, compared to mailings.

Methods:

The study recruited breast cancer survivors (<5 years since diagnosis) to participate in a home-based physical activity intervention. Mailing efforts were defined as informational letters sent by tumor registries, etc. and media efforts were defined as news articles, radio and social media sources. Age and education (years in school) were collected from all respondents who successfully completed a phone screen. Respondents were asked to define their education level: 1) less than high school, 2) high school graduate, 3) some college, or 4) college graduate.

Results:

From the 416 respondents with completed phone screens; 11 women were removed from the analyses because they were not recruited from a mailing or media source. Overall, 405 women (mean age =  $57.2 \pm 10.8$ , 64.4% college graduates) were included in the analyses. Mail respondents (n=310) had a mean age of  $57.7 \pm 10.8$  and were educated (58.9% college graduates). Media respondents (n=96) had a mean age of  $55.7 \pm 10.6$  and were educated (82.3% college graduate). Mean ages of respondents to mailings vs. media were compared using a t-test, and education of respondents to the two types of recruitment approaches were compared using a chi-squared test. There were no age differences between women who responded to either mailings or media ( $p=.117$ ). However, education years were significantly different ( $p=.001$ ): more educated women responded to media recruitment than mailings.

Conclusion:

Breast cancer survivors, regardless of age, responded to both mailings and media recruitment approaches. However, more educated women were more responsive to media efforts as compared to mailings.

**Strampp, Brittany**

**Mentor(s) -- Dr. David Crockett**

**Rainbow Washing and Queer Marketing**

It is easy to miss the mark when marketing to the LGBT+ community. The term rainbowing is used to describe when a business uses LGBT+ symbols to build consumer credibility but isn't actually a queer-friendly business. After same-sex marriage was legalized in 2015 in the USA, a lot of companies slapped rainbows and pride flags on their ads. This was the minimum effort to show their support without actually being supportive of the queer community or even within their own corporate culture. With the guidance of Dr. Crockett, I am going to be doing the content analysis of LGBT+ ads and analyzing what they should be doing differently. I am developing an understanding of how consumer behavior has been shaped through readings in social science and applying it to this topic. It is an ongoing process in understanding the portrayal of LGBT+ people in advertisements relative to straight people. This is an important issue as the queer community gains more buying power. Segmenting gets really complicated and it is really difficult for companies to understand unless they are personally in that segment. If companies want to develop their long-term relationship with the queer community they need to understand the difference isn't just sex. Data collection and analysis of these ads is still ongoing but anticipated theories included that companies need to understand how subtle things are important in order to build these relationships. Companies need to be more thoughtful when proclaiming themselves to be allies and fully understand the significance when they put that rainbow in an ad.

**Strickland, Courtney**

**Mentor(s) -- Dr. Daniel Fogerty**

**The contribution of visual cue synchrony to recognition of temporally interrupted speech**

Currently, it is unclear how well individuals temporally integrate visual cues with a degraded auditory signal to support the recognition of speech in adverse listening conditions. This project investigated the importance of visual speech cues for perceptually filling-in missing auditory speech information. This was studied by varying the temporal synchrony of visual speech information with temporally interrupted auditory speech presentations. Experiment 1 involved two groups of listeners that heard either normal or cochlear implant simulated (i.e., vocoded) speech. Each listener group completed three conditions: interrupted auditory-only speech, auditory speech with video presented synchronously with the auditory interruptions, and auditory speech with video presented asynchronously with the interrupted auditory signal. Participants verbally repeated the sentence after each stimulus. Results demonstrated no significant difference between performance on synchronous and asynchronous audio-visual conditions. However, a significant benefit of visual information was observed in both conditions, particularly for the vocoded listener group. This first experiment used high-context sentences which may have facilitated temporal integration of the two modalities across temporal interruptions. Additionally, a ceiling effect may have reduced the potential contribution of visual cues. To further study this topic, Experiment 2 was carried out involving the same three conditions: auditory-only, synchronous, or asynchronous auditory-visual speech signals. However, in this experiment low context sentences were used and further modified by low pass filtering the normal speech to reduce overall speech intelligibility in the auditory-only condition. Three different interruption rates were also tested. Data collection is currently in progress.

**Stricklin, Hunter**

**Mentor(s) -- Mrs. Sarah Gay**

**Perpetual Learning Through Professional Engagement**

My experience at the University of South Carolina has provided me with many opportunities that have shaped my global mindset. Throughout the courses I have taken through The Darla Moore School of Business, I have been exposed to many different business ideals and concepts that I have applied outside of the classroom. Seeing the connection between the concepts learned in the classroom and

the application of these concepts outside of the classroom helped me realize the importance of continuous learning. Some of the experiences that have significantly developed my views on leadership include holding leadership positions through campus organizations, internships with local businesses, and completing the Capstone Consulting Project through the Darla Moore School of Business. These experiences were vital to the growth of my leadership skills and ideals throughout college. This portfolio will take you my collegiate journey of learning about myself, becoming a well rounded individual, and my insights on leadership through professional and civic engagement. I have developed three key insights that depict my personal growth from within and beyond the classroom. I believe the culmination of these leadership skills will allow me to be a lifelong learner and an excellent leader throughout the rest of my life and career.

**Strothers, Lauren**

**Mentor(s) -- Dr. Natalia Shustova**

### **Photophysics of Coordinatively Immobilized Photoswitches**

Optically triggered photochromic materials are unique materials which have been utilized in materials such as “smart” windows and lenses, and efficient sensors. Coupling these photoswitches, namely diarylethene and spiropyran, with porous metal-organic frameworks (MOFs) leads to a whole new possibility of advanced materials.

Diarylethene- and spiropyran derivatives are some of the most commonly studied photoswitches due to their unique photophysical properties. Diarylethene-based compounds exhibit a high resistance to fatigue, as well as fast photoisomerization in the solid state, whereas spiropyran analogs isomerize very slowly in the solid state. We envisioned that coordinative immobilization of photochromic molecules inside a MOF could drastically increase the performance of the photoswitches, which is a key parameter for their implementation as sensors and other advanced materials.

Herein, we present the development of three new diarylethene- and spiropyran systems with a particular focus on their photophysical properties. Our studies include extensive characterization of the properties of the chosen photochromic molecules in solution, in the solid-state, and as linkers inside of a MOF by utilizing UV-vis and diffuse reflectance spectroscopies. The presented study shows that utilization of a porous MOF in the development of novel photochromic molecules can increase their performance for a multitude of applications, which have the potential to significantly enhance the current technological landscape.

**Suarez, Jeremy**

**Mentor(s) -- Dr. Xiaomei Zhang**

### **Characterizing and Predicting the Social Trends of a Local Community Based on Online Social Networks**

According to a summer article in the Island Packet, Bluffton is the fastest growing city in South Carolina. This provides a new challenge to city officials and new opportunities for businesses. To have the most adaptable plan, city leaders and businesses need to know the general interests of the growing community.

During this modern age of social media, people are organizing into social communities of shared interests. Because the social groups are formed online, they are easily tracked and measured. The date a group is created is collected and stored. Online planning allows for quick dissemination of information to the individuals of the group and any student of social behavior or another third party. With social media sites such as Meetup, people create social groups, organize social events, and track the number of members. Moreover, Meetup has APIs, which can be leveraged by a third party. APIs are preexisting computer code that allows users to pull information stored in the originators' database.

APIs is a growing interface in the technology and marketing industry. The preexisting code allows programs to connect easily and share information instantaneously. Large amounts of data can be

retrieved at a rapid pace. The hastened pace enables data to be pulled quickly; therefore, giving more time to data analysis and faster predictions.

Using APIs from social media and effective data mining techniques, it is feasible to find patterns and trends of social groups, which in turn can lead to an educated prediction. The model can be applied to a real, growing community such as Beaufort County. With accurate predictions, city leaders and business can tailor make options for the community and be better prepared.

Current research based on Meetup mainly focuses on developing a system for recommendations, including group and event recommendation for users, event-participant arrangement for users and the prediction of activity attendance and user behaviors [14,15]. With the highest level of assurance possible, this research will be the first work to characterize and predict social trends of local communities using an online social network such as Meetup.

**Sudak, Sophia**

**Mentor(s) -- Ms. Maeve Snyder**

**Mechanisms of competition: The role of space preemption in a classic competitive interaction between two rocky intertidal barnacles**

The barnacle species *Cthamalus montagui* and *Semibalanus balanoides* coexist in rocky intertidal ecosystems throughout the United Kingdom. Interspecific competition for space causes mortality and depends on initial recruitment density. These barnacles compete through interference competition where *S. balanoides* is superior at crushing or smothering individuals of *C. montagui*. Therefore, space preemption may offer a protective effect due to increased time to calcify shells. We asked whether preemptively occupying a cleared space would confer an advantage to whichever species received a head start. Barnacles were removed at staggered intervals – based on spawning season – to simulate recruitment failure. We measured mortality of *C. montagui* and *S. balanoides* between Spring 2016 and Spring 2017 to determine if space preemption benefited either species. The expectation was that *C. montagui* would experience less mortality with space preemption. Additionally, mortality of *S. balanoides* (the dominant competitor) would not change with the hypothesized advantage of space preemption. We found decreased mortality of *C. montagui* in the absence of interspecific competition, therefore we expect that space preemption is an important determinant of competitive outcomes in these communities. Our study additionally found variation in the effect of space preemption across latitude. Recruitment densities of *S. balanoides* and *C. montagui* vary across our study region due to differences in reproductive physiology. The influence of recruitment dynamics on competition is valuable knowledge for understanding community structure. Understanding mechanistic drivers of competition will also improve the ability to forecast community shifts in the face of global change.

**Sullivan, Kathryn**

**Mentor(s) -- Dr. Hilary Lichterman**

**Practicum Experience Taught Me How to Treat Illnesses and Injuries I Had Never Seen Before**

As an Exercise Science major at UofSC, I am required to complete 300 hours at an off-campus location, preferably one that relates to my future career and professional goals. During this spring semester of 2018, I have been completing my practicum at The Sigurd Center for Ortho and Neuro Rehab. This is an outpatient physical and occupational therapy clinic that works with patients who vary in age and injury, or reasoning for therapy. At the clinic, I work almost as an aide, doing administrative work to help in the smooth operation of the clinic, keeping the gym fully stocked and clean after each patient uses equipment, and working with the therapists, helping them with patients and learning from them. This experience has opened my eyes to an array of diseases and injuries that I did not know much about, such as neurological disorders like strokes and Parkinson's Disease, and orthopedic issues like brachial plexus injuries and amputations. Because I am there for a full semester, I am able to see the improvement in stroke patients, the progression of Parkinson's Disease, the strengthening of patients with brachial plexus injuries, and the improvement of amputee's walking. As I go into phys-

ical therapy school after graduation, I am confident that this is the field I want to work in and I now have a better idea of what it would be like to spend my career in the outpatient field.

**Sullivan, Mary Elizabeth**

**Mentor(s) -- Ms. Jordan Ezell, Dr. Jane Roberts**

**Comparing Heart Activity and Anxiety Symptoms in Children with Autism Spectrum Disorder and Typically Developing Children**

Autism Spectrum Disorder (ASD) is a highly prevalent neurodevelopmental disorder that occurs in approximately 6 out of 1000 children (Faras, Ateeqi, & Tidmarsh, 2010). ASD is diagnosed in children who show difficulties in social situations and communication, display stereotyped behaviors and restrictive, repetitive interests (American Psychiatric Association, 2013). Anxiety concerns are one of the most common problems in children with ASD, however it is not considered a core characteristic of ASD (Ghaziuddin, 2002). Measuring anxiety in children can be very difficult, thus using a physiological measure like heart activity can help identify features of anxiety. Children with ASD often show a higher level of arousal compared to typically developing children (Mertens, J., Zane, E. R., Neumeyster, K., & Grossman, R. B., 2017). The objective of this study is to assess the relationship between the baseline heart rate of ASD children and anxiety by (1) comparing the difference in baseline heart rates between typically developing children and ASD children and (2) correlating baseline heart rate to anxiety symptoms. The participants in this study consist of two groups, children who are high-risk for ASD and a low-risk, typically developing (TD) group. The Child Behavioral Checklist (CBCL) is a parent questionnaire in which parents answer a series of questions about their child's behavioral and emotional difficulties. For this study, the DSM-V Anxiety Problems subscale was used to provide a psychological assessment of their child's anxiety symptoms. Baseline heart activity was collected through the attachment of a heart rate monitor while viewing a movie to capture resting state heart activity. First, T-test analysis will be done to see if there is evidence of any significance between baseline heart rate between the TD and ASD samples. Then, correlation analysis will be conducted to look for a relationship between baseline heart rate and CBCL anxiety subscale. The findings for this study could potentially identify early risk predictors of anxiety in ASD and TD. The findings could also influence early treatment methods for individuals with ASD.

**Sulzer, Kara**

**Mentor(s) -- Ms. Natalie Onopochenco**

**Gilda's Club South Jersey**

Cancer can have a devastating impact on an individual's life, as well as on the lives of the family and friends of the individual. Gilda's Club - an affiliate of the Cancer Support Community - provides a safe environment to educate and support those touched by cancer at no cost. Their mission is to "ensure that all people impacted by cancer are empowered by knowledge, strengthened by action, and sustained by community." In 2014, I made the decision to volunteer at Gilda's Club South Jersey, the only cancer support community located in southern New Jersey, in the child support sector of the organization. Here I worked one-on-one with children impacted by cancer, helping them express their feelings and cope with their situations through communication and activities. When I first decided to volunteer at Gilda's Club, I hoped to have the opportunity to impact children's lives in a positive way; I did not anticipate, however, the monumental impact the children would have on my life. I have transformed into a role model, learned to put things into perspective, and put into my everyday life the values I want to uphold: compassion, courage, patients, and leadership. Today, I consider Gilda's Club South Jersey to be my second home and the community members to be my second family. This experience has had an invaluable impact on my life, and I cannot imagine where I would be today without the support and love of my second family.

**Sunderlage, Alexis**

**Mentor(s) -- Mrs. Diane Ehlers**

**Effects of Sedentary Behavior on Subjective Memory Impairment in Breast Cancer Survivors**

Background: Up to 83% of breast cancer survivors (BCS) report cognitive declines, especially in memory. Studies in older adults indicate that prolonged sitting, independent of physical activity, may negatively impact cognitive function. The purpose of this study was to determine the effects of total daily sitting and different types of sitting behaviors on subjective memory impairments in BCS.

Methods: BCS (N=430) completed iPad-based questionnaires assessing demographics, breast cancer history, sedentary behavior (Longitudinal Aging Study Amsterdam [LASA] Questionnaire), physical activity (Godin Leisure-Time Exercise Questionnaire [GLTEQ]), and subjective memory impairment (Frequency of Forgetting [FOF] Scale). The LASA asks individuals to report time spent sitting on weekdays and weekends in various types of behaviors (e.g., TV watching, puzzles/playing an instrument, listening to music, socializing). The data were analyzed using multiple linear regression controlling for age, receipt of chemotherapy, body mass index, and physical activity.

Results: BCS reported more sedentary behavior on weekdays (690.73±387.64 minutes) compared with weekends (651.77±318.68 minutes),  $p=0.01$ . BCS reported more sitting for computer use and meetings/administrative tasks on weekdays, both  $p<0.001$ . On weekends, BCS reported more sitting for reading, television watching, hobbies (e.g., knitting, puzzles), socializing, and attending church/theaters, all  $p<0.001$ . Weekday sitting was significantly associated with greater subjective memory impairment on all FOF subscales,  $\beta=-0.11$  to  $\beta=-0.19$ , all  $p<0.02$ . These associations were stronger between weekend sitting and all FOF outcomes,  $\beta=-0.10$  to  $\beta=-0.24$ , all  $p<0.04$ . More weekday minutes listening to music was associated with less memory impairment,  $\beta=0.14$ ,  $p=0.01$ . Weekend socializing was marginally associated with less memory impairment,  $\beta=0.09$ ,  $p<0.10$ , and weekend computer use was marginally associated with greater memory impairment,  $\beta=-0.10$ ,  $p=0.08$ .

Conclusions: Independent of physical activity, greater sedentary behavior time was associated with greater subjective memory impairment. BCS reported more weekday sedentary time, but the effect of weekend sedentary time on subjective memory impairment was stronger. Type of sedentary behavior showed inconsistent and week association with memory impairment. This suggests strategies to reduce sedentary time overall, opposed to targeting specific types of sedentary behavior, may benefit subjective memory impairments in BCS. More research is warranted to investigate the effects of sedentary behaviors on cognition in BCS.

**Sutton, James**

**Mentor(s) -- Dr. Julius Fridriksson, Dr. Brielle Stark, Dr. Alexandra Basilakos, Dr. Chris Rorden**  
**Examining brain damage associated with poor reading comprehension**

Reading comprehension involves integrating information about what words mean which involves a widely distributed network of brain areas. It remains unclear which of these areas, and the connection between areas, are most associated with poor reading comprehension that we often see post-stroke. Connectivity is especially interesting, because often areas that are not anatomical neighbors will work together on tasks, and it is likely the case that stroke disrupts these relationships which leads to impairment. In this project, we will analyze brain damage to specific areas that correspond to poor reading comprehension and we will also examine reduced functional connectivity between areas that correspond to poor reading comprehension.

We analyzed data in 88 (59 male) stroke survivors at the University of South Carolina whose mean age was 62.33 (SD=11.22). All stroke survivors had damage to their left hemisphere, were native English speakers, and were at least six months post-stroke upon assessment (M=45 months, SD=43.44). Using a common test of reading comprehension, acquired from the Western Aphasia Battery - Revised part two, we assessed each participant's reading comprehension. The total score for each participant was a proportion of the total possible score (out of 20). In all participants, we acquired structural and functional MRI scans and analyzed how brain damage and reduced functional

connectivity associated with poor reading comprehension.

The mean score on reading comprehension was 15.5 (SD=4.98), out of 20 total points. Damaged left hemisphere areas that were statistically associated with poor reading comprehension were largely in the temporal lobe and functional disconnection was found between left hemisphere temporal and frontal regions as well as bilateral temporal-to-frontal regions.

Poor reading comprehension was found to associate with structural damage in temporoparietal lobe and underlying deep white matter as well as functional disconnection between temporoparietal areas and areas of the lateral frontal lobe. This information is helpful clinically because damage to these areas and connections may preclude an ability to relearn reading.

**Svendsen, Sara**

**Mentor(s) -- Mrs. Katie Hopkins**

**A Distinctive Difference – Bridging Health and Education**

Last summer, I worked for Distinctive Schools, a nonprofit charter school management network based out of Chicago, IL. The schools are K-8, located in underserved areas where there is not a good public school option and are free for students to attend. These schools build educational equity, allowing children opportunities that they would otherwise not have. As a public health major at the University of South Carolina, I have taken many classes regarding health access and equity, but never have been able to step out and put the lessons to use. Working at Distinctive Schools helped me see how much farther my education applies than to just basic health needs. By serving as the marketing and communications intern, I was able to work on projects to further student enrollment, get the community involved, and spread awareness for what makes the schools different. I saw a direct impact of my work on the community as I toured the schools and spoke with students, teachers, and parents. I decided to major in Public Health because I wanted to help people, but before this internship I did not know how. Through my experiences at Distinctive Schools, I realized how I could tailor my passion for helping others into a sustainable career. Now, a year later, I am enrolled in a graduate program for Nonprofit Management beginning in the fall, because I feel that is the way that I will be able to make the biggest impact.

**Swiecki, Allison**

**Mentor(s) -- Dr. C. Nathan Hancock, Dr. April DeLaurier**

**Analyzing a Tol2-Based activation tag construct in zebrafish and yeast**

Transposable elements, are segments of DNA that can move from one region to another within the genome when induced. The Tol2 transposon from Medaka fish has successfully been adapted for transgenesis, integrating foreign DNA, in a wide variety of vertebrates. Our goal is to develop the Tol2 element into a mutagenesis tool for gene discovery. Activation tagging, a form of transposon tagging, is when a strong enhancer is positioned within the element. Activation tags can induce overexpression of genes, allowing us to learn about the function of genes that may otherwise be hard to study because of lethality or redundancy.

Zebrafish are a model for vertebrate development, therefore activation tagging within zebrafish will allow for the discovery of developmental-related genes. A Tol2-based activation tag construct was engineered by PCR, digestion, and sequence analysis. The construct consists of the Tol2 terminal inverted repeats (TIRs) flanking the enhancer region of the Beta-actin promoter. This activation tag was cloned next to the remainder of the Beta-actin promoter, and a mCherry reporter gene to indicate if transposition has occurred. A Tol2 transposase construct was previously engineered to provide transposase, which is necessary to induce transposition of the activation tag in zebrafish. These constructs were coinjected into zebrafish embryos to create a population for measuring transposition rates and look for altered phenotypes. Concurrently, yeast transposition studies are being performed in order to

identify methods which increase Tol2 transposition rates. We are testing if removal of a Nuclear Export Signal (NES) from the Tol2 transposase will allow for more efficient transposition.

**Targonski, Caroline**

**Mentor(s) -- Mrs. Katie Hopkins**

**The Positive Power of Self-Efficacy in Individuals with Intellectual and Developmental Disabilities**

The Arc is a nonprofit agency that promotes and protects the human rights of people with intellectual and developmental disabilities and actively supports their full inclusion and participation in the community throughout their lifetimes. While serving as an intern at The Arc of South Carolina, I witnessed the growth of self-efficacy in individuals with disabilities and saw the positive impact this self-determination and empowerment has on their lives. Psychologist Albert Bandura's concept of self-efficacy is described as a person's belief in his or her ability to succeed in a particular situation, which plays a major role in how one approaches everyday life tasks, goals, and challenges. As an intern, I had the privilege of having a hands-on role as a volunteer for 3 sessions of The Arc of South Carolina's "Everyday Living" program. This is an 8-week interactive training program that develops independent living skills such as cooking, cleaning, personal hygiene, nutrition, finances, and safety among young adults ages 13-21 with disabilities. The goal of each meeting is to strengthen the participants' self-confidence, positive behaviors, and ultimately self-efficacy through reinforcing their ability to complete various independent living life skills. Through my experience I witnessed the positive power of self-efficacy. Although the participants' disabilities often hinder their self-confidence, each "Everyday Living" participant overcame their self-doubt. This empowered them to recognize their unique skills, personal strengths, and ability to accomplish new tasks and reach individual goals. This perspective on self-efficacy will be instrumental in my future career as I become an Occupational Therapist and empower others to take part in their hobbies, passions, and activities despite any illness, disability, or emotional difficulties.

**Taylor, Kathryn**

**Mentor(s) -- Dr. William Jones**

**Finding My Passion in Leadership**

An undergraduate degree provides academic knowledge, but leadership experience is what differentiates someone for future employers. Throughout my senior year of college, I have been a scholars program intern in Corporate Communications at Colonial Life, a voluntary benefits insurance company. In this internship, I support both internal employee communication as well as external brand promotion and media relations. Furthermore, I am the project owner for the company social media brand ambassador platform that has grown to include over 340 sales agents that have shared messages to an audience of over 26 million people. As the project lead, I've learned how to be comfortable with ambiguity and confident in sharing the value of work I've produced with others. Overall, this experience has allowed me to test my ability to lead both projects and groups, which has been important to my growth as a student about to enter the workforce. As a result of this, I had valuable experiences to speak on as I progressed through interviews and eventually accepted a job for after graduation.

**Taylor, Sarah**

**Mentor(s) -- Dr. Nina Moreno**

**Becoming an Effective Health Care Professional in a Globalized World**

In Spring 2017, I spent my Semester in San Ramon, Costa Rica to take classes in global health, culture, and language in an immersed setting, fulfilling components of my degree in Global Studies. My classroom experiences at Carolina prepared me by quietly shaping and widening my cultural perspective. In addition to my classes abroad, I traveled, participated in a field study to Cuba, and lived with a host family. Through application of what I learned in my classes, I was able to see how culture is

expressed in all aspects of human life. I developed my ability to connect with others, navigate cultural perspective, and view history in context.

This experience was personally significant for me, because it helped prepare me to become an effective health care professional in a globalized world. In addition to practicing compassion and understanding, I hope to use my respect for how history and culture dictate health outcomes and beliefs. Through respecting people's backgrounds, I intend to help cultivate patient trust in modern medicine and promote compliance and effective treatment. The lessons I have learned through my studies and experiences have applications in both domestic and global settings.

**Thomas, Hannah**

**Mentor(s) -- Dr. Scott Decker, Mr. Michael Eason**

**Comparing Cognitive and Neurological Profiles of Children With and Without Dyslexia**

Many children with adequate intelligence face difficulties when learning to read. Those who have adequate intelligence but cannot read despite proper educational opportunities are identified as having a specific learning disability. Early identification of specific learning disabilities (e.g., dyslexia) is essential to allow for the proper individualized instruction necessary facilitate academic success in these children. However, the complex profiles of such disabilities lead to a delay in the identification and diagnosis of them, putting the child at a disadvantage in the classroom. The goal of this study is to contribute to the neurological and cognitive understandings of specific learning disabilities. We aim to improve the identification of such disabilities and promote earlier interventions to prevent academic decline. Utilizing standardized tests of cognitive and academic abilities (Woodcock-Johnson IV Cognitive Abilities and Achievement) and neurological profiles of brain connectivity (Quantitative Electroencephalography; qEEG) we will compare comprehensive evaluations of children with (n=34) and without (n=30) specific learning disabilities. In comparing the groups we aim to identify specific indicators within the cognitive and neurological profiles in regards to the identification of dyslexia. Ultimately, we hope to offer generalized findings for purposes of earlier identification of specific learning disabilities, and thus enhance the treatments and assistance for these children, providing them the opportunity to excel in their education.

**Thomas, Hannah**

**Mentor(s) -- Mrs. Kelly Caravella, Dr. Jane Roberts**

**Language and Cognition as Predictors of Change in Social Communication in Young Children with Fragile X Syndrome**

Fragile X Syndrome (FXS) is a genetic disorder characterized by intellectual impairment and behavioral and learning delays. FXS is highly correlated with autism spectrum disorder (ASD); 60-74% of males with FXS meet for ASD criteria. Despite high comorbidity of ASD in FXS, there is limited research investigating the diagnostic stability and maturational qualities of the disorder. This study aims to contribute to the understanding of social communication changes in FXS. We hope to obtain a better understanding of the symptomatic development of children with FXS, and how these developments relate to language skills and cognition.

Two sequential assessments of males ages 2-6 (n=17) were selected from a longitudinal study on children with FXS. Data was taken from two measures; the Brief Observation of Social Communication Change (BOSCC) and the Mullen Scales of Early Learning (Mullen). The BOSCC is a coding measure used to rate core ASD behaviors in minimally verbal children. Two sequential BOSCC scores will be compared to determine a change score. The Mullen is a standardized measure of development in children under the age of 5. Three domains of interest, Expressive Language (EL), Receptive Language (RL), and Visual Reception (VR) will be used in analyses.

A preliminary Pearson's correlation analysis was completed to examine the relationship between EL, RL, and VR and BOSCC change scores. Correlation analysis identified no significant relationship

between the BOSCC and the Mullen domains; EL,  $r(17) = .39$ ,  $p = 0.13$ , RL,  $r(17) = -.19$ ,  $p = 0.46$ , or VR,  $r(17) = -.25$ ,  $p = 0.34$ . These results suggest that neither EL, RL, or VR is significantly related to BOSCC change scores. Final analyses will be conducted on our total sample size ( $n=25$ ). Our initial findings suggest that neither cognition nor language abilities may not be related to social communication change over time. Our small sample size and restricted time frame impacted the generalizability of the results. Tracking changes in a larger sample over a longer time frame may better capture the complex development of ASD in FXS.

**Thornhill, Shelby**

**Mentor(s) -- Dr. William Jones**

**A Lesser Known Equation: Integration  $\neq$  Assimilation**

Over the four years of my undergraduate career, I struggled to find the balance between integrating myself in a new culture rather than totally assimilating myself. This confusion arose when I first moved to South Carolina for college; it continued when I studied abroad in Prague, Czech Republic. Upon returning back to University of South Carolina after a semester abroad, I watched as my international friends experienced similar problems and issues. As I work towards earning my Graduation with Leadership Distinction in Global Learning, I have come to the realization that integration and assimilation are not interchangeable vocabulary words. While they may be synonyms to one another in Microsoft Word, they are two antonyms in my mind. I believe the distinction comes in the form of remembering, acknowledging, and celebrating your home culture, instead of disregarding or ignoring it in order to “fit in” with a new community. This presentation addresses my key insight, my personal experiences, and the ways in which I work to balance this equation in everyday life.

**Thurman, Deanna**

**Mentor(s) -- Prof. Tricia Kramer**

**Building Strong Global Leaders**

I spent the Spring semester of 2017 studying at Kedge Business School in Marseille, France. I had done short term study abroad programs before, but living in a foreign country for an extended period and fully immersing myself in the culture was an experience that was totally new. I took a variety of classes at Kedge ranging from Strategic Game Theory to Regional Business Environment in the Southern Mediterranean and traveled across the South of France, 14 countries in Europe, and Singapore and Vietnam. I have always matured hugely through the experiences I’ve had while traveling and I was attracted to a semester program because I knew how interacting across cultures and adapting to the norms of a new country would lead to personal growth. I observed the consequences that come from being close-minded, confronted my own biases, and learned about the success that comes from collaborating with people from different cultural backgrounds. These ideas are some of the cornerstones of my personal beliefs now and have resulted in me growing into a stronger and better leader both globally and in the classroom. I hope to utilize the skills that I learned about working with people from different cultures and backgrounds to be a more effective communicator and negotiator in my future career in both domestic and international politics. I also hope that my understanding that everyone brings something to the table will allow me to foster dialogue and hear ideas from unlikely sources without bias, as I believe this is the key to success.

**Tramontin, Angel**

**Mentor(s) -- Ms. Lisa Camp**

**Promoting Diversity, Inclusion, and the Power of Networks in the Workplace**

As a graduating senior, I have accomplished quite a bit through my four years at Carolina. I have joined campus organization to effect change, learn about myself, and meet new people. I have undertaken many a class project within my business curriculum. I have tackled immense problems through a variety of internships both off and on-campus. This project explores how group dynamics can

change by accepting diversity, how we can combat the lack of said diversity, and finally how a strong network can propel you for success.

I have been involved with an organization by the name of Management Leaders for Tomorrow (MLT). This organization strives to connect talented underrepresented students (Black, Latino, and Native American) with high caliber internships and full-time positions. Through this organization, I was able to secure my full-time role after graduation. I joined this cohort of students from all over the nation to tap into an invaluable network of students creating real change in the world and collaborating with some of the most important organizations in America. This organization helped me realize and pinpoint my passion for diversity, namely in the workplace. It introduced me to people that I wouldn't have met at USC, it showed me what is possible when you connect talent and opportunity, and it inspired me to continue chasing that post college.

I want people to understand that sometimes we may get caught in our own bubbles in our environments. It is a call for awareness of the lack of diversity we see in many professional organization in college and after. It is a demonstration of what can be achieved when you realize the untapped potential when you create avenues for success simply through education and access. Fortunately for me, through MLT I have found my next play at LinkedIn where I will continue to work to provide economic opportunity for EVERY member of the global work force.

**Trask, Kaiya**

**Mentor(s) -- Dr. Barbara Koons-Witt**

**Incarcerated Women and Their Motherhood Identities**

The current study uses data collected from an existing set of in-depth interviews with 22 incarcerated mothers housed at a maximum prison facility to explore how they feel about their motherhood identity, and how the age of their children may shape that identity. Prior research suggests that being a mother may serve as an incentive to desist from crime and lead to success when released from prison, yet incarcerated mothers face numerous obstacles in contacting and maintaining relationships with their children. For women who view this identity as particularly salient, their ability to have an active role as mothers is diminished and the way that they see themselves as mothers can change. Relying on descriptive, topic, and analytic coding strategies, Nvivo is used to organize and code data from the in-depth interviews with subjects about their motherhood identity (i.e., self, external, importance, role). Results from this study have important implications for theory and criminological research, policy, and programming. For instance, understanding the experiences of incarcerated mothers and how they view their motherhood identity can help tailor specific correctional programming and policies to facilitate relationships between inmates and their children, allowing women to play an active role as mothers while behind bars or creating a supportive environment that adequately prepares mothers for reunification with their children and possible desistance from crime.

**Traurig, Julianna**

**Mentor(s) -- Prof. Theresa Harrison**

**Summer Risk Analyst at JPMorgan Chase & Co.**

For summer 2017, I was a credit risk intern at JPMorgan Chase & Co. in the Chief Investment Office (CIO) in New York City. Risk analysis is essential for the CIO because it calculates the probability of the bank to be paid back from its investments. My finance teacher sent out a link about a diversity application for JPMorgan called "Winning Women's Superday," which piqued my interest because JPMorgan has an accredited risk program. I submitted my online application, received an invitation to attend the event, and three days later, I received an offer to be a summer analyst. My main project over the summer was analyzing the retail industry and the exposure the securities owned by the CIO had to that specific industry. While working with my team on this project, I realized that I enjoyed the people I worked with along with the project I was doing. This internship helped me become more proficient in Excel, how to analyze certain securities, and most importantly, decide what I wanted to

do after graduation. Next year, I will be moving to New York City and returning to work in JPMorgan's credit risk group.

**Treadway, Michaela**

**Mentor(s) -- Dr. C Nathan Hancock**

**Correlation of the rs4988235 C/T Single Nucleotide Polymorphism with Lactose Intolerance**

Lactose intolerance is the inability to digest lactose due to low levels of the lactase enzyme in the small intestine. As a result, lactose travels to the large intestine and induces bacteria growth and intestinal discomfort. Single Nucleotide Polymorphisms (SNPs) are used to analyze the genetic variation in human populations. Previous studies have identified a SNP 14kb upstream of the lactase gene that can predict lactose intolerance with about 90% accuracy in some populations. A homozygous allele CC at the rs4988235 locus is associated with lactose intolerance. The purpose of this study was to test the reliability of the rs4988235 SNP test in a local population. It was predicted that those who reported lactose intolerance but don't show the expected CC genotype may have another medical condition such as Celiac disease or milk allergies. DNA was collected from saliva samples of individuals with self-reported lactose intolerance and genotypes were tested by qPCR. In addition, pedigree analysis of a family segregating for lactose intolerance was performed. We found that 12% of participants with the CC allele did not report lactose intolerance. Similarly, about 25% of participants with the CT or TT genotype reported lactose intolerance. Together this means that the rs4988235 allele was less accurate in our population than what was observed in other populations. Our data confirms that there are multiple mechanisms which cause lactose intolerance, but suggests that genotyping of the rs4988235 SNP could hasten diagnosis.

**Tripp, Nina**

**Mentor(s) -- Dr. Theodore Rosengarten**

**Education Within Borders: Holocaust Education in Germany, Poland, and Ukraine**

In May of 2016 I studied abroad on a Maymester with Professor Ted Rosengarten on a trip called "Tracing the Holocaust Through Europe." We traveled for three weeks through Germany, Poland, and Ukraine and studied the memorialization of the Holocaust and its integration into school systems. The ways that Holocaust education is handled across the borders of Germany, Poland, and Ukraine, are both vastly different from each other as well as very telling of the cultural differences across Central and Eastern Europe. I focused on the Germans' integrative Holocaust Education system, the Ukrainians' lack of Holocaust education, and the Polish people's generational division in their educational practices. With the intention of further pursuing Holocaust research and Human Rights studies in my future academic plans and career goals, this insight has helped me to understand the complexities of these modern relationships with genocide and will give me valuable background into how and why we as humans memorialize and think about our shared history.

**Tucker, Analeigh**

**Mentor(s) -- Dr. Randy Lowell**

**Sensory Processing Differences across Personality Types**

Personality varies widely across human beings and differences in personality can be difficult to quantify or explain. The Big 5 Inventory is a self-reporting tool used to measure individuals on 5 major personality dimensions: Openness to new experiences, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Eysenck theorized that individual differences in personality are caused by physiological differences in processing sensory input. This study will use the Big 5 Inventory to assess personality traits, which will be examined in relation to sensory sensitivity. Sensory intensity will be manipulated during the cognitive task of a reading comprehension test to measure individuals' ability to focus under varying sensory stimulation. The eye movements of 48 undergraduate students at USC Union will be recorded by an Eyelink 1000 eyetracker from one eye during the comprehen-

sion task as an online measure of information processing, while sensory input is manipulated. When exposed to higher than normal levels of sensory input we have found, thus far, that individuals high in neuroticism are less affected by the varying levels of sensory stimulation than those who are low in neuroticism, in terms of their eye movements while reading the passages. At this point, that has not translated into a systematic difference in comprehension accuracy, however, the size of the current sample is too small to confirm an effect or lack thereof. As we collect more data throughout the spring semester, we will examine these trends further.

**Turnbull, Victoria**

**Mentor(s) -- Dr. Troy Herter, Dr. Becky Anprasertporn**

**Examining the Roles of Visual Processing and Eye-Hand Coordination in Parkinson's Disease Disability**

Parkinson's Disease (PD) is a neurodegenerative disorder that is typically associated with tremor, slower movements, and difficulties initiating movements. It is less well recognized that PD often includes visual, cognitive, and eye movement deficits, and these impairments may contribute to difficulties performing activities of daily living. The purpose of this study was to test the hypothesis that impairments of visual processing, decision-making, eye movements, and eye-hand coordination independently contribute to difficulties performing visuomotor tasks and daily activities in patients with PD. We are collecting data from 20 patients with mild Parkinson's disease, who are using an upper-limb robotic device to perform an Object Hit and Avoid (OHA) task within a virtual environment. In this task, subjects use virtual paddles attached to their hands to hit away 200 target objects (e.g., circle, rectangle) and avoid hitting 100 distractor objects (e.g., square, triangle) that move towards the subjects in the virtual environment. We are using an integrated eye tracking system to measure visual processing speed, decision-making accuracy, eye movement efficiency, and eye-hand coordination during the OHA task, and we will compare these measures with normative data from healthy, age-matched controls to establish the presence of impairments in individual patients. We are also examining task performance during OHA to measure difficulties performing visuomotor tasks, and we are using standardized clinical assessments to measure difficulties performing daily activities. We will perform multiple regression analyses to test if impairments of visual processing speed, decision-making accuracy, eye movement efficiency, and eye-hand coordination independently contribute to difficulties performing visuomotor tasks and daily activities. If the findings support our hypothesis, this study will demonstrate that individual impairments of these functions can be used as additional biomarkers for tracking progression of PD. Furthermore, this study will foster the development of novel interventions designed to improve quality of life in patients with PD.

**Vath, Madeleine**

**Mentor(s) -- Mr. Jay Pou**

**Modern-Day Storytelling**

This presentation details the college experiences I've had that built my storytelling knowledge and skills, from writing web stories for USC's Darla Moore School of Business to telling a veteran's story through an audio podcast to compiling a photo story for the Lord Mayor of Dachau, Germany. By working and exploring in these and other leadership roles, I gained experience in a multitude of journalistic areas including the basics — how to craft a lead — and the more advanced — how to conduct a meaningful interview in English with someone who speaks a different language. Through completing the professional and civic engagement GLD pathway, I reflected on my college leadership experiences in order to share my own story about telling other people's stories.

**Vazquez, Iver**

**Mentor(s) -- Dr. Bettie Johnson, Dr. Anette Golonka**

**Floral Scent Variation in *Gelsemium sempervirens***

*Gelsemium sempervirens* is a perennial, distylous woody vine native to South Carolina. It is known for its sweet aroma and its toxicity due to the presence of alkaloids (i.e. gelsemine) in all parts of the plant. The composition of this flower's scent has not been determined. In this study, the scent profiles of 74 flowers obtained from 6 different wild and cultivated populations of *G. sempervirens* were measured by solid phase microextraction – gas chromatography – mass spectrometry (SPME-GC-MS.) The relative concentrations and identities of the floral scent compounds were determined and the impacts of location, source, and morph on scent profile were investigated. The results revealed a number of volatile organic compounds (VOCs) emanating from these flowers. The benzenoids were most abundant and they included benzaldehyde, p-anisaldehyde, benzyl benzoate, and benzyl alcohol. Lower levels of terpenoids such as a-ocimene and a -farnesene, aliphatics such as 2-pentadecanone and 2-tridecanone, and yeast-associated compounds such as ethanol were also present. There was significant scent profile difference between L and S morphs based on the Bray-Curtis similarity indices. The L morphs contained a greater abundance of benzenoids in their scent profiles and the S morphs contained a greater abundance of terpenoids. The L morphs produced a higher abundance of total scent compounds than the S morphs based on paired t-tests. This study represented the first evaluation of the floral scent composition of this native South Carolina species.

**Vetack, Alexis**

**Mentor(s) -- Ms. Carly Moser, Ms. Alexis Brewe, Dr. Jane Roberts**

**Parenting Stress and Child Behavior Problems Associated with Comorbid Autism and Fragile X**

Parents of children with developmental disorders (e.g. autism spectrum disorder (ASD), fragile X syndrome (FXS)) have considerably higher stress levels than parents of neurotypical children (Hayes & Watson, 2013; Baker et al., 2003). ASD is characterized by poor social communication and restricted and repetitive behaviors, whereas FXS is characterized by intellectual disability and behavioral and learning problems (Autism Speaks., 2012; National Fragile X Foundation). Both disorders are also associated with higher behavior problems, such as aggression and disobedience (National Fragile X Foundation). In the typical population, research has shown that child behavioral problems contribute to parenting stress (Hastings, 2009). Although many studies conclude that an ASD diagnosis contributes to greater parenting stress, there is less of a focus on the parental stress of having a child with FXS, especially for parents of children with comorbid ASD and FXS ((FXS+ASD; Abbeduto et al., 2004). The current study aims to determine if there are higher levels of parenting stress for parents of children with comorbid ASD and FXS in comparison to parents of children with ASD or with FXS. Furthermore, the study aims to determine whether child behavioral factors contribute to parenting stress within these populations. Participants include 28 children with ASD and their mothers, 18 children with FXS and their mothers, and 26 children with FXS+ASD and their mothers. Parenting stress was measured using the Parenting Stress Index, a self-report questionnaire (Abidin, 1995). To measure child behavioral problems, the externalizing problems subscale of the Child Behavior Checklist, a parent-report form, was utilized (Achenbach & Rescorla, 2001). This subscale is comprised of attention problems and aggressive behaviors. It is hypothesized that parents of children with comorbid FXS+ASD will have the highest level of stress, and that increased behavior problems will contribute to higher levels of parenting stress in all three groups. The study will add to existing research on parenting stress in comorbid FXS and ASD populations. It will also target specific behavioral issues associated with parenting stress, which will help inform parenting strategies to reduce stress and optimize child outcomes.

**Vicente, Jussara**

**Mentor(s) -- Dr. Amber Fallucca, Mr. Timothy Lewis, Ms. Julie Medlin**

**My Journey So Far**

At age 18, after completing high school in my home country, Angola, I applied for a scholarship

through Sonangol EP, which is Angola's governmental oil company. After positive results from the testing I was submitted to, I was selected as one of the candidates for a full scholarship to the United States to study Chemical Engineering. The University of South Carolina was my first option since I had enrolled in the English Program for Internationals to achieve the proficiency required by the university, and during that time, had become familiar with the campus ambience and enjoyed the warm SC climate. Being fluent in English has definitely helped with the lengthy adaptation process as I was able to make friends and interact with many people, travel to other states such as New York, Washington DC, Florida, and a few others. Living in a different country from my own has showed me how important it is to have an open mind to different viewpoints, allowed myself to grow spiritually and mentally, and experience many situations that probably would have not happened had I stayed back home with my family. Africa Night 2015 is probably one of the most memorable events I participated in while at USC which allowed me to not only learn more about other African countries but also expose some of the Angolan culture through dancing. After almost 5 years in the US as an international student, I have overcome homesickness and sociocultural shock. I am eager to what the future holds for me, as a grown woman and as a future engineer that is willing to contribute to the dynamic world we live in.

**Villalta, Janelys**

**Mentor(s) -- Dr. Shay Malone**

**Using my Identity as a Platform for Advocacy**

All my life my Latinx culture has provided me with a sense of pride, identity, and community. When I arrived at the University of South Carolina I wasn't prepared for the culture shock that I experienced. I knew immediately that I wanted to find people who shared the love of my culture, while also finding community at such a large university. It didn't take long to find the group that could offer me the home away from home I sought. I learned about the Latin American Student Organization (LASO) days into my freshman year, and it has been an instrumental part of my life ever since. LASO has not only strengthened the love of my culture but it has introduced to some of the most amazing people and opportunities. Through LASO I have found some of my best friends and mentors. The love of my culture transformed into a passion for advocacy and activism, for my community and others. When I became president of LASO I knew that I wanted to make this passion a core aspect of our organization by focusing more on the issues that our community faces. I hope this important work can inspire and empower others to find ways in which they can also advocate for their communities.

**Vittes, Allison**

**Mentor(s) -- Ms. Shannon O'Connor, Dr. Jane Roberts**

**Early Features of Anxiety Behaviors in Infants at Risk for Autism Spectrum Disorder**

Autism spectrum disorder (ASD) and anxiety disorders are among the most common and impairing psychopathologies found in young children. Research has shown that children diagnosed with ASD, children with an older sibling diagnosed with ASD (ASIBs), and children diagnosed with fragile X syndrome (FXS) are at particularly high-risk for developing clinical levels of anxiety. Studies have also shown that ASIBs and children with FXS are at an increased risk for exhibiting ASD symptoms. However, there is limited research comparing how ASD symptom severity impacts the presentation of anxiety in infancy across high-risk populations. This study examines the emergence of behavioral antecedents of anxiety across two etiologically distinct populations at high-risk for anxiety and ASD symptomology. These two distinct populations include: children with an older sibling diagnosed with ASD (ASIBs) and children diagnosed with fragile X syndrome (FXS). The present study aims to compare the proportion of escape behaviors, as a proxy for measuring anxiety, specifically social fear and object fear between ASIB children and children with FXS at 24 months of age. Escape behaviors were videotaped during The Laboratory Temperament Assessment Battery (Lab-TAB) and subsequently coded offline using The Observer XT. The Lab-TAB is a standardized assessment used to

observe differences in temperament across various contrived tasks (e.g. the stranger and fake spider tasks) meant to mimic everyday situations. Proportion of escape behaviors (representing anxiety behaviors) during both the stranger approach task (representing social fear) and the fake spider task (representing object fear) were compared across groups with ASD symptom severity scores on The Autism Diagnostic Observation Schedule (ADOS)-Toddler Module, the “gold-standard” diagnostic measure for documenting autism symptom severity. Based on current research, it is hypothesized that infants with moderate to high ASD symptom severity scores will exhibit higher proportion of escape behaviors as compared to those who have lower ASD symptom severity scores.

**Wade, Leah**

**Mentor(s) -- Mr. Jay Pou**

### **Leah’s Journey: Gaining a Global Perspective**

The first time my bright-eyed, ten year old self had the opportunity to venture abroad, I was overwhelmed with excitement. Being able to immerse myself in a different culture while connecting with new people who have many different views inspired me. I knew from that point on, I would do whatever it took to study in an environment where I could surround myself with people from all over the world. Shortly after I began my freshman year at the University of South Carolina, I was thrilled with all of the opportunities to not only study abroad, but take business classes that were focuses on global learning. At the end of my sophomore year I participated in a Maymester program through the Darla Moore School of Business to Norway. Learning in Norway allowed me to experience another culture that was different from past experiences, while integrating what I’ve learned in the classroom with real world experiences. Shortly after my Maymester, I studied abroad for a semester in Paris, France. This is the semester I had been dreaming about since I was ten years old. During this semester I was able to reach fluency in the French language by taking courses in both French and English, and sometimes being the only American in my class. These experiences have increased my cultural awareness and driven me to continue to learn about the world so that I can do business in any corner of the world.

**Waggett, Raines**

**Mentor(s) -- Dr. Dawn Wilson, Mr. Tyler McDaniel**

### **The Effects of Genetic Risk, Neighborhood Social Control, and Social Life on Blood Pressure in African Americans Adults**

African Americans have endured a prevailing disparity in having elevated blood pressure (BP), which over time may increase occurrence of health conditions such as stroke, atherosclerosis, and heart attack. Few studies have evaluated neighborhood social factors or the interaction of genetic predispositions on BP in underserved populations. The purpose of this study was to investigate the associations between genetic risk (HPA axis index) and neighborhood social factors (neighborhood social control - likelihood of neighbors intervening in negative events-; and social life) on BP (systolic BP [SBP], diastolic BP [DBP]) in underserved African-American families from the Positive Action for Today’s Health (PATH) trial. To analyze genetic risk, two single nucleotide polymorphisms (SNPs) were sequenced and evaluated from the HPA axis (HPA-axis SNP; Bcl1 [rs41423247], FKBP5 [rs1360780]). To produce a reliable and valid data set for BP measurements, each participant underwent three BP assessments using a standard research protocol that were then averaged. The final sample size included 165 participants (59% female; BMI M=30.9, SD=7.5; Age M=52.1, SD=14.6). Regression analyses examining the effects of genetic risk and neighborhood social factors on SBP and DBP outcomes indicated a significant effect for SBP ( $F [14,149] = 2.66, p < .01$ ) accounting for 12% of variance. This result indicated that age and BP medications were predictors of SBP. There was also a significant effect for DBP ( $F [14,149] = 2.23, p < .01$ ), accounting for 10% of variance. Neighborhood social control ( $B = - 1.37; SE = 0.70; p = 0.05$ ) and social life ( $B = 0.35; SE = 0.15, p < 0.03$ ) both significantly predicted DBP. DBP was negatively associated with neighborhood social control, suggesting that higher neigh-

neighborhood social control was associated with lower levels of DBP. Unexpectedly, DBP was positively associated with neighborhood social life, suggesting that greater social life was associated with higher DBP. While we did not find any significant gene-by-environment interactions for SBP or DBP, we did identify neighborhood social life and social control as potentially important predictors of DBP. Further research is warranted as this study clearly identifies the neighborhood social environment as a potentially important factor in BP regulation, in underserved African-Americans.

**Wagner, Tyler**

**Mentor(s) -- Dr. Brandon Bookstaver, Dr. Kevin Lu**

**Comparison of published severity assessment tools and scoring systems to predict *Clostridium difficile* infection associated outcomes**

Introduction: Individuals with *Clostridium difficile* infection (CDI) often suffer from multiple comorbidities and present with varied degrees of severity. As a result, there are several published scoring systems that analyze patients' underlying conditions and initial presentations to predict CDI-associated outcomes.

Research Question or Hypothesis: Which CDI scoring systems and severity assessment tools best predict CDI-associated clinical outcomes and recurrence rates?

Methods: This retrospective, observational, multi-center study includes adult patients with a positive *C. difficile* PCR admitted between January 1st, 2014 and December 31st, 2016. Eleven severity assessment tools and scoring systems proposed in literature were applied to study subjects. Scoring systems included in the analysis: ATLAS, ATLAS-A, APACHE II, HORN, CARDS, Kelly, Viswesh, Na, Lungulescu, IDSA/SHEA Guidelines severity index, and ACG Guidelines severity index. The ability to predict clinical outcomes (i.e., hospital length of stay, CDI recurrence, 30-day mortality, and clinical failure) will be assessed. Clinical failure is a composite endpoint defined as recurrence of disease, lack of resolution of symptoms resulting in extension of therapy or escalation of therapy after 7 days, and/or 30-day mortality.

Results: Overall, 151 patients with an initial episode of CDI have been included to date. Patients predominantly reside at home (85%) prior to hospital admission with a mean age of 62 years old (range 18 - 92 years) and an average hospital length of stay of 24 days. Co-morbid conditions included most commonly diabetes mellitus (40%), cardiopulmonary disease (34%), and chronic renal disease (32%).

Conclusion: Data analysis is ongoing.

**Wallam, Sara**

**Mentor(s) -- Dr. Caryn Outten**

**Purification and characterization of Fep1 and its interacting partners in *S. pombe***

Iron is essential and strictly regulated in biological systems. Bound to proteins in the form of distinct cofactors, or in free chelatable form, iron participates in critical biological processes like cellular respiration and the electron transport chain, redox catalysis, photosynthesis, and DNA synthesis repair. Understanding the mechanism of iron regulation is necessary since both iron deficiency and overload lead to serious consequences in humans. Most iron homeostasis pathways are conserved between humans and yeast, a model eukaryotic organism. In this study, a species of yeast, *S. pombe*, is used to investigate the mechanism of iron homeostasis via in-vitro protein purification and interaction studies. Previous studies in *S. pombe* have revealed that the transcriptional repressors Php4 and Fep1 play major roles in iron regulation. In-vivo studies have indicated that Fep1 is active under iron-replete conditions, and Grx4 and Fra2 interact with it under distinct cellular iron conditions. Grx4 and Fra2 proteins have been shown to be important in the iron homeostasis pathway in another widely studied

species of yeast, *S. cerevisiae*. The primary goal of this study is to determine how and why the Fep1, Grx4, and Fra2 proteins interact and the importance of this interaction in the iron regulation pathway. In order to study this we have co-expressed Fep1, Grx4 and Fra2 proteins in *E. coli* to determine if they physically interact to form a complex. Then, we proceeded to characterization of the complex using chromatographic and spectroscopic techniques. Information on iron regulation from such a molecular level can be used to fill gaps in the iron regulation pathway and thereby used to treat iron-related disorders in humans.

**Walsh, Eleanor**

**Mentor(s) -- Dr. Kathrene Brendell, Dr. Abbas Tavakoli**

### **Long Term Effects of Childhood Sexual Trauma**

Research shows that childhood sexual trauma (CST) alters normal growth patterns, brain development, social and mental advancement. Yet there is lack of research correlating age of CST with specific mental health, physical health and emotional health outcomes. Investigations of the sequelae of CST need to consider the developmental period during which the trauma occurred. Neurobiology, attachment theory and infant development research create the Adaptive Information Processing (AIP) model for mental processes and memory storage. Trauma response develops into a failure of adaptive processing to neural connections by preventing information from being fully processed. Understanding stages of brain development and disruption of integrated neural processing after trauma through the AIP model can explain symptoms of mental and physical health patterns. A survey consisting of demographic data, modified Childhood Experiences of Violence Questionnaire and a symptoms checklist categorizes participants as being exposed to CST during specific developmental periods, as well as identifies presenting symptoms of mental and physical health diagnoses. Survey participants are University of South Carolina students in various colleges, including the College of Nursing. Statistically significant data is presented on specific developmental periods, type of sexual trauma and various mental and physical health outcomes. Outcomes in correlation are shared based on data from the administered survey. Understanding the impact of CST at different developmental stages open avenues for targeted age appropriate intervention. Recognition of correlations between brain developmental period and specific disease outcome patterns serves as a guide for future research on how trauma impacts age-related neurophysiology.

**Ward, Kellie**

**Mentor(s) -- Prof. Rui Qi**

### **Factors Affecting Choices in Different Generations in the Shared Economy**

The concept of a shared economy has become popular over the past 5 years. The shared economy is a peer-to-peer marketplace that is facilitated by the internet and mobile apps. Airbnb is a website where travelers can rent homes from strangers who live in the area they are traveling to for a period of time. Uber and Lyft are mobile apps that represent the transportation sector of the shared economy. Riders are quickly connected with strangers in the immediate area that have been hired through Uber or Lyft to drive them to their desired destination. While these applications and websites offer travelers a more affordable and convenient experience, they also raise concern for the safety of consumers. The purpose of our research is to better understand which factors (safety, price, or convenience) are most important to consumers when choosing to use a shared economy. We want to understand the different opinions among generations X, Y, and Z, when utilizing the shared economy, because each will consume differently. We plan to conduct a 20-25 question survey, to collect data regarding whether safety, price or convince are most important to consumers when using a shared economy. Convenience sampling will be used when sending these surveys out to each generation, which will be done through email and social media platforms. We will use the data to understand the differences of opinions from the different generations. We recommend that more safety practices of websites and mobile applications representing the shared economy be implemented to ensure that

consumers feel safe in their decision to utilize these convenient and affordable services.

**Wardlaw, Andreia**

**Mentor(s) -- Dr. Kent Germany**

**Mavericks of Motherwit: Black Female Healthcare Workers and the Antebellum Plantation System**

This paper examines Black Midwives during the Antebellum South. Their agency and autonomy and how their skills and knowledge transcended racial boundaries and instilled pride in rising generations of African American Women.

**Warrington, John**

**Mentor(s) -- Dr. Phillip Buckhaults**

**A TP53 Knockout system for oncology drug testing.**

TP53 is one of the most frequently mutated genes in human cancers. The effects of TP53 mutation on sensitivity to FDA approved chemotherapies is incompletely described. We generated TP53 knockout derivatives of MCF7 breast cancer cells using CRISPR-Cas9 technology, and measured in vitro differences in sensitivity to 133 chemotherapeutic agents in the NCI Approved Oncology Drug Set, and 92 anti-cancer compounds in the Biolog phenotype drug array plates M11-M14. TP53 KO clones were confirmed by genomic analysis of the targeted region, and by demonstrating resistance to the MDM2 inhibitor Nutlin3A. We identified drugs that were less effective in MCF7 cells with TP53 deletion compared to wild type parental cells, such as olaparib, oxaliplatin, and thiotepa. We also observed compounds that were more effective against TP53 KO cells, compared to wild type parental cells, including 4'-demethyl epipodophyllotoxin, hydroxyurea, and fluorouracil. These results provide clues to novel combinatorial regimens to try in preclinical and clinical models to target TP53 mutant human breast cancers. In addition, the isogenic sets of cell lines created for this investigation will be valuable for testing novel therapeutics for p53-dependent effects.

**Waters, James**

**Mentor(s) -- Dr. Keri Weed**

**The Effects of Induced Anxiety on Executive Functions Among Athletes Measured by the P3 Wave in a Go/NoGo Task**

An elite athlete employs complex skills during a competition that have been learned and perfected over long periods of training. Skills such as kicking, throwing, and hitting are complicated and require heightened motor control, focus, and attention. Attention allocation and motor control can be evaluated by the P3 wave. The P3 represents a neurophysiological measure of cognitive control. The Go/Nogo is used to study executive functions by averaging electroencephalogram readings for Go and Nogo stimuli, in which the latency and amplitude are compared between the Go and Nogo conditions. Latency is a measure of how fast attention is allocated, while amplitude measures how strong the attention allocation is. EEG readings of this wave represent the active decision-making by athletes during competition and the cognitive functions carried out as a result. Performance anxiety is another factor that can affect performance, which can be confirmed through skin conductance and electrodermal activity. This study combined the use of EDA and anxiety induction with EEG and the P3 wave to show whether executive functions are positively or negatively influenced by anxiety, as well as whether athletes or novices are better equipped to perform under anxious conditions. We had a total of 50 participants, 25 athletes, and 25 novices. Each participant completed the Go/NoGo task once in a resting state and once after anxiety induction. The EDA and STAI were used to confirm that anxiety has been induced. Half of the participants received stress induction before the first EEG task, and the other half of participants established the baseline before the first task. Due to the drive theory, which suggests motivation to compete creates heightened arousal and allows people to perform at a higher skill level, we expect that subjects will perform better when anxious, and athletes will perform better

than novices when anxious.

**Weaver, Kylie**

**Mentor(s) -- Dr. Bryan Love**

**Proton pump inhibitor use and femoral bone mineral density, NHANES 2005-2010**

Proton pump inhibitor (PPI) medications are indicated for a variety of conditions including peptic ulcer disease and gastroesophageal reflux. PPI's decrease gastric acidity, which may decrease calcium absorption, potentially affecting bone mineral density (BMD). Several studies have evaluated osteoporosis using BMD data from the National Health and Nutrition Examination Survey (NHANES) database; however, the impact of PPIs in this population is unknown. The aim of this project was to determine if proton pump inhibitor use affects femoral BMD levels.

We investigated associations between PPI use and femoral BMD among 15,401 males and 15,633 women, aged >50 years old, who participated in NHANES, 2005-2010. A dichotomous variable representing PPI use was created using prescription data available in NHANES. Osteopenia and osteoporosis were defined according to the World Health Organization methods using a standardized T-score, comparing an individual's BMD to average values for young healthy women. Clinical characteristics including age, sex, race/ethnicity, BMI, labs, and smoking status were assessed. Sampling weights and primary sampling units provided by NHANES were utilized to make inferences about the general US population. Continuous variables were evaluated using student t-test, and categorical variables were analyzed using Pearson's chi-square test. Linear regression with marginal means and pairwise comparisons with Bonferroni adjustment was used to describe the interaction between PPI use and sex. All analyses were completed using STATA, version 15 (College Station, TX). The IRB determined that this is not human subject research.

Patients with osteopenia and osteoporosis were significantly older and had lower BMI compared to normal BMD population ( $p < 0.001$  for both comparisons). Osteopenia and osteoporosis was more common in females ( $p < 0.001$ ). PPI use was reported in 13.7% of the participants. After adjusting for confounders, femoral BMD was lower in men (0.832 vs. 0.882;  $p < 0.001$ ) and women (0.771 vs. 0.797;  $p = 0.01$ ) who reported PPI use.

PPI use is common and may be associated with reduced femoral BMD.”

**Webb, Frank**

**Mentor(s) -- Dr. Amir Karami**

**Social Media and LGBTQ+ Health Analytics**

Using Twitter's API and related R libraries, LGBTQ+ Twitter users were identified and their tweets were collected. Linguistic Inquiry and Word Count software was used to identify health related tweets for use in topic modeling. Using Mallet and R libraries, latent Dirichlet allocation (LDA) models were created to analyze the content of the health-related tweets. Research is continuing to examine specific subsets of the LGBTQ+ community and the different health concerns of the populations as an effort to collect non-clinical data for minorities who may be hesitant to share all information with their primary care physicians or who may not have access to affirmative healthcare.

**Weisberg, Melissa**

**Mentor(s) -- Dr. Eric Goff**

**STEM Learning: Examining the role of youth educators in informal science learning sites**

Over the last decade, the growth of jobs in STEM fields has been three times faster than non-STEM alternatives. Despite this, there is a significant shortage of students majoring in the STEM disciplines and matriculating into the STEM workforce. In order to address this, we must engage and train more students, especially from groups that are underrepresented in STEM fields. Informal Science Learning Sites (ISLS) could serve as a better way to provide opportunities for building interest and engage-

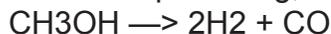
ment in the STEM fields. ISLS provide opportunities for adolescents to interact with STEM content in a setting other than the formal classroom environment. These interactions promote learning on a different level than that of a traditional lecture hall. While these opportunities are becoming more prevalent, peer-reviewed research has yet to identify a specific relationship between ISLS experiences and their effects of STEM identity. Preliminary research has documented measurable benefits in terms of STEM interest and engagement of a wide variety of out of school experiences. Broadly, we aim to evaluate outcomes from both the perspective of youth educators and visitors to exhibits at ISLS. In this introductory step, we reached out to visitors in ISLS to gain information about their responsiveness towards STEM concepts. We focus specifically on possible differences across age groups in regards to their science identity. To do this, we surveyed adolescents (N=124) comprised of two distinct age groups (5-9 yo, 10+ yo). Subjects interacted with a STEM based exhibit at an ISLS and completed a follow-up survey developed to garner information on science attitudes. As children develop and transition into older age groups, we expect to be able to see changes in how they identify with STEM topics. This project aims to gather more information on science identity for adolescents in the Columbia area in order to equip ISLS to better promote STEM interest and engagement.

**Weiss, John**

**Mentor(s) -- Dr. John Weidner**

**The comparison of synthesis methods in Pt/Ru catalysts with applications in Direct Methanol Fuel Cells (DMFC)**

The Direct Methanol Fuel Cell (DMFC) has emerged as a potential power source for small scale electronic units. As a liquid fuel, methanol is also both cheaper and easier to transport than its gaseous hydrogen counterpart, the Proton Exchange Membrane Fuel Cell (PEMFC). However, the methanol decomposition reaction that is initiated by platinum (Pt) on the DMFC catalyst produces acute carbon monoxide poisoning, as shown below:



Carbon monoxide poisoning occurs when polar CO gas binds to the charged platinum (Pt) catalyst surface, reducing the amount of active sites for the catalyst to carry out the reaction. In order to combat this issue, researchers have found that the addition of ruthenium (Ru) metal to the catalyst allows the following reaction to occur:  $\text{O}_2 + 2\text{CH}_3\text{OH} \longrightarrow 4\text{H}_2 + 2\text{CO} + \text{O}_2 \longrightarrow 4\text{H}_2 + 2\text{CO}_2$

Through this ideal reaction, the non-polar CO<sub>2</sub> gas releases from the catalyst surface, and allows platinum deposits to remain active across the catalyst. Practically, however, Ru sites must be evenly spread across Pt sites in order to carry out this ideal reaction, and the commercial catalyst synthesis procedure (wet impregnation) does not successfully do so.

Therefore, in this research, methods of strong electrostatic adsorption (SEA) and electroless deposition (ED) were utilized with the intent of more evenly spreading Ru and Pt sites, respectively. First, SEA controls the pH of Pt sites during synthesis, which causes Pt sites to become variously charged ions. ED then controls the pH of Ru sites in a similar fashion as they are synthesized onto the catalyst surface. By creating charged Pt and Ru sites, Pt/Ru sites bind more frequently and with smaller particle sizes across the catalyst surface, resulting in an increase in active sites and a higher Electrochemical Surface Area (ECSA).”

**Welty, Erin**

**Mentor(s) -- Dr. Hunter Gardner**

**Ritualized Eating: The Feasts of Homer’s Iliad**

The study of food and eating in the ancient world has been of growing interest in recent years for anthropological, archaeological, historical, philological, and other branches of scholarship, classical and otherwise (Alcock 2006, Wilkins 2006, Dalby 2003, Garnsey 1999, and Dalby 1996, for example).

In this vein, the remarkable feasting scenes of the Homeric epic poems – the Iliad and the Odyssey – are of particular interest for classicists. These Homeric feasts have supplemented archaeological findings on prehistoric Greek eating practices to draw historical conclusions about the reality of Greek life (Wright 2004), but the feasts scenes also hold great potential for developing literary interpretations of the epic poems. One approach in this literary analysis is to examine eating as a site of key understanding for the epics' reception in early Homeric audience (Davies 2015, Dalby 1995). This project compiles the feast scenes of Homer's Iliad and identifies their ideological meaning within the literary Homeric universe. Then, using the available historical knowledge of early Homeric audiences, I investigate points of continuity and possible tensions between the social function of the feast for the early Homeric audience and for the poetic world of the Iliad.

**Werner, Phillip**

**Mentor(s) -- Dr. Anu Chakravarty**

**Political and Social Impacts of the Greensboro Truth and Reconciliation Commission**

The Greensboro Truth and Reconciliation Commission sought to repair relations following the events of November 3rd, 1979. The goal of this project was to examine what this Commission achieved as well as comparing this Commission to other commissions held throughout history.

**Werner, Phillip**

**Mentor(s) -- Mr. David Deweil**

**Staying True to Yourself Even When Everything Else Fails**

As part of the Professional and Civic Engagement GLD pathway you are required to take part in a beyond the classroom experience involving leadership. For my beyond the classroom experience I interned at the SCGOP and held a variety of executive positions in student organizations. I did not initially plan on doing GLD, I simply wanted to be involved and help my organizations grow. In doing this I learned a great deal about myself. First and foremost, I learned that I gravitate towards responsibility. Even after transitioning out of executive positions for my fraternity I still find myself providing advice and assistance in the planning of events such as our philanthropy. Additionally, I have a natural inclination to take charge of challenging situations. These two realizations are incredibly important as they will help me tremendously in the professional world and as I begin law school. GLD has helped me formalize the tremendous impact my leadership experiences made on me during my time at UofSC.

**Wesley, Megan**

**Mentor(s) -- Dr. Joe Quattro, Prof. Mark Roberts**

**Hybridization rates among sea turtles off the east coast of the United States.**

Seven species of sea turtles exist globally and are represented by two families, the Cheloniidae and Dermochelyiidea. The family Cheloniidae contains six species within five genera. All species of marine turtles are of conservation concern and three are considered endangered or critically endangered due to historical harvest, incidental by-catch, habitat alteration, and, hybridization and subsequent introgression brought on by interspecific mating. Hybridization could be due to global climate change bringing two previously separated populations into contact due to changing water temperatures or a diminished population in desperate search of a mate and finding only other species of sea turtle. Hybridization between species, suspected for years, has only recently been verified through genetic testing. With high rates of hybridization occurring elsewhere, it was hypothesized that hybridization would be detected off of the East coast of the United States within the 1,500 samples collected. Confronting two-pair (CTTP) PCR primers were used to amplify species specific portions of loci as a cost effective method to identify potential hybrids between loggerhead (*Caretta caretta*) and Kemp's ridley (*Lepidochelys kempii*) sea turtles (the two most frequently encountered as part of this study) quickly and easily. Any suspected hybrids were confirmed using DNA sequencing. The preliminary findings show

no hybrids between loggerheads and Kemp's ridley sea turtles, however an Olive Ridley (*Lepidochelys olivacea*) that was originally identified as a Kemp's ridley in the field, was identified. This encounter represents a significant expansion of the known range for this species. Presently all 1,500 samples have been analyzed at one genetic and mitochondrial marker with no evidence of hybridization. All samples will be analyzed at two remaining genetic markers. Here we present data in stark contrast to other studies, which find very high rates of hybridization in certain parts of the world, particularly Brazil. What drives the high degree of hybridization in Brazil is unclear but it is clearly not affecting the eastern United States. However, the potential exists that the other species may be involved in hybridization here (particularly greens (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) sea turtles) and analyses are being developed to investigate this possibility.

**Weston, London**

**Mentor(s) -- Prof. Rui Qi**

### **Marketing Using Social Media Across Generations in Tourism and Hospitality**

The use of social network sites (SNSs) for marketing hotels, events, and services is a skill that future employees of the hospitality and tourism industry need to be experts on. Across the generational cohorts—baby boomers, Generation X, millennials—usage of SNSs varies which is key knowledge when trying to understand consumers when developing marketing strategies. Our study's purpose is to discover the differences and similarities between these cohorts and the frequency and usage of specific SNSs. By analyzing our results of our study, we can conclude the best method for marketing to each generation from the standpoint of a business in the hospitality and tourism industry. Our research is based off the surveys and questionnaires we distributed among various samples of each generation. We will draw our samples through a stratified sampling technique. From the results we can further predict how the future generations, Generation Z, will react to marketing over the use of SNSs and how marketers can effectively reach their interests.

**Whelan, Audrey**

**Mentor(s) -- Ms. Asheley Schryer**

### **Leadership Through Harmony**

Cockappella is a co-ed a cappella singing group of students from the University of South Carolina. I joined Cockappella as a freshman in order to maintain a passion and interest in music, knowing that I would not be pursuing musical performance as a course of study. Since my sophomore year, I have taken on several positions on Cockappella's executive board as Vice President, Treasurer, and Music Director. I took on these roles to become more involved in the organization, hone my leadership skills, and give back to an organization that had brought me immeasurable joy. My experience in Cockappella, and as Music Director in particular, has stretched the bounds of my understanding of what it means to be a leader and to work as a team. I have learned how better to listen critically and make constructive commentary in order to better the group as a whole and further our mission of providing quality music to the community. I have learned about the value of companionship and communication when working toward a common goal. Because of Cockappella, I have grown as a musician by doing something I love with people I love. I have pursued a passion that I would not have otherwise pursued without the student organization. I have shared experiences with members of the Carolina community – from events at the University President's house, to competitions throughout the country, to performing at local charity functions – that have shaped my college experience. I have never felt more strongly that doing what you love is important, but sharing it with people who love it as well is more important. My time in this student organization has instilled in me an unquenchable thirst for pursuing things that I am passionate about. I will always carry with me the energy, enthusiasm, desire for growth, and verve that was engrained in me as a member of Cockappella. I also hope to serve as a resource in whatever capacity I can for future members of Cockappella.

**Whitbeck, Rachel**

**Mentor(s) -- Ms. Theresa Harrison**

**Becoming Independent In Madrid**

In the spring of 2017, I studied abroad in Madrid, Spain. I attended the Instituto de Empresa University and became involved by joining the school's Rotaract club. I took four classes, each of which included constant group work, so I got to know the local students as well as those attending from other countries. I studied abroad not only because it was required for the International Business program at USC, but also because I love to travel and I know that not studying abroad is a lot of people's biggest regret from college. I wanted to put myself out there while also trying to improve my language skills. In order to study abroad, I had to attend multiple workshops, fill out lots of paperwork, and- the most difficult thing- travel to Miami to get my visa. Then I booked a one way ticket to Madrid and stayed in an AirBnB for almost two weeks while I apartment hunted, which gave me new sense of independence. I found a flat in the south of the city and became close friends with my international roommates. I immersed myself in the culture by going to "meet and speak" events, which are held at bars or restaurants for internationals to gather and practice languages as well as meet new people. My study abroad experience helped me to leave my comfort zone and gain independence, as well as to interact with culturally diverse people and improve my language skills. In the future, I will utilize these skills and experiences to work internationally.

**Whitbeck, Grace**

**Mentor(s) -- Mr. Ryan Lloyd**

**Lily House**

One of the first shelters established for women and adolescents rescued from human trafficking, prostitution, or any situation of exploitation resides in Juan Dolio, Dominican Republic. During the summer of 2017, with nothing but a background in psychology and a heart for trauma victims, I was given the privilege of serving as an intern at the Lily House shelter in Juan Dolio. I was engaged in the daily life of the girls, learning to aid in their mental, physical, and spiritual support and development. Specifically, I was involved in learning and helping with skill training, such as jewelry making, cleaning, baking, tutoring, and financial planning. For five weeks I was encouraged to build relationships and asked to develop the brand and marketing of Lily House Jewelry. While being exposed to daily life in a developing nation, I learned the value of appreciating the available resources, the capabilities and needs of the local people, and the complexity of producing a sustainable and positive impact on the foreign environment and individuals I lived with and learned from. My visit to the Dominican Republic reinforced the importance of individual, meaningful relationships and community, and I was able to bring home a fresh perspective on the needs and benefits of an often stigmatized and marginalized people group and nation. I feel so lucky to be able to learn from such an opportunity, to realize the personal hardships and uncertainties of aiding in the empowerment of exploited individuals, to appreciate the preciousness of the individuals known and helped, and to understand the complexities of collaborating with and truly valuing a developing community.

**White, Kelley**

**Mentor(s) -- Prof. Maegan Gudridge**

**My Social Media Marketing Experience**

Since May 2017, I have been interning at the Darla Moore School of Business in the Marketing and Communications Department as the Social Media Intern. The Marketing and Communications department at the Moore School is responsible for promoting and marketing graduate programs, maintaining the website, creating marketing campaigns for various events and keeping students and alumni informed. In this role, I manage all the social media sites for the business school, including Facebook, Instagram, Twitter and LinkedIn, by creating daily content and monitoring the accounts. In addition to coming up with new, creative content, I keep detailed monthly analytics reports to track the en-

agement, reach and trends of each account. This experience has allowed me to further improve my marketing knowledge, creative thinking and communication skills. As a marketing major, I wanted to gain hands-on experience to build upon what I have learned in the classroom. When this opportunity came about, it was the perfect way for me to take what I already knew about social media and digital marketing and gain real-world experience. Without this internship, my knowledge of marketing would not nearly be as strong as it is today. This internship is important because without it I would not have gained the skills I know today. Having experience in a real-world office, getting to work with a team of interns and full-time staff and learning how a marketing department operates are all important lessons that will prepare me for my first job after college.

**Wiggins, Kali**

**Mentor(s) -- Dr. April DeLaurier**

**Determining the role of *ldlrp1a* in skeletal development and cholesterol metabolism in zebrafish**

Low density lipoprotein receptor adaptor protein 1 (LDLRAP1) is a factor which interacts with low-density lipoprotein receptors (LDLR) in endothelial cells to endocytose lipids from the bloodstream. Humans with mutations in LDLRAP1 have familial hypercholesterolemia, an autosomal recessive inherited disorder, resulting in abnormally high levels of blood lipoproteins. Evidence exists that LDLRAP1 may also function in cartilage cells (chondrocytes), and so we hypothesize that *Ldlrap1a* may also be involved in skeletal development or another cellular function in cartilage. Using CRISPR-Cas9, we previously generated a zebrafish mutant line for *ldlrp1a*. We have genotyped F2 *ldlrp1a* generations, and performed in-crosses to generate F3 embryos. In one line, sequencing F3 mutant embryos revealed a 7bp deletion in exon 3. We predicted that we would observe skeletal defects in mutants. However, analysis of F3 offspring revealed no obvious skeletal defects which led us to investigate the possibility of maternal “rescue” of larval phenotypes by the normal maternal transcripts and proteins. We currently have an adult homozygous female *ldlrp1a* mutant which we plan on crossing with a heterozygous male to generate mutants with no functional maternal *Ldlrap1a*. Since LDLRAP1 has an important role in lipid metabolism in humans, we are expanding our study to look at the effects a mutated *ldlrp1a* gene has on cholesterol metabolism in zebrafish. We hypothesize that as in humans, *Ldlrap1a* functions in zebrafish to clear blood lipoproteins. We have already generated a line of *ldlrp1a* zebrafish that express EGFP in their vasculature by crossing our F2 *ldlrp1a* (-7bp deletion) fish to our *fli1:EGFP* line. We plan on developing a high cholesterol diet containing a lipophilic label, which we will feed to the *ldlrp1a:fli1:EGFP* line. We plan to use confocal imaging to view the labeled lipids in the fluorescent vasculature. Our prediction is the zebrafish will exhibit lipid accumulation in their vasculature indicating a function of *ldlrp1a* in cholesterol clearance from the bloodstream. If zebrafish have a lipid clearance defect, this line could be a useful model to study hypercholesterolemia in humans.

**Wilbur, Mary**

**Mentor(s) -- Ms. Sarah Gay**

**Improving the Student Designer Showcase**

As treasurer of Fashion Board at USC for two years, I was in charge of revamping the Student Designer Showcase for USC fashion week. Event attendance and designer participation had dropped for this event, so I took a systematic approach to analyze the strengths and weaknesses of the event to improve it for all participants. My first year as treasurer, I changed the format and how designers were judged. The format was changed from a fashion show runway style to a cocktail party style. Instead of presenting their collections to be judged in their entirety and participate in a question and answer period, designers were prejudged on one look from their collection backstage and then the winner was announced after all the collections had been presented to the audience. As a result of these changes, the number of designers who participated increased from three to seven. The attendance

also increased due to increased publicity about the new format of the event. During my second year as treasurer, I continued to improve the showcase by altering the judging rubric and adding a theme to the event and the judged look. In addition to improving the event, I was in charge of coordinating over 50 people, including designers, judges, models, and volunteers. I had to be very organized and communicated effectively in order to run a smooth event. I also learned how to take a struggling event and accentuate its strengths and fix the weaknesses. These experiences demonstrate that I am able to implement process improvement and manage people, skills that will be valuable to employers as I begin my career in supply chain.

**Wilbur, Katherine**

**Mentor(s) -- Dr. Karen McGee**

**Medication Transitions in PACE: a Survey and Analysis**

PACE (Program of All-Inclusive Care for the Elderly) is a national organization that provides comprehensive medical services and daytime care to individuals 55 years of age and older that are categorized by state Medicaid programs as frail and “nursing home eligible”. The goal of PACE is to maintain elderly patients in the community and to avoid hospitalizations and nursing home placements. Palmetto SeniorCare is a local PACE program serving the midlands of South Carolina that is currently seeking to improve their transitions of care plan for patients who choose to disenroll from their facility. The purpose of this study is to identify current issues with Palmetto SeniorCare’s transitions of care in order to create a protocol for PACE programs that will prevent any lapse of medication coverage for patients during transitions of care. The staff at Palmetto SeniorCare have expressed their barriers to providing adequate transitions of care. From this discussion a survey was formed to obtain information from other PACE facilities throughout the country regarding their own transitions of care processes. Information sought includes the major reason for disenrollment, disenrollment notification, what the facility provides patients upon disenrollment, any other pharmacy affiliations that may aid in the facilities’ disenrollment process, where the patients are going after disenrollment, where the facility refers a majority of their patients after disenrollment (nursing home, hospital, adult day health care center, etc.), policies in place for transitions, and barriers to attaining new insurance. The data will be gathered and relevant charts and tables will be formed to organize the facilities’ responses for analysis and review. The staff of Palmetto SeniorCare will then be met with to create a Transition of Care Protocol based off of survey results and resources available to the center. Once implicated, the use and effects of the protocol will be monitored to evaluate pros and cons to enable future adjustments. This protocol should prevent lapses in coverage during transitions of care and ultimately provide patients with access to necessary medications for optimal health maintenance.

**Williams, Jordan**

**Mentor(s) -- Prof. Leslie Wisner**

**Reactive Policing in the Columbia Metropolitan Area: An In-depth look at the Investigative process for Richland County Sheriff Department**

During spring 2018, I interned with Richland County Sheriff Department (RCSD) in their Criminal Investigations Division (CID). While working for RCSD, I assisted Investigators with processing shoplifting and larceny cases. CID conducts investigations through standard investigative techniques to include DMV records, Augmented Criminal Investigation Support System (ACISS), Axon Evidence, and Alvin S. Glenn Detention records. Investigators also conduct witness interviews and victim Follow-up conversations throughout their investigation. As a double major in Criminal Justice and Psychology at the University of South Carolina, this internship provided me with first-hand law enforcement experience. I had the opportunity to work directly with investigators in the Larceny Unit of CID. While assisting investigators, I followed up on incident reports with local businesses, updated ACISS files, researched suspects, and collaborated with crime analysts. Also, RCSD provided me the opportunity to attend training and attain certification in National Crime Information Center (NCIC) Inquiries.

Participating in this internship reaffirmed my desire to attend graduate school in a Criminal Justice-related field and pursue a career in law enforcement. I plan to expand this experience next fall with an internship at the South Carolina Law Enforcement Division or a federal law enforcement agency.

**Willoner, Terence**

**Mentor(s) -- Dr. April DeLaurier**

**Using CRISPR/CAS9 to Study the Role of ZMYM2 and ZMYM3 in Zebrafish Craniofacial Development**

Potocki-Shaffer syndrome (PSS) is a rare contiguous gene-deletion caused by heterozygous interstitial microdeletions of chromosome region 11p11-p12 and is characterized by developmental defects that include intellectual disability and craniofacial anomalies. PSS is associated with mutations in genes encoding factors in the PHF21A protein complex, including KDMA1, ZMYM2, and ZMYM3 proteins. It is hypothesized that these protein complexes affect craniofacial development of zebrafish in a way that reflects their function in humans. Previously, F0 founder fish carrying mutations in *zmym2* and *zmym3* were generated by microinjection of CRISPR constructs including, guide RNA and Cas9 mRNA at the 1-cell stage. Founders were screened by PCR and T7 endonuclease digest to identify mutations. These founders were used to generate F1 lines and were screened by using tail fin DNA in PCR and T7 endonuclease digest. Zebrafish with potential frameshifts were out-crossed to produce an F2 generation. Other *zmym2* and *zmym3* potentially mutant F1 and F2 heterozygote lines need to be screened using PCR and T7 endonuclease digest. To confirm the nature of the mutations in the F1 and F2 generations as frameshifts or early stop codons, *E. coli* cells were transformed with PminiT plasmids containing PCR amplicons from individual confirmed heterozygote fish. Ampicillin-agar plates were used for positive selection of transformed cells. Four colonies from each plate will be sent for sequencing. In principle, half of clones will contain mutant sequence and half of clones will contain wild-type sequence. If frameshift lesions are detected in DNA samples, these lines will be used to generate homozygous mutants. Lines will be screened using PCR and T7 endonuclease digest, or if there is a large enough indel, PCR products run on a 2% agarose gel will be used to resolve genotypes. The F3 generation will be studied at 7 days post fertilization for anatomical abnormalities in craniofacial development by using Alcian Blue and Alizarin Red histological stains for cartilage and bone. The ultimate goal of this project will be to identify the roles of *zmym2* and *zmym3* in zebrafish development, and how loss of function of these factors may underlie the defects seen in PSS.

**Wilson, Lacey**

**Mentor(s) -- Dr. Orgul Ozturk**

**Dietary Recommendations and Egg Expenditures Across Generations**

During the late 1970's and early 1980's, foods with high levels of fat and cholesterol were purported to directly cause heart disease and targeted as unhealthful. Dietary recommendations from both the USDA and popular media during this time emphasized avoidance of these products. Previous studies show that individuals tend to retain beliefs learned during childhood; this study will address whether Americans who grew up during this period retained a tendency to avoid high fat and cholesterol foods. We use expenditure data from the Bureau of Labor Statistics' Consumer Expenditure Survey to analyze the spending patterns of different 'generations' in the context of dietary recommendations learned during primary school. This presentation will focus on eggs as an example of a high-cholesterol food. Respondents are split into groups based on birth year, and we find group averages for percentage of total grocery dollars spent on eggs between the years 1996 and 2014. We find that individuals who were of primary school age during the late 1970's and early 1980's allotted a significantly lower percentage of grocery dollars to eggs than did counterparts born earlier. These results imply that Americans who were recommended against consuming high-cholesterol foods during childhood may continue to consume less of those foods than do those who were not, regardless of a later change in those recommendations. Thought should be given to the lasting impacts of recommending

or advising against specific foods or macronutrients to children based on the tendency to retain this information.

**Wilson, Connor**

**Mentor(s) -- Dr. Alicia Flach**

**Relationship of Self-Reported Physical Activity Levels in Persons with Parkinson's Disease and Their Care Partners with Recent History of Falls and Time Since Diagnosis**

Parkinson's disease (PD) is a neurodegenerative disease that causes motor and non-motor signs and symptoms that impacts daily activities, mobility and quality of life. Exercise has been shown to improve physical function, quality of life, strength, balance, and walking speed in persons with PD (PwPD).<sup>1</sup> The purpose of this study was to determine levels of physical activity in PwPD and their care partners and how their physical activity levels may be related to recent history of falls; and the relationship between time since diagnosis and activity level in PwPD. Our hypotheses were 1. PwPD and care partners that reported higher amounts of physical activity per week would report less falls and 2. PwPD with longer time since diagnosis would report decreased levels of physical activity. PwPD and their care partners (n=19) were invited from a local support group and neurologist to participate in a one-time educational seminar focused on introduction to management PD. A component of this seminar was dedicated to benefits of exercise and included specific exercise recommendations and resources for local PD specific exercise groups. Following the seminar, participants were asked to fill-out a short questionnaire. We analyzed the following questions for our study (1) the participant's relationship to Parkinson's disease (PwPD or caregiver), (2) the amount of physical activity conducted in the last week, (3) the time since diagnosis (if PwPD), and (4) if they experienced a fall in the last six months. We found 27.2% of the least active (< 90 minutes/week) individuals (PwPD and their care partners) and 37.5% of the most active (> 90 minutes/week) individuals reported experiencing a fall in the last six months. Lastly, we found a low correlation ( $R^2=0.0106$ ) between time since diagnosis and self-reported physical activity in PwPD. Overall, we found the least active individuals experienced less falls compared to more active individuals suggesting these individuals may be self-selecting not to or unable to participate in activities that may put them at risk for falls (i.e. walking). Lastly, we found longer time since diagnosis was not related to decreased amounts of self-reported physical activity.

**Wiltshire, Trudee**

**Mentor(s) -- Prof. Keith Kenney**

**My Growth in the Heart of Europe**

Last spring, I spent the semester studying at the University of Vienna in Vienna, Austria. With Management and Marketing majors and Spanish and Portuguese minors, this university may not have seemed like the obvious first choice, but it was the ideal school and city for me. As one of the largest universities in Europe, Uni Wien's enormous range of courses offered allowed me to continue my Spanish and Portuguese studies-even in a German speaking country-while also enriching my academics in upper-level business courses with students from all over the world. It was truly challenging to the brain to be studying these languages while also attempting to pick up conversational German in order to get by, but the academic stimulation was worthwhile. Vienna is known as the "Heart of Europe," as it is the perfect gateway to Central, Eastern, and Western Europe. Its ideal location allowed me to explore a total of twenty-three countries, consistently developing my independence and personal growth. By engaging in numerous solo trips to European countries, I improved my flexibility, adaptation, and open-mindedness. By spending classroom time and leisure time with local Austrians and exchange students, my understanding of global perspectives was constantly challenged and strengthened. After living at the International House at Maxcy College at USC for two years, it was interesting to be on the other side of the spectrum where I was the exchange student in a completely new setting. My background of living at Maxcy reassured me not to be afraid to try new things, and reminded me to make the most of each moment as I embraced new cultures. My time spent abroad will forever

be something I can reflect upon, and I know that the lessons I gained will be with me for a very long time.

**Winton, Hannah**

**Mentor(s) -- Prof. Katie Hopkins**

**From Textbooks to Potato Chips: Bridging the Gap Between Classroom and Industry**

During the summer of 2017 I worked as a full time supply chain intern for Frito-Lay Inc. at their manufacturing plant in Perry, Georgia. The Perry site is the largest snack food plant in the world with sixteen production lines, a 1500 acre site, and nearly a million square feet under one roof. Besides being Frito-Lay's premier pilot sight for new products the Perry plant also manufactures company staples such as Doritos, Lay's, Rold Gold Pretzels etc. I worked specifically in the Bakery Packaging Department where products such as Baked Lay's, Cheetos, Cheetos Puffs, Hot Fries, Funyuns, and many other baked products are packaged and sent to warehouse to be shipped. During my time with the Perry Bakery Packaging Department I developed a standard line setup guide to improve the bag weight accuracy of the department. I also developed a visual metric system to track team member success and opportunity throughout the week. My experience with Frito-Lay allowed me to expand on my problem solving and team work methodologies I have learned during my time as an undergraduate chemical engineering student at the University of South Carolina. My opportunity to grow and learn with Frito has led me to accept a full time position with the Perry site as a supply chain leader after my graduation in May.

**Wood, Danielle**

**Mentor(s) -- Dr. Patrick McFaddin**

**Does the structure of a flipped classroom allow students to have a better understanding on the applicability of mathematics and the way it influences their learning and reasoning?**

Our focus in this research is to analyze the results of flipping a middle school mathematics course. The analysis involves surveying students to obtain opinions on the classroom change and also involves short examinations to compare the critical reasoning skills gained in lectured-based and flipped classroom learning. We plan on having a "pilot" run with one school to start our experiment. Having one school limits the diversity and variety, but in doing so, we believe this experiment will be more feasible to work around complicated scheduling.

Before receiving this grant, we will continue to conduct intensive research on adolescent brains, the flipped classroom-learning environment, and middle school level mathematics. Once we hopefully receive the grant, we will then proceed to contact a few different middle schools to see if any of their faculty would be interested in partaking in this project.

From there, we will either take preexisting videos for the lectures, or I will create the videos myself, and we will choose a unit to teach. There will be a control group, the lecture based classroom, and the dependent variable, the flipped classroom. Students will receive surveys periodically throughout the learning experience to see how they are reacting to the new way of learning.

In addition, we will give cognitive reasoning "exams" at the beginning and end of the unit to assess if the flipped classroom enhanced the overall learning experience.

**Woods, Carla**

**Mentor(s) -- Dr. Swati DebRoy**

**Influence of Educational Intervention on Salad Bar Usage Among Middle-School Children**

The purpose of this research project is to examine the association of certain socio-economic factors such as age, ethnicity, gender, and Body Mass Index, along with socio-economic status with prefer-

ence to elect for a salad-bar lunch in middle-school children in Jasper County. With obesity in children being a health concern for the United States is on the rise, measures are required to be taken to avoid the issue in the future. With data procured from middle schools in Jasper County, data analysis is used to calculate the change in salad-bar usage, if any, before and after an educational intervention promoting healthy lifestyle choices. From there, statistical analysis is used to calculate the strength of correlations between the times a student has visited a salad bar to the characteristics (physical and socio-economic) of the student, the analysis of variance to determine statistically significant difference in the usage of the salad bar, study the time-series pattern of number of visits to the salad bar per week when categorized based on the Body Mass Index status, and implement multivariate regression analysis if it is deemed appropriate.

### **Woods, Shelby**

**Mentor(s) -- Ms. Lisa Camp**

#### **Seeking Holistic Healthcare**

In my time at USC, I was fortunate enough to not only build my skills through hands-on clinical practice but also have the rewarding experience of working with Spanish-speaking clients at Good Samaritans Clinic. At the clinic, I helped the nurse translate to triage and organized files to increase the efficiency of the clinic. For my senior nursing semester, I have been placed in the Emergency Department at University Hospital in Augusta where I have been able to vastly expand my skills, enhance my autonomy with patient care, and learn the meaning of being a valued member of the healthcare team. Integrating all of these growth opportunities has allowed me to fully appreciate the advanced healthcare system we have here in the United States and inspired me to research what more we can do for the underserved populations in our community. Through our school's College of Nursing, I have had rotations on several different types of hospital floors, enabling me to find what field in which I find the most interest and passion. As a result, I will be working in the Surgically Trauma Intensive Care Unit in Charlotte, NC come July of this year. I hope to utilize my Spanish language abilities, my clinical experience, and my drive for serving underrepresented communities to create change in the health care world.

### **Woolf, Hope**

**Mentor(s) -- Ms. Sarah Gay**

#### **Listen to Your Heart**

During the summer after my junior year, I was the Health Strategies Intern at the American Heart Association (AHA) in the Greater Washington Region. The AHA promotes healthy lifestyles, funds research related to cardiovascular disease and stroke, advocates for public health policy, and educates communities about how to save and improve lives. As a public health major at the University of South Carolina, my internship gave me a hands-on learning experience related to public health. I had the opportunity to assist in organizing and implementing initiatives and programs throughout communities. Specifically, I was able to create a weekly newsletter, design marketing materials, and I worked on revamping and developing the program curriculums for targeted audiences. By participating in this internship, I was able to experience firsthand what a career in this field would be like. This experience impacted me by showing me the importance of working with nonprofits as well as being engaged in the local communities. While in the Greater Washington Region I learned the importance of advocating for rights of populations and the value of public policy. I was able to use my background knowledge from my professional and academic experiences to help me succeed in this environment. After working with the American Heart Association I now am better equipped for working in this field in the future and I hope to be able to use the skillset obtained from this experience in my future professional settings.

### **Woolf, Hope**

**Mentor(s) -- Dr. Andrew Kaczynski, Ms. Sarah King, Mrs. Caroline Dunn, Ms. Melissa Fair**  
**Dietary Behavior Differences of Children with Minority and Low-Socioeconomic Backgrounds**

**Abstract**

**Background:** Rates of childhood obesity are extremely high, especially in racial/ethnic minority low-income youth. In Spartanburg County, SC, nearly 33.7% of children are overweight or obese. Much research has examined health disparities among minority and low-income populations, but gaps exist related to the dietary habits and nutritional intake of these disadvantaged groups in comparison to Whites or higher income youth. The purpose of this study was to investigate differences in daily eating behavior of students of various racial/ethnic and socioeconomic backgrounds within Spartanburg County, SC.

**Methods:**

This study used data from the Spartanburg Healthy Schools Initiative (SHSI). Students (n=997) in 4th-5th grades completed the School Nutrition and Physical Activity Survey in Spring 2017. School databases provided demographic information used to categorize students as either minority (i.e., Black, Hispanic, Asian, or Other) or White. Lunch status (free/reduced versus full paid) was used as a proxy for socioeconomic status. The nutritional intake variables of interest included 9 composite measures: unhealthy proteins, healthy proteins, dairy, refined grains, whole grains, fried snacks, vegetables, sugar-sweetened beverages, and sweets. Logistic regression in SPSS 24.0, controlling for gender, was used to analyze differences in servings per day (0 versus 1 or more) for each nutrition variable according to race/ethnicity or income group.

**Results:** Minority youth were significantly less likely (OR=0.71, 95% CI=0.55-0.92) to consume healthy proteins compared to White youth.

**Conclusion:** This study revealed few differences in nutritional behaviors between youth from diverse racial/ethnic and socioeconomic backgrounds. Future research and interventions should explore individual, interpersonal, and policy/environmental strategies that can help ensure all youth maintain healthy eating habits and weight status.

**Worobetz, Nestor**

**Mentor(s) -- Dr. Sarah Keeling**

**Rediscovering the Desire to Attend Medical School Across Borders**

This presentation will consist of an explanation about my two beyond the classroom experiences when I traveled abroad to Central America for medical mission trips over spring break. This presentation will: (1) describe the trip schedule in hopes of inspiring others to travel abroad, (2) compare and contrast the two experiences I had (Panama and Nicaragua), and (3) describe the inspiration I found which reaffirmed my desire to attend medical school and become a physician.

I will briefly mention how my clinical mission experience related to each of my three Key Insights which I discussed in my GLD E-portfolio. All three of my insights – flexibility towards problem solving, accountability, and working as a team – were a result of these two experiences.

I have pictures to display, as well as items which I used on the mission trips, or brought back which I will use on a table. I will highlight my cultural experiences within the Central American countries and relate this to my overarching appreciation of diversity. I will discuss how I grew on these trips and will spend a short time connecting missionary work to my desire to spend some of my medical career practicing medicine abroad.

The essence of this presentation will focus on my appreciation of the opportunity to travel abroad. Interacting with the Central American people on these two trips touched a part of me that is hard to experience in America due to the restrictions in the healthcare system. I will briefly touch on my experience as a medical scribe for Lexington Medical Center and volunteer work within Palmetto Baptist

Hospital, in order to contrast the vastly different experiences. These trips inspired me to become the best physician I know I can become and reminded me of my initial desire to go into medicine: to attempt to help those who are in need receive as the same quality of service regardless of ability to pay.

**Woronko, Stephanie**

**Mentor(s) -- Ms. Lisa Camp**

**Study Abroad in Thailand**

The world is so connected, yet so misunderstood. I am fascinated by travel and others' experiences abroad, and I noticed that well-traveled adults often have a hole in their maps, where the pins stop and their knowledge takes a turn. While Americans frequently travel through South America, Europe, Australia, and even Africa, I have noticed how few people have ever stepped foot in Asia. There is an intense fear of a region situated literally on the opposite side of the world, a culture marked by competitive technological innovation and a government structure that is quite different from much of the Western Hemisphere. As a public relations major who plans to work in the foreign service, I was particularly interested in exploring the Thai perception of America and testing my understanding of South-east Asian culture. What I observed were two different versions of Thailand - the local and the tourist. The separation of the two became increasingly obvious, and I realized how important it is to keep this in mind when drawing observations about a culture or a place. The characteristics that are the easiest to understand are often not accurate representations of the whole. I learned that entering any country, especially one that has been invaded by your own, puts you on the hot seat for any criticisms people may have. My experiences had been difficult and even awkward at times, but in order to fully get to know Thailand, I knew that I needed to venture away from the tourist traps. I met monks, war survivors, people from hill tribes, as well as other students. The push to learn English in Southeast Asia means that almost anyone is willing and able to talk to you, and my best moments were at locations that others have not heard of in cities that barely make the map. It took me several weeks to understand that people genuinely wanted to travel with me, show me their country, and share their story. I returned home with seven different currencies in my wallet and memories to treasure for a lifetime.

**Wright, Michael**

**Mentor(s) -- Dr. Karen Patten**

**IIT Capstone Project: Flowchart of the UoSC Gifts and Records Services Process**

In this project, we mapped out the UoSC Gifts and Records Services process by creating a work-flow chart which iterates each step in detail. We also improved the process by redesigning key steps to improve efficiency. Using this flowchart, the Gifts and Records Services Department at UoSC can be assured that each step in the process is streamlined towards achieving their goal of maximum efficiency.

**Wu, Christopher**

**Mentor(s) -- Dr. Ehsan Jabbarzadeh, Dr. Maria Yanez, Ms. Maria Piroli**

**Development of Microwell-Imprinted Thermoresponsive Hydrogel for Inducing Cellular Membrane Stress**

Various signaling factors and drug compounds have been well investigated through transport and diffusion kinetics for their time-dependent effects on cell specificity and characteristics. However, research efforts in the fields of drug delivery and stem cell engineering have been hampered by the limited variety of molecules that can effectively diffuse the cellular membrane due to membrane-molecule interactions. Recent efforts to understand the mechanochemical properties of cellular membrane have demonstrated the critical effects of extracellular mechanical characteristics on membrane diffusion kinetics. The goal of this contribution was to develop a platform to increase membrane permeability by inducing isotropic stress. To accomplish this goal, a thermoresponsive hydrogel with a reversible lower critical solution temperature (LCST) of 32°C was developed. The thermoresponsive

hydrogel, known as poly(N-isopropylacrylamide) (PNIPAM), was synthesized from the monomers N-isopropylacrylamide (NIPAM) and N,N'-methylenebisacrylamide (BIS), which provide a concentration-dependent balance between thermal responsiveness and structural integrity, respectively. Cell and cell spheroid microwells were topically imprinted on the hydrogel during and post-crosslinking. We observed a significant microwell volume reduction based on hydrogel swelling kinetics with a temperature change from 37°C to 25°C. This volume reduction provides the mechanism for inducing isotropic stress on cellular membrane. The insight gained from this project provides a rational basis for utilizing PNIPAM-based hydrogels in drug-delivery and stem cell engineering systems for use in both research and clinical settings.

**Wydotis, Elisabeth**

**Mentor(s) -- Dr. Theresa Harrison**

**Community Service: Learning I Don't Need To Travel Abroad To Serve**

The 153 Project was formed to help the homeless in Columbia eat a hot meal at least once a week and to get the community involved with its large homeless population. I wanted to get involved in the community because it's important to me to serve where you live, and I want others to learn that the homeless need encouragement and love as much as the rest of the community. Since being formed in 2003, the project attracts 200+ homeless weekly and thrives on college student volunteers from Columbia. We serve the homeless plates filled with donated food, and are able to talk with those being served and learn about their lives through asking questions and spending time with them, which will form friendships. I'm also able to meet other college students through serving, and meet people filled with wisdom and encouragement that help encourage my love of service. I love serving through this project because I'm able to meet so many people and learn why their lives brought them here. The homeless are open about how thankful they are to the volunteers, and I'm encouraged weekly by both the homeless and volunteers to continue to attend. Since being founded, the project has started finding its feet on social media and spreading our outreach, however, we are working on overcoming the challenges with spreading the word to the homeless of Columbia to ensure that our purpose and mission is being achieved every week we serve.

**Yates, Justin**

**Mentor(s) -- Mrs. Anna Oswald-Hensley**

**It's Just-in, I'm a difference maker**

My focus at the beginning of the year was to effectively apply the work I have done and the skills I have learned in a productive manner. My chosen distinction is in community service. I applied my community service hours, to my church and our local Sumter Opera House. I chose to apply myself in these two places, due to the fact that, I know how much of an impact my church tries to make in the community and that our local Opera House was becoming a part of the major undertaking and revitalization of the down town area and emphasizing the importance of the arts. Through the work in my church, it made me realize how much I do through my church and how much of a difference maker my church is and why helping people is so important. My church has undertaken projects such as making bags of food for underprivileged students to have food on the weekend and having a free clothes give away for anybody to come pick out some clothes at no cost to them. In the working through the Sumter Opera House, I was able to realize how much our community is trying to do to make this an area people are proud to call home. While working there I was able to interact with some members of the community and was told on several occasions how they appreciate what we are doing here and all how important arts are. Over the course of my community service it, affirmed how I want to continue to make a difference in the lives of other and making the arts something that the community can learn from and be proud of. Both the arts and helping others are important to me because I want to try to fulfill people's needs and knowing how much of an impact the arts have had on me and can affect others.

**Yow, Jackson**

**Mentor(s) -- Dr. Tim Mousseau**

**The Influence of Ionizing Radiation on the Inheritance of Developmental Abnormalities**

Nuclear energy and medical technologies have led to significant increases in the doses of ionizing radiation received by the general public and the natural environment. Nuclear accidents and atomic bomb testing have generated many regions around the world with relatively high contamination with radionuclides while advances in medical technology increasingly rely on the use of radiation. However, relatively little is known concerning the health and environmental impacts of low-dose ionizing radiation. In this project, we studied a model insect from the Chernobyl region of Ukraine where populations have been chronically exposed to radionuclides for more than 30 years. Specifically, we tested the hypothesis that the frequent developmental abnormalities (i.e. visible mutations) that have been reported for organisms living in the radioactive regions of Chernobyl have a genetic basis that can be passed from one generation to the next (i.e. is heritable). In addition, we examined the genetic architecture of these abnormalities (i.e. single or multiple genes), estimated their heritability (i.e. the proportion of variation that can be attributed to genetic versus direct environmental effects), and tested for any genetic association between visible mutations and fitness. The results of this study have relevance for populations exposed to radiation, even humans, and could potentially influence policy related to public exposures. Overall, preliminary data suggests that developmental abnormalities are inheritable

**Yow, Jackson**

**Mentor(s) -- Dr. Tim Mousseau, Dr. Carol Boggs**

**Utilization of motion-sensing cameras to conduct wildlife surveys at Chernobyl, Fukushima, and Ft. Jackson**

Biodiversity surveys and ecological monitoring are valuable tools that help define areas and the species within them to aid in scientific research and conservation efforts. Advances in digital photography have produced noninvasive and cost-effective means of detecting elusive wildlife. We utilized motion-sensing cameras to conduct wildlife surveys at Fukushima, Chernobyl, and Ft. Jackson. The Fukushima survey began in January 2015 and employed 75 cameras; the Chernobyl survey began in January 2016 and employed 75 cameras; and the Ft. Jackson survey began in January 2017 and employed 100 cameras. The purpose of the project was to create comprehensive baseline biodiversity surveys allowing us to test hypotheses related to ionizing radiation, fire burns, climate change, and other factors affecting these ecosystems. Preliminary analysis of data from Fukushima suggested elevation and radiation were good predictors of relative abundance. Continuation of the surveys will allow us to study temporal changes in response to human disturbances and develop a more complete understanding of the abundance of wildlife in each area for use in future studies and conservation efforts.

**Yow, Jackson**

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**Zamiela, Sarah**

**Mentor(s) -- Dr. C. Nathan Hancock, Dr. Clint Page**

**Improving the Transposition Efficiency of the Harbinger3N\_Dr Transposable Element**

DNA transposable elements, or transposons, are mobile sequences of DNA that jump from one site in the genome to another in a cut-and-paste manner. They are found in all kingdoms of life and are sorted by homology into groups called superfamilies. The transposable elements from the PIF/Harbinger superfamily are one of the more recently discovered superfamilies. We are interested in studying these elements in particular because the Harbinger3N\_DR transposable element from zebrafish has been shown to be able to transpose in human cells, where it can be used for transgenesis or mutagenesis. We hope to learn more about its transposition characteristics, as well as develop hyperactive versions that transpose at higher rates. In order for Harbinger3N\_DR to “jump” the proteins Harbinger ORF1 and Harbinger Transposase (TPase) must be present. I have developed Harbinger ORF1, Harbinger TPase expression constructs and transformed them into yeast together with a Harbinger3N\_DR reporter construct. We are performing yeast transposition assays to determine the transposition rate and analyze the excision sites. These results will be compared to mPing, another PIF/Harbinger superfamily transposable element from rice. We anticipate that these elements will show similarities in their transposition strategies. We can then use strategies that worked for increasing mPing transposition rates to make a more efficient Harbinger3N\_DR element. This includes removal of nuclear export sequences and mutation of internal sequences.

**Zhang, Ao**

**Mentor(s) -- Ms. Rui Qi**

**Distribution of Wechat Official Accounts**

The aim of this research is to investigate how Destination Marketing Organizations (DMOs) in China can implement their marketing and promotion tasks among different groups by utilizing WeChat official accounts. Since WeChat official accounts have several functions, we want to figure out which function is most useful to DMOs' marketing tasks.

Snowball sampling will be primarily used in this research. We plan to conduct a survey and post it on our WeChat Moments, and participants who finish the questionnaire might share it on their Moments to attract more people engaged in this survey. The target population is all people who use WeChat in China, and the target sample is WeChat users who participate in our online questionnaire. The snowball sampling will help us to increase the population, so we have greater possibility to enlarge the sample size. The data collected through online questionnaire conducted by us will be analyzed, comparing with the secondary database.

We make two implications. One is that DMOs will primarily use the article function to attract potential tourists, and the other is that women users will be the major customers that DMOs target."

**Zhong, Zihang**

**Mentor(s) -- Dr. Jiajia Zhang**

**Association between Serum Antibodies to Oral Microorganisms and All-Cause, CVD And Cancer Mortality Risk in adults**

We conducted an analysis to evaluate the association between serum antibodies against 19 selected oral microorganisms and the risk of all-cause mortality, CVD mortality and cancer mortality according to statistics from NHANES III. The antibody titers have been grouped into 4 categories. We applied Cox proportional hazards models weighted for complex survey design, in which the risk of different mortalities were outcomes and 4 antibody cluster scores were exposures, adjusting for potential confounders.

**Zyck, Amaelia**

**Mentor(s) -- Dr. Christopher Chambers**

**Coupled effects of CO<sub>2</sub> and dissolved oxygen on early life stages of Atlantic silverside, *Menidia menidia***

With the rapid increase in atmospheric and oceanic carbon dioxide (CO<sub>2</sub>) concentrations, ocean acidification (OA) has become a major concern for marine ecosystem health. OA can affect the phenotypes and survival of marine organisms including embryonic and larval fish that are still developing crucial physiological capabilities for handling high CO<sub>2</sub> levels. Atlantic silverside, *Menidia menidia*, is a key forage fish distributed along the Atlantic Coast of North America, an environment that exhibits large seasonal and daily fluctuations in CO<sub>2</sub> and dissolved oxygen (DO). The combined effects of CO<sub>2</sub> and DO on coastal marine organisms are poorly understood and motivated the experiment reported here. We used a single-replicate, response-surface approach for an initial assessment of the plasticity of embryonic and larval silverside when exposed to each of seven CO<sub>2</sub> levels (range: 611 to 2403  $\mu$ atm pCO<sub>2</sub>) at two DO levels (3 and 8 mg/L), resulting in 14 unique CO<sub>2</sub> × DO environments. Adult silversides were spawned into each of the 14 environments, their embryonic and larval developmental stages maintained through hatching and to 14 d post-hatching (dph), and key early life characteristics scored. Survival to hatch varied from 0.75 to 0.94 with highest survival at intermediate CO<sub>2</sub> levels (p<0.05), and trending lower at low DO levels, especially at the higher CO<sub>2</sub> levels. Embryonic period duration was shortest at intermediate CO<sub>2</sub> levels and significantly longer at low DO levels irrespective of CO<sub>2</sub> levels. Size (length) at hatching was also maximal at intermediate CO<sub>2</sub> levels and larvae were shorter overall at low DO levels (p<0.01). Survival of larvae to 14 dph tended to be maximal at intermediate CO<sub>2</sub> levels and was lower at low DO levels (p<0.01). Size (length) at 14 dph was independent of both treatments. Our response-surface approach identified significant effects from CO<sub>2</sub> and DO, and a high potential for their interactions especially at high CO<sub>2</sub> levels and low DO levels.

**Zyck, Amaelia**

**Mentor(s) -- Ms. Jennifer Bess**

**NOAA Ernest F. Hollings Undergraduate Scholarship**

This prestigious scholarship, named after Senator Ernest F. Hollings, provides recipients substantial academic support and a summer internship at any NOAA facility in the United States. Interested students will apply during the second semester of their sophomore year as an undergraduate. The application deadline is at the end of January and students will receive an answer in early April. The application process requires a submission of an online application form, one essay, official transcripts, and two letters of recommendation. Recipients will be selected based on academic merit, relevant experience, and the statement of career interest essay.

We find the essay to be the most important part of the application because it allows students to talk in great detail about their career interests and how those interests align with NOAA's mission. Applicants that can make that connection are more likely to be awarded the scholarship. Awardees complete a summer internship between their third and fourth year as undergraduates. Upon completion of the internship, the Hollings Program will cover the costs of two national conferences, where students can present their research.

There are many resources available to students interested in applying for the Hollings scholarship. Each year, the Office of Fellowships and Scholar Programs (OFSP) hosts several workshops, in which previous winners provide tips on the application process and talk about their experience. In addition, OFSP holds open hours for students to have their application and essay reviewed. They also allow students to read the essays of past winners.

Amy and Katie were both awarded the Hollings scholarship and have completed the summer internship. They wish to present a poster that will contain all the information needed to complete the application for the Hollings Scholarship. In addition, they would like to share their experiences as awardees and offer any additional insight to students interested in applying.



# **Graduate Student presentations**

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**Abboodi, Fadi**

**Mentor(s) -- Prof. Lucia Pirisi-Creek**

**Molecular mechanisms of loss of E7 expression in HPV16-transformed human keratinocytes**

Human Papillomavirus HPV is responsible for 5% of all human malignancies. The HPV oncoproteins E6/E7 are responsible for the transforming potential of the virus. Although continuous expression of HPV oncogenes was considered indispensable for HPV-induced carcinogenesis, we have demonstrated that a subset of HPV-positive cancers (10% in cervical cancer and up to 30% in Oropharyngeal cancer) contain HPV DNA but do not express the HPV E6/E7 oncogenes. These tumors have been designated as HPV-inactive tumors. The gene expression profile of the HPV-inactive cancers is different from HPV-positive active tumors and is close to that of HPV-negative tumors. Interestingly, metastases from OPC tend to be HPV-inactive, while primary tumors are more often HPV-active. This evidence led to the hypothesis that HPV-inactive cancers begin as HPV-active lesions and lose their dependence on continuous E6/E7 expression during progression. This may be due to mutational and/or epigenetic modifications caused by additional carcinogens to which the tumor is exposed. Based upon our observation that HPV-inactive cancers of the uterine cervix often have mutated p53, while HPV-active cancers don't and p53 mutations are common in HPV-negative tumors, but comparatively rare in HPV-positive cancers, we suggested that HPV-positive tumors may become inactive if tumor suppressor protein p53 becomes mutated. Therefore, by using CRISPR-Cas9 technology, we knocked out the p53 gene in HPV16-transformed differentiation resistant human keratinocytes. We noticed that the E7 expression is increasing with increasing passage number in p53 wild-type cells, while it decreased in p53 knocked-out cells. This decrease in E7 expression was reversed by using the demethylating agent 5-Aza-2'deoxyctidine, suggesting that methylation plays a role in this process. Also, we used In Situ hybridization to detect HPV16 E7 mRNA in the same cell lines grown as spheroids on an agarose cushion. We found that some spheroids of p53-KO strains have lost E7 expression partially or completely while all the spheroids of p53-WT strains have a uniform distribution of E7 mRNA. These results support our suggestion that p53 mutation is an important factor in driving the HPV16 transformed cells to lose dependence on continuous expression of HPV oncoproteins.

**Abdollahi, Hessamaldin**

**Mentor(s) -- Prof. Enrico Santi**

**A Novel Adaptive Impedance-Based Control Scheme for DC Power Distribution System Stabilization**

In line with the ever increasing growth of semiconductor technology, the power electronics based DC distribution power systems are becoming dominant in different applications. This includes Microgrids, electrical transportations, data centers, and etc. In most of the applications, several source power converters supply a common DC bus which in turn provides loads through some other power conversion units. The commonly adopted power converters are generally under different feedback control strategies which regulate the power they deliver to their respective loads. The fact that the control units tightly regulate the output voltage of the converters leads to inevitable dynamic interactions at the DC bus. Such interactions can adversely affect the system performance or even drive the overall interconnected system into instability. As a consequence, it is significantly important to develop novel control methods in order to enhance the system reliability and power quality. On the other hand, it is very practically probable that the system experiences variations in operating conditions. For instance, the equivalent load might change or some source might go out of service which causes the remaining source sub-systems in operation undergo additional stress. As a result, the developed control methods must be capable to getting adapted to any change in the system operating condition. This implies that to utilize adaptive control methods is vital to preserve system stability under different operating scenarios and to guarantee continuity of service. To this end, an adaptive control method is developed in this work which is capable of stabilizing the DC power distribution system under different operating modes. The method relies on a recently developed MIMO identification technique that allows

the control unit to rapidly acquire knowledge into the system status. The measurement results are then adopted for control adaptation and system stabilization. The method provides significant ease of implementation and is very computationally efficient which makes it an inexpensive measure for DC system stabilization. The proposed method is validated both in simulation and experimentally. The results very well confirm the effectiveness of the proposed control algorithm.

**Abdulla, Osama**

**Mentor(s) -- Prof. Mitzi Nagarkatti, Prof. Prakash Nagarkatti**

### **2,3,7,8-tetrachlorodibenzo-p-dioxin induced gut dysbiosis modulates delayed type hypersensitivity reaction**

Both gut microbiota and 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) have been shown to have an impact on immune response and disease development. The present study investigates how TCDD alters gut microbiota, thereby inducing immunosuppression in delayed type hypersensitivity reaction (DTHR). C57BL/6 mice were sensitized with methylated bovine serum albumen (mBSA) and re-challenged after six days with mBSA. On day 5, one group received intraperitoneally TCDD (10 $\mu$ g/kg) and the other group received vehicle. On day 8, all groups were sacrificed. TCDD treated mice showed significant reduction in the DTHR in comparison with the vehicle group. Furthermore, we found an increase in the T regulatory cells (Tregs) in draining lymph nodes of TCDD-treated mice, and in the expression of TGF $\beta$ . Moreover, cecal flushes were collected and 16S rRNA sequencing was performed. We determined alpha and beta diversity. We found that at the level of phylum, there was a significant decrease in Bacteroidetes and a significant increase in Firmicutes in TCDD-treated mice in comparison with vehicle group. Interestingly, TCDD-treated group showed significant increase in members of the class Clostridia, which is known to maintain the immune homeostasis by inducing T-regs. Furthermore, we found a significant decrease in the species, *Prevotella* in TCDD-treated group in comparison with vehicle-treated group. It is known that decreased abundance of *Prevotella* in the gut correlates with reduction in inflammation in the joints. Together, TCDD treatment alters gut microbiota which may be responsible for amelioration from inflammatory diseases.

**Adeluyi, Adewale**

**Mentor(s) -- Dr. Jill Turner**

### **Microglial Activation and Associated NADPH Oxidase 2-Induced Reactive Oxygen Species in the Nucleus Accumbens Contributes to Anxiety-like Behavior during Nicotine Withdrawal**

Tobacco smoking is the leading cause of preventable morbidity and mortality globally. Medical and behavioral interventions developed to reduce smoking-related diseases and deaths have been limited by smokers' inability to quit smoking. Mounting evidences have suggested that withdrawal from nicotine, the additive compound in tobacco, during smoking cessation may lead to increased inflammatory responses and consequential oxidative load. While the role of oxidative stress in the pathogenesis of many neurological disorders is established, its contribution to the development of nicotine withdrawal symptoms, which drives smoking relapse, is unknown. To evaluate excessive production of reactive oxygen species (ROS) and its contribution to the development of anxiety-like behavior during nicotine withdrawal, mice treated for two weeks with either saline or nicotine prior to withdrawal were injected intraperitoneally with either vehicle or 150mg/kg/day N-acetylcysteine (NAC), pre-withdrawal (X1day), during withdrawal (X1day), and post-withdrawal (X2days). Open field (OF) test and Marble-burying test (MB) were conducted on mice 30 minutes after receiving NAC injection on first and second post-withdrawal day, respectively. In this experiment, we used NAC as an antioxidant tool, and we found that excessive ROS production and upregulation of inflammatory markers in the nucleus accumbens during withdrawal were attenuated by NAC treatment. A similar profile was observed specifically with NADPH oxidase 2 (Nox2) expression, implicating this molecule as the key producer of ROS during nicotine withdrawal. Further analysis suggested possible withdrawal-induced microglia activation, which previous studies have demonstrated to be associated with Nox2-induced ROS

production. Finally, our behavioral studies showed that NAC-treated withdrawal mice displayed anxiolytic effects in both OF and MB task in contrast to untreated withdrawal mice. Altogether, our emerging evidence suggests that underlying microglial activation and associated Nox2-induced ROS in the nucleus accumbens drive anxiogenic behavior during nicotine withdrawal in mice. For the first time in nicotine addiction studies, we demonstrate that nicotine withdrawal induces oxidative stress, which may contribute to the development of anxiety-like behavior during smoking cessation, via activation of microglial-Nox2 pathway. Therefore, antioxidants targeting ROS production via this pathway may be promising compounds for smoking cessation therapeutics.

**Ahmed, Fahim**

**Mentor(s) -- Mr. Majbah Uddin**

### **Analysis of Pedestrian Injury Severity in Motor Vehicle Crashes in Ohio**

This paper investigates factors contributing to the pedestrian injury severity resulting from motor vehicle crashes in the state of Ohio, USA. It uses the crash data from the Highway Safety Information System, from 2009 to 2013. The explanatory factors include the pedestrian, driver, vehicle, crash, and roadway characteristics. Both fixed- and random-parameters ordered probit models of injury severity (where possible outcomes are major, minor, and possible/no injury) were estimated. The model results indicate that being older pedestrian (65 and over), younger driver (less than 24), driving under influence (DUI), being struck by a truck, dark-unlighted roadways, six-lane roadways, and speed limit of 40 mph and 50 mph were associated with more severe injuries to the pedestrians. Conversely, older driver (65 and over), passenger car, crash occurring in urban locations, daytime traffic off-peak (10 AM to 3:59 PM), weekdays, and daylight condition were associated with less severe injuries. This study provides specific safety recommendations so that effective countermeasures could be developed and implemented by the policy makers, which in turn will improve overall highway safety.

**Al Yassein, Rajaa**

**Mentor(s) -- Dr. Geoffrey Scott**

### **Impacts of Climate Change on the ecotoxicology of Bifenthrin insecticide on the Estuarine Grass Shrimp, *Palaemonids pugio***

Global Climate Change may have number effects on environment such as increasing water temperature and altering salinity that led to changes in risk assessment of aquatic pollutants. Pesticide are agrochemicals that may be affected by climate change, because of their specificity for use on crops and their diffuse application, mechanism of action and transport/fate pathways. This study evaluates the effects of increasing temperature and salinity associated with climate change conditions on the ecotoxicology of pesticide (Bifenthrin) (e.g. 20oC, 20 Psus = Standard Conditions; 30oC, 35 Psus = Climate Change Interaction Conditions), to the estuarine adult grass shrimp, *Palaemonetes pugio*. Bifenthrin 3-[(1Z)-2-Chloro-3,3,3-trifluoro-1-propeny]-2,2-dimethylcyclopropanecarboxylic acid (2-methylbiphenyl-3-yl) methyl ester, is a pyrethroid insecticide that is widely used in agriculture, horticulture, and for residential purposes. Grass shrimp *P. pugio*, are common inhabitants of salt marshes along the Atlantic and Gulf coasts of North America. Grass shrimp, *P. pugio* comprise up to 56% of pelagic macro fauna in estuarine tidal creeks. Exposure to pesticides along with changes in temperature and salinity associated with global climate change may potentially impact the survival and population distributions of *P. pugio* throughout the Atlantic and Gulf coasts of the United States. The nominal test concentration of Bifenthrin with three replicated were control, 10-100 µg/L were the same as in (20oC, 20 Psus & 30oC, 35 Psus). The LC50 test result for 20oC, 20 Psus, in an estimate of with a 96-h LC50 of 36.59 µg/L (95% CI 0.0050– 0.0175 µg/L). While, the LC50 test result for 30oC& 35 Psus in an estimate of with a 96-h LC50 of 32.13 µg/L (95% CI 0.0047–0.0125 µg/L). Bifenthrin was slightly more toxic to shrimp at 30oC, 35 Psus than 20oC, 20 Psus. These findings suggest that changes in temperature and salinity associated with climate change may alter the toxicity of certain pesticide.

**Aladhami, Ahmed**

**Mentor(s) -- Dr. Carole Oskeriztian**

**Potential angiogenic functions of mast cells in early stages of prostatic transformation**

Prostatic Intraepithelial Neoplasia (PIN) is an abnormal growth of epithelial cells which may progress from Low-grade (L) PIN to pre-cancerous PIN. Angiogenesis is a hallmark of solid tumors, as they need blood supply to grow. Located close to blood vessels, prostate-resident mast cells (MC) are first-line source of various mediators including angiogenic Vascular Endothelial Growth Factor-A (VEGF) and sphingolipid sphingosine-1-phosphate (S1P) produced by sphingosine kinase (SphK). Thus, we hypothesize that MC-derived angiogenesis, through local production of VEGF and S1P, initiates prostate transformation. We investigated MC status during prostatic transformation, using a well-established C3(1)/SV40Tag transgenic mouse model (C3) that mimics human prostate cancer initiation and progression. Surprisingly, increased microvasculature, indicative of angiogenesis was observed in LPIN, and MC were located in close proximity to the newly generated blood capillaries. MC numbers were augmented and MC were more activated in LPIN, compared to normal or wild-type littermate prostatic sections. Moreover, significant increase of local mRNA expression for SphK1, VEGF and matrix metalloproteinase (MMP) 9 also implicated in angiogenic remodeling was substantiated in LPIN samples, accompanied with elevation of S1P. Furthermore, we established a novel unbiased imaging method to quantify cell-associated VEGF expression in tissue sections. In situ VEGF protein expression was restricted to MC in all experimental groups but more elevated in LPIN samples, compared to other controls. Our results suggest that early prostatic transformation encompasses S1P and MC-derived VEGF-mediated angiogenesis.

**Alattabi, Zaid**

**Mentor(s) -- Prof. George Voulgaris, Mr. Douglas Cahl, Dr. Lynn Leonard**

**Evaluation of using high frequency beam-forming radars to extract wave spectra**

Although High Frequency (HF) radars are used routinely for measuring ocean surface currents, their utilization for estimating ocean wave spectra is still limited. They require empirical algorithm calibration and a large received signal with a large signal to noise ratio in the frequency range of the second order Doppler spectra. In this study, Doppler spectra collected using two beam-forming (WERA) HF radar systems operating at 8.3 MHz are presented. The data were collected from measurements taken at 30-minute intervals over a period of six months (July 2016 to January 2017) in Long Bay, SC, an embayment located on the South Atlantic Bight (SAB). The radar-estimated second order spectra are compared against in-situ measurements of surface wave spectra and root mean square wave height (Hrms) obtained at three locations over the radar coverage area. The locations correspond to radar radial beam angles from 4 to 52 degrees with respect to radar boresight and radial ranges from 19 to 131 km. The calibration analysis included fitting a spectral form of Heron and Heron's (1998) empirical equation and estimating coefficients as a function of ocean wave frequency. The coefficients were found to have variability based on wave frequency, radar site, instrument location. Using Doppler spectra with high signal to noise ratios improved wave estimates. For signals with lower signal to noise ratios, averaging of the spectra both in the time series domain (over a period of 2.5 hrs, five consequence points on time domain) and in the frequency domain (averaging over five consequence points on frequency domain) improved the predictions significantly. Our analysis based on single station solutions has revealed that using results from two stations could deteriorate wave estimates, as one unit might have a low signal to noise ratio while the other has a very high signal to noise ratio

**Al-Ghezi, Zinah**

**Mentor(s) -- Dr. Mitzi Nagarkatti**

**Combination of cannabinoids,  $\Delta^9$ - tetrahydrocannabinol (THC) and cannabidiol (CBD), mitigate experimental autoimmune encephalomyelitis (EAE) by altering the gut microbiome.**

Multiple Sclerosis (MS), is a common autoimmune disease that affects the central nervous system.

Currently, there is no cure for MS, and most treatments involve the use of immunosuppressive drugs that can have adverse effects or increased toxicity. Cannabis, commonly known as marijuana, is a product of the *Cannabis sativa*, and for several centuries has been used as an alternative medicine in many cultures. *Cannabis sativa* produces over 421 chemical compounds, including about 80 terpenophenols named phytocannabinoids, and include both psychotropic THC and non-psychoactive CBD. In the currently study, we show that a combination therapy using THC and CBD results in amelioration of EAE, an animal model of MS, by reducing hind limb paralysis, decreasing immune cellular infiltration into the brain, and mitigating the presence of inflammatory biomarkers, including gram negative bacteria-associated lipopolysaccharide (LPS). Interestingly, the gut microbiome plays an important role in immune function and studies have shown that it is altered significantly in MS patients. Inasmuch, we performed 16S rRNA sequencing on experimental groups to investigate the gut microbiome composition after using a combination of THC and CBD compared to disease controls. Interestingly, we found that EAE mice showed increase in the mucin degrading bacterial species, *Akkermansia muciphila*, which was significantly reduced in disease mice treated with THC+CBD. Collectively, our data suggests that THC+CBD can ameliorate EAE by preventing accumulation of mucin-degrading bacteria that would lead to increased gut microbial dysbiosis.

**Alhabas, Maryam**

**Mentor(s) -- Prof. Edward A. Frongillo, Dr. Christine E. Blake**

**The Effect of Workplace Breastfeeding Supporting Policy on Breastfeeding Duration in Riyadh, KSA**

**Objective:** To examine the relationship of not having breastfeeding support policy in workplace such as employees pumping breast milk or breastfeeding their infant while at work policy to early initiation of formula and cessation of breastfeeding.

**Design:** Cross-sectional study

**Setting:** Expecting-mothers, and mothers' working in the twelve different organizations in Riyadh, Saudi Arabia.

**Subjects:** A total of 210 working mothers.

**Method:** An electronic questionnaire survey was administered to 340 workingwomen in 12 different organizations in Riyadh. Questions were about participants' demographics and employment characteristics, breastfeeding support services in their workplace, knowledge about breastfeeding benefits, breastfeeding duration during maternal leave and after return to work, and formula initiation.

**Results:** Having a policy supporting breastfeeding employees to breastfeed or express milk in their workplace was associated with lower discontinuance of breastfeeding (OR (95%CI)= 0.157 (0.019-1.299) compared to working mothers who did not know if they have this policy. In addition, the hazard of discontinuance of any breastfeeding 2 months after return to work until one year working and early initiation of formula feeding after baby's birth significantly decreased with having a policy facilitating breastfeeding employees to breastfeed or express milk in their workplace, where the hazard ratios were (HR=0.390, p-value=0.0498) and (HR=0.448, p-value=0.0110), respectively. **Conclusions:** Not having or not knowing about policies that support breastfeeding employees to breastfeed or express milk in their workplace were significantly associated with shorter breastfeeding duration and earlier formula initiation. Creative solutions must found to improve breastfeeding protection at work so mothers will be able to breastfeed longer, which will improve health and development for both child and his or her mother. To inform these solutions, research is needed to understand mothers' perspectives about strategies that could let them continue breastfeeding inside and outside the home and in the workplace.

**Alharris, Esraah**

**Mentor(s) -- Dr. Mitzi Nagarkatti**

**Resveratrol attenuates allergic asthma and associated inflammation in the lungs through mi-**

## **croRNA regulation**

Asthma is an allergic condition characterized by airway hyper-responsiveness and increased bronchial spasm, inflammation and mucous secretion. More than 25 million Americans suffer from asthma, with children constituting around 7 million. The inflammation in asthma is mediated by Th2 cell activation with increased levels of IL-4, -5, and -13. Resveratrol (3,4,5-trihydroxystilbene)- a polyphenolic stilbene, has been shown to mediate anti-inflammatory properties. In the current study, we investigated if resveratrol could suppress allergic asthma. To that end, we induced asthma in BALB/c mice by injecting ovalbumin (OVA) with aluminum hydroxide intraperitoneally followed by 7 days treatment with resveratrol (100mg/kg) by oral gavage. Intranasal ovalbumin was given on day 8 to induce asthma followed by 7 more days of treatment with resveratrol. We found that resveratrol significantly attenuated the allergic asthma in the lungs and caused reduction in CD3+CD4+ and CD3+CD8+ cell numbers in pulmonary tissue of sensitized mice when compared to vehicle controls. There was significant reduction in T-helper cells both in pulmonary tissue and BALF in resveratrol treated group with reduced levels of IL-5, IL-13, GM-CSF and TNF- $\alpha$  in BALF. Interestingly, miRNA-34a was downregulated in cells from the lungs of asthmatic mice treated with resveratrol. Ingenuity pathway analysis (IPA) demonstrated that miRNA-34a was targeting FOXP3, the transcription factor for Tregs that are highly immunosuppressive. Moreover, our PCR results showed that resveratrol-treated OVA mice expressed higher levels of FOXP3 in lung-infiltrating mononuclear cells. Immunofluorescent staining of pulmonary tissue also showed higher expression levels of FOXP3-expressing mononuclear cells in resveratrol-treated asthmatic mice. We conclude that resveratrol-mediated downregulation of miR-34a leads to upregulation of FOXP3+ Tregs, thereby inhibiting Th2-mediated inflammatory response and attenuation of asthma (Supported by NIH grants P01AT003961, R01AT006888, R01AI123947, R01MH094755, P20GM103641, and R01AI129788 to MN and PN, as well as MOHESR to EA).

**Alkarkoushi, Rasha**

**Mentor(s) -- Dr. Traci Testerman**

## **Enterohepatic Helicobacter species modulate severity of DSS-induced colitis but do not prevent amelioration by indole-3-carbinol**

Enterohepatic Helicobacter (EHH) species are Gram-negative bacteria, colonize the colons and the biliary ducts of humans, primates, rodents. Virtually nothing is known about the influence of EHH species which are more relevant to most humans. Dextran sulfate sodium (DSS) treatment is widely used in mice to mimic ulcerative colitis. Indole-3-carbinol (I3C), a chemical extracted from cruciferous vegetables, ameliorates DSS-induced colitis. We hypothesized that specific EHH species would alter the course of DSS-induced colitis and possibly the responses to I3C treatment. We infected C57BL/6 mice with human- and rodent-associated EHH species and measured the effects on DSS-induced colitis and response to I3C treatment by measuring inflammation, T cell responses, and microRNA expression patterns. We found that *H. muridarum* and *H. cinaedi* exacerbate DSS-induced colitis and delay recovery, whereas some other EHH species may reduce DSS-induced colitis severity. Furthermore, I3C ameliorated colitis and shifted the Treg/Th17 balance in *H. muridarum*-infected mice. Moreover, the microRNA expression pattern was altered in *H. muridarum*-infected mice when compared to that of uninfected mice. Interestingly, enhanced colitis as well as increased Th17 cells in spleens and mesenteric lymph nodes were observed in *H. muridarum*-infected DSS-treated mice when compared to *H. muridarum*-infected mice. I3C treatment of DSS + *H. muridarum*-infected mice decreased the expression of pro-inflammatory IL17 and RORC as well as increased anti-inflammatory Foxp3 when compared to the DSS + *H. muridarum* group. These immunological changes correlated with the microRNA expression. The decreased expression of RORC correlated with increased miR-let7a-2 and miR-29a-3p expression and increased FoxP3 with correlated with decreased miR-874 expression following I3C treatment. These studies demonstrate that the presence of EHH species alters susceptibility to DSS-induced colitis. Importantly, mice with exacerbated colitis respond to I3C. These results suggest that EHH species could make a human more or less prone to inflammatory

bowel disease. In the future, we plan to study the mechanisms underlying the effects of EHH on colon cancer development and the efficacy of I3C in both the colitis and colon cancer models.

**Allen, Ashley**

**Mentor(s) -- Dr. S. Michael Angel**

### **SPATIAL HETERODYNE SPECTROMETER FOR REMOTE LIBS AND RAMAN SPECTROSCOPY USING FRESNEL COLLECTION OPTICS**

A combined laser-induced breakdown (LIBS) and Raman spatial heterodyne spectrometer is described for remote measurements using Fresnel collection optics. The spatial heterodyne LIBS and Raman spectrometer (SHLS and SHRS) is based on a fixed diffraction grating interferometer with no moving parts that offers a very large field of view, high light throughput, and high spectral resolution in a small package. The field of view of the SHS spectrometer is  $\sim 1^\circ$  in remote LIBS and Raman measurements making it very forgiving of collection optics alignment and image quality. In the SHLS/SHRS system described here, a  $\sim 100$ -mm diameter,  $f/1.25$  Fresnel lens is used for light collection and compared to a high quality  $\sim 100$ -mm aperture Questar long distance microscope. LIBS and Raman measurements were made at 10 meters for a variety of organic and mineral samples including materials from deep ocean hydrothermal vents. The overall quality of the spectra as indicated by fringe visibility in the interferograms is the same using each type of lens. However, spectral intensities are reduced by about a factor of 4 for the Fresnel lens, likely due to scattering and reflection losses as well as aberrations in the Fresnel optic. The results are encouraging, suggesting that Fresnel optics might be useful in applications where size and weight are restricted, such as in instruments designed for spacecraft and planetary landers.

**Almurshidi, Badria**

**Mentor(s) -- Dr. Mohammed Baalousha**

### **Role of Selenium Nanoparticles in Reduction of Oxidative Stress on Cerebral Cavernous Malformation (CCMs)**

Cerebral Cavernous Malformation (CCMs) is genetic origin vascular disorder due to mutations in CCM1, CCM2 and CCM3 genes. The disease is characterized by irregular clusters of dilated thin wall layer of small capillaries in the brain and the spinal cord. These fragile capillaries have a tendency to rupture and bleed because of abnormal junction between neighboring smooth muscle cells and abnormal formation of elastin (stretchable material in the vessels). Earlier pharmacotherapeutic approach based in in vivo and in vitro research found a strong relation between mutated form of CCMs proteins, and excessive production of reactive oxygen species (ROS). ROS have a crucial role in mediating consistent inflammatory responses and inducing the disease progression. Recent pharmaceutical therapies are focusing on targeting the progression and severity of the disease to prevent de novo formation of CCMs lesions in patients. Most advanced therapeutic approaches are developed from understanding the pleiotropic biological functions of CCMs proteins and their role in distinct signaling pathways. Some of these signaling pathways including those involved in molecular response to oxidative stress and formation of reactive oxygen species (ROS). Selenium Nanoparticles (NPs) have previously revealed great promise in taking advantage of decrease oxidative stress in other diseases studies, by decreasing accumulation of ROS. Primary research found that selenium nanoparticles can act as super oxide dismutase enzyme (SOD) to scavenge ROS. This research is just a beginning to develop a new nanotherapeutic approach using selenium nanoparticles to target oxidative stress in CCMs disorder. Using selenium nanoparticles as in consequent implications to develop a novel, safe, and effective preventive therapeutic strategies from de novo formation of CCMs lesion and protect a neurovascular unit. The main aim is to determine the ability of selenium nanoparticles antioxidant mechanism to detoxify the reactive intermediates or repair the resulting damage.

**Alrafas, Haider**

**Mentor(s) -- Prof. Mitzi Nagarkatti**

**Effect of Resveratrol on Gut Microbiome in Colorectal Cancer**

Colorectal cancer (CRC) is a heterogeneous disease with distinct molecular and clinical features, which reflects the wide range of prognostic outcomes and treatment responses observed among CRC patients worldwide. Currently, there is no cure for patients suffering from CRC, and most treatments involve the surgical removal of the cancer and chemotherapy that are not effective in most cases and have adverse side effects or increase the toxicity. In current study, we investigated the effects of resveratrol (RES), a natural component found in grapes, strawberries and raspberries on murine azoxymethane-dextran sodium sulfate (AOM-DSS) induced CRC model.

Our data shows that administration of RES alleviates symptoms associated with CRC in this model, which includes reversal of weight loss and decreased colon polyps. Flow cytometry data showed significant increase in both blood and splenic MDCs in AOM-DSS group following RES treatment while significant decreases in blood, spleen and mesenteric lymph node (MLN) CD3+, CD4+ and CD8+ T cell. Also, flow cytometry data showed significant increase in blood, spleen and MLN Foxp3+ T cells and IL10 in RES treated group while significant decreases in IFN- $\gamma$  and Th17 cells in blood, spleen and MLN. Endoscopy and histopathology also showed decreased colonic tissue damage, tumor growth and cellular infiltration in the colon after RES treatment. To better understand the beneficial effects of RES in CRC, we performed 16S rRNA metagenomic sequencing to investigate alterations in the gut microbiome in vehicle- or RES-treated AOM-DSS mice. Analysis of cecal flushes revealed that AOM-DSS administration led to significant decrease in *Ruminococcus gnavus*, *Akkermansia muciniphila*, *Bacteroides acidifaciens* and *Mucispirillum schaedleri*. However, mice that were treated with RES showed a remarkable reversal in these gut microbial alterations caused by AOM-DSS CRC induction, which had gut microbiome similar to that of naive mice. Collectively, these data suggest that RES can ameliorate CRC by preventing gut microbial dysbiosis and restore gut microbiome composition to a more homeostatic state. (Supported in part by NIH grants P01AT003961, R01AT006888, R01ES019313, R01MH094755, P20RR032684 and VA Merit Award BX001357).

**Al-Sammarraie, Nadia**

**Mentor(s) -- Dr. Mohamad Azhar, Ms. Kayce Booth, Mr. John Johnson**

**Loss of Transforming Growth Factor Beta-2 in Myocardium Causes Congenital Heart Defects**

Background and significant: Tetralogy of Fallot (TOF) is a congenital heart defect (CHD). TOF involves four heart defects: ventricular septal defect (VSD), an obstruction from the heart to the lungs due thickening of the pulmonary valves (PV) (i.e., pulmonary stenosis), overriding aorta (OA), and thickening of the muscular walls of the right ventricle (RV) (i.e., RV hypertrophy). Transforming growth factor beta-2 (TGF $\beta$ 2), a multifunctional cytokine, is considered as a potential candidate gene involved in CHD, including TOF. Although *Tgfb2* is expressed in many cardiac cell types, the cell-specific role of TGF $\beta$ 2 has not been determined in heart development. Methods and Results: Histo-morphological analysis of wildtype and myocardium-specific *Tgfb2* conditional knockout (*Tgfb2*CKO) embryos (E14.5) showed thickened PV, thin myocardium (RV affected more than left ventricle (LV)), OA, and VSD. In vitro Collagen Gel Explant assays indicated attenuated or delayed cushion EMT in *Tgfb2*CKO embryos. Immunohistochemistry analysis showed reduced cushion mesenchymal apoptosis in the RV outflow tract (RVOT) and decreased myocardial proliferation (RV affected more than the LV) in *Tgfb2*CKO embryos (E14.5). In contrast, the RV walls, in particular, became thicker than the LV in *Tgfb2*CKO fetuses before birth. Conclusion: Our results indicate that loss of myocardial TGF $\beta$ 2 causes CHDs of TOF, including VSD, PV stenosis, OA, and RV hypertrophy. Although RV hypertrophy thought to be developed in response to elevated pulmonary afterload, it is not clear what the underlying mechanisms are and if they share the same hypertrophic signaling mostly established in adult left ventricle. However, it is unclear how hypoxemia contributes to the pathological outcomes of RV hypertrophy and failure in TOF patients. Our work has revealed TGF $\beta$ 2 as a potential regulator for myocardial proliferation in the RV. By linking the signaling cascade of TGF $\beta$ 2 to those involved in

chamber specific pathogenesis induced by hypoxia, our study has potential to facilitate the development of new therapies for newborn infants with TOF.

**Andersen, Haley**

**Mentor(s) -- Dr. Kenneth Walsh**

**A Real Time Screening Assay for Cannabinoid CB1 Receptor-mediated Signaling**

The cannabinoid CB1 receptor is expressed at high levels in the central nervous system where it functions to regulate neurotransmitter release and synaptic plasticity. While the CB1 receptor has been identified as a target for both natural and synthetic cannabinoids, the specific downstream signaling pathways activated by these various ligands have not been fully described. In this study, we developed a real-time membrane potential fluorescent assay for cannabinoids using pituitary AtT20 cells that endogenously express G protein-gated inward rectifier K<sup>+</sup> (GIRK) channels and were stably transfected with the CB1 receptor using a recombinant lentivirus. In whole-cell patch clamp experiments application of the cannabinoid agonist WIN 55,212-2 to AtT20 cells expressing the CB1 receptor (AtT20/CB1) activated GIRK currents that were blocked by BaCl<sub>2</sub>. WIN 55,212-2 activation of the GIRK channels was associated with a time- and concentration-dependent (EC<sub>50</sub> = 309 nM) hyperpolarization of the membrane potential in the AtT20/CB1 cells when monitored using a fluorescent membrane potential-sensitive dye. The WIN 55,212-2-induced fluorescent signal was inhibited by pretreatment of the cells with either the GIRK channel blocker tertiapin-Q or the CB1 receptor antagonist SR141716. The cannabinoids displayed an efficacy of WIN 55,212-2 ≈ anandamide (AEA) > CP 55,940 > Δ<sup>9</sup>-tetrahydrocannabinol (THC) when maximal concentrations of the four ligands were tested in the assay. Thus, the AtT20/CB1 cell fluorescent assay will provide a straightforward and efficient methodology for examining cannabinoid-stimulated Gi signaling.

**Arrasmith, Kathleen**

**Mentor(s) -- Dr. Wendy Valerio**

**Guided Music Play between Two-Year-Old Children and a Music Play Facilitator: A Case Study**

With the intention of increasing social music interaction understanding, the purpose of this study is to investigate guided music play between two-year-old children and a music play facilitator. I will investigate two specific research questions:

What play behaviors and roles emerge when children and I, a music play facilitator, engage in guided music play?

What music emerges when children and I, a music play facilitator, engage in guided music play?

Children use play appropriate to their developmental ability, skill independence, and socialization experiences. Playfulness guided by an adult within a music setting has the potential to elicit children's music responses and increase children's musical independence. To date, some researchers have elucidated music play relationships between an adult and children, but none have documented the adult's and children's interactions during guided music play.

I facilitated six 20-minute music engagements with two-year-old children, six of whom are included in this study. I provided rich, thick descriptions of each child and vignettes that depict instances of guided music play and participants' play behaviors and music responses. I used songs and rhythm chants, with and without words and in a variety of tonalities and meters, to establish and maintain the music environment. I engaged the children in tonal acculturation patterns and rhythmic acculturation patterns within the context of songs or rhythm chants. I determined developmentally appropriate music skills and used children's play to scaffold learning to increase children's music skill independence. I used the children's play suggestions, inferred through verbal and nonverbal cues, to create inviting

scenarios during which children engaged in music through intrinsically motivated play.

I gathered data via written journal entries from the assistant who recorded each session, the two-year-old children's classroom teachers, and myself. The classroom teachers and a music development specialist engaged in individual think-aloud interviews while watching video recording clips. I coded and transcribed all data, created a taxonomic analysis to organize cultural domains, and developed a componential analysis to identify patterns and themes. Findings and implications are discussed.

**Atiya, Huda**

**Mentor(s) -- Dr. Ann Ramsdell**

### **Role of the epithelial microenvironment in mammary tumor progression**

The mammary gland is a unique organ composed of two distinct microenvironments: the epithelium (ductal network) and the stroma (fat pad). Both the stromal and epithelial microenvironments have been reported as major regulators of mammary gland development and homeostasis. However, the preclinical mouse models used in studying tumor progression and metastasis are generated in the stromal microenvironment and bypass the epithelial microenvironment. Failure to consider effects of the epithelial microenvironment may be a significant omission because human breast cancer originates in the epithelial microenvironment. Thus, the aim of this study was to determine if the epithelial component has an effect on mammary tumors progression and/or metastasis when compared to tumors generated in the stroma, the fat pad.

We chose a widely used 4T1 mouse model. In this study, 4T1 cells were injected intraductally into the epithelial microenvironment of mouse mammary glands. Tumor properties (tumor take, growth rate, histology, gene expression profile, and metastasis) were compared to what has been reported in the literature about the fat pad 4T1 mouse model.

Our result show that tumor take and growth rate of 4T1-intraductal generated tumors are similar to what has been reported for the fat pad generated tumors. However, the 4T1-intraductal generated tumors have several differences compared to what has been reported for the 4T1-fat pad generated tumors. First: 4T1-intraductal tumors show different histopathological features not reported for 4T1-fat pad tumors, such as collagen deposition and fibrosis which is associated with increased metastatic behavior. Second: 4T1-intraductal tumors show increased lung metastases at an earlier time point compared with lung metastases resulting from 4T1-fat pad generated tumors. Furthermore, gene expression profile shows 6,375 genes that are differentially expressed in 4T1 cells isolated from the intraductal generated tumors compared to only 325 genes that are differentially expressed in 4T1 cells after the fat pad injection. Moreover, the genes affected by intraductal injection are associated with processes that drive tumor progression and metastasis. Collectively, our results indicate that the mammary epithelial microenvironment promotes more aggressive tumors compared to the stromal microenvironment.

**Atwell, Madeline**

**Mentor(s) -- Dr. Carlina de la Cova**

### **Embodied Madness: Contextualizing Biological Stress Among 19th and 20th-Century Institutionalized Euro-American Women**

The height of state-run mental institutions in the 20th-century United States reflected a period in which women of middle and low socio-economic status were admitted into insane asylums at a higher rate than men for the first time in recorded history. Societal stigma associated with women and mental illness contributed to the institutional abandonment of those that deviated from the norm. These individuals often became patients at underfunded state-run mental hospitals, where immense overcrowding resulted in subpar medical care. The patients in this study suffered from neglect, were never successfully rehabilitated, and ultimately died within the care of the State. An existent body of histor-

ical and feminist literature highlights the social and cultural climate in which the institutionalization of women was both acceptable and commonplace; yet few of these studies have paired this research with the information that can be revealed on the bones of those institutionalized. A sample of 53 institutionalized women from the Robert J. Terry Anatomical Collection were analyzed for evidence of fracture trauma and active disease to understand how structural violence infringes upon the human body in ways that are embodied in both life and death. Trauma, including perimortem and healing fractures, as well as active disease, were observed in various manifestations across the sample. These results, combined with historical research, indicate that mental institutionalization negatively contributed to the health of the women in this study, and in some cases, led to their death.

**Aydin, Serdar**

**Mentor(s) -- Prof. Mahmud Khan**

### **An Approach to Evaluation of Taiwan Healthcare System Performance and Healthcare Reform**

Taiwan has some special aspects of its health care system which may not be seen in anywhere else. After the implementation of the National Health Insurance acted in 1995, the health system has remarkably improved and effected in rural as well as urban area. The National health insurance has three main objectives; financial sustainability, equity, and efficiency.

The most important aspects of Taiwan's health care system can be the followings; Universal coverage, comprehensive coverage, public single-payer, national global budget, and patient satisfaction. At the same time, life expectancy, aging population, infant mortality rate, birth rate, and the percentage of health expenditure on the GDP are the result and different aspects of Taiwan's health care system. Public single-payer has played a key role on health systems to control total cost as well as quality. The system administration is deciding the fee for drugs, hospitalization, and care as a single purchaser to play role in the market, by which total health expenditure can be under control.

Taiwan has the national global budget method to do resource allocation, which protects to exceed the allocation of budget. This type of budget method helps to control resources, motivate workers to strive to achieve budget goals and accountability.

Patient satisfaction is the one of important quality indicator used for health system performance. Taiwan's population satisfaction rate of the national health insurance is more than 80 percent, compared to United States that spends almost 18 percent of its GDP on health expenditure it is remarkable success Taiwan has done.

Having high life expenditure with low health expenditure that is really important aspect of Taiwan health system cannot be easily transformed and implemented to other countries system. Unfortunately, Taiwan is expected to have the largest aging population in the future because of low birth rate, which has been affected by several reasons such as high women education, cultural challenge, and economic development. Overall, Taiwan's health system is currently one of the best systems as a model that serves to all population with efficiency and effectiveness.

**Aydin, Serdar**

**Mentor(s) -- Prof. Ercan Turk**

### **EVALUATION OF THREE DIFFERENT PALLIATIVE CARE SERVICE MODEL IN TERMS OF THE CANCER PATIENTS AND COST-UTILITY ANALYSES IN TURKEY: Hospital-Based, Home-Based, and Hospice Care**

Cancer is a major disorder and killer affecting most people directly or indirectly throughout human history. Nearly half of diagnosed patients can survive longer than five years and the course of cancer is shifting from an acute disease to a chronic disease condition which is supposed to take long-term treatment.

Palliative care is an approach that improves the quality of life of patients and their families facing the problem associated with life-threatening illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems,

physical, psychosocial and spiritual.

Home-Based Care is defined as any form of care given to ill people in their homes. Hospice care is a specialized and intensive form of palliative care emphasizing quality of life, and the relief of suffering in any residential living environment from private home to a long-term care facility. Hospital-based care is provided in the hospital and patients can be at any stage of illness, from months to years.

The aging of population, rising of life expectancy and chronic diseases can affect the needs to Palliative care. A study shows that patients and health care systems can save money with palliative care even the unit is not profitable itself. For instance, transferring a patient from intensive care unit (ICU) (\$3500/day) to the palliative care unit (PCU) (\$1500/day) can save \$2000 a day. A research proves that total and ancillary service costs were reduced after consultation and transfer to palliative care for those who were discharged or died in the hospital. Besides, hospital palliative care consultations teams have been shown to improve care for adults and reduce on hospital costs as well.

Finding any evidence on costs and cost-effectiveness of alternative methods of delivering health-care services is increasingly important to facilitate appropriate resource allocation decisions as well as public health policy makers to create standardization based on cost-effectiveness. Care at the end of life is known to account for significant proportion of health care resources, for instance, 25% of U.S health care expenditure goes for the end of patient life year cost.

**Babatunde, Oluwole**

**Mentor(s) -- Dr. Swann Adams**

### **Identifying predictors of racial disparity in treatment and mortality among patients diagnosed with breast cancer in South Carolina**

**Introduction:** Despite a lower incidence of breast cancer (BrCa) among Blacks in the U.S. compared to Whites, Black women experience consistently higher mortality rates. The aim of this study is to assess racial disparities in treatment delays and the utilization of Adjuvant Hormone Therapy (AHT) among patients diagnosed with breast cancer.

**Methods:** Outcome variables were diagnosis-to-treatment time for breast cancer-related surgery, radiation, and chemotherapy and receipt of AHT as part of first course of treatment (receipt vs non-receipt). The main exposure variable was patient race (white vs black). Chi-square tests and logistic regression analyses were conducted to compare patients who received AHT to those who did not receive AHT in order to identify important predictors of receipt of AHT.

**Results:** A total of 1611 breast cancer patients with 1205 whites and 406 blacks were reported in the study period (2002-2009). There was consistent increase in the mean number of days from diagnosis to receipt of first course of treatment overall, surgery, radiation, chemotherapy and hormonal therapy among blacks compared to whites respectively. The crude odds of non-receipt of AHT was 1.59 (95% CI: 1.14-2.21), and the adjusted odds was 1.23 (95% CI: 0.85-1.78) among Blacks compared to Whites. The adjusted odds of non-receipt of AHT were 2.02 (95% CI: 1.36-2.99) and 5.15 (95% CI: 3.41-7.77) among tumor grade II and III/IV compared to grade I respectively. Among patients who were married, the odds of non-receipt of AHT were 2.19 (95% CI: 1.28-3.74) among Blacks compared to Whites; among those that received late surgery, the odds of non-receipt of AHT were 3.00 (95% CI: 1.34-6.71) among Blacks compared to Whites; and among tumor stages II and III/IV, the odds of non-receipt of AHT were 1.81 and 2.42 (95% CI: 1.14-2.87 and 1.29-4.55), respectively among Blacks compared to Whites.

**Conclusions:** To improve overall use of AHT, efforts need to be directed at Black breast cancer patients that received late surgery (>30 days after diagnosis). Further investigation of the impact of marital status on AHT usage among black breast cancer patients is warranted.”

**Ballou, Amy**

**Mentor(s) -- Dr. Sue Heiney**

### **Evidence-Based Practice Screening for Depression in Medical Oncology Stage IV Patients**

**Significance:** Depression may be an underdiagnosed condition in patients with non-curative cancer (Stage IV) who are unlikely to survive their disease. It is challenging to differentiate between distress from a Stage IV cancer diagnosis and major depression. Use of a reliable and easily administered depression screening instrument would improve mental health care for these patients.

**Purpose:** This evidence based practice change will examine the provider's adherence to use of the Patient Health Questionnaire-9, a depression screening tool in stage IV medical oncology patients in an outpatient cancer center.

**Methods:** A literature review found that the Patient Health Questionnaire-9 (PHQ-9) instrument was a valid and feasible tool to incorporate into the electronic medical record. Assessment of current practice, confidence in assessment and receptivity to change was implemented and included a review of nurse practitioner's (NPs) charts for documentation of depression screening and survey of NPs regarding management of depression. Medical assistants were surveyed regarding their understanding of the PHQ-9. Post implementation of the screening tool, a second chart review will be conducted to determine adherence to the screening and post screening care.

**Results:** We report on the pre-assessment results of the project, which showed 73% of NPs (n=11) and 64% (n=11) of medical assistants wanted information on depression. The mean score for perception of depression knowledge was 3.45 out of a 5-point Likert scale with responses ranging from not at all confident (1) to very confident (5). They were also not very confident in utilizing a depression screening instrument (mean of 2.8). The chart review yielded no indication of depression screening.

**Implications:** In clinical practice, providers are faced with the perplexing task of distinguishing between normal distress from a cancer diagnosis and major depression, two processes that merit different interventions. Depression screening at diagnosis may provide improved management of depression.

**Bandyopadhyay, Tirthankar**

**Mentor(s) -- Prof. Caryn Outten**

**Severe redox stress correlates with pH changes in the cytosol and mitochondria of *S. cerevisiae***

Maintenance of thiol redox balance is essential in both prokaryotes and eukaryotes. Glutathione (GSH) has been shown to be a major cellular redox buffer and is critical for mitochondrial functions such as Fe-S cluster biogenesis, oxidative phosphorylation and mitochondrial protein import. Since thiol-disulfide exchange reactions involve the transfer of protons as well as electrons, their redox potentials vary with pH. These pH differences should be taken into consideration while calculating the cytosol, matrix and IMS redox potentials. Previous studies in our group have suggested that GSH:GSSG redox state in subcellular compartments such as the cytosol, mitochondrial matrix and intermembrane space (IMS) is maintained separately [1], but it is still unclear how perturbations of the GSH:GSSG couple influence the distribution of GSH:GSSG between these compartments. Our goal is to understand the mechanisms for maintaining thiol redox equilibrium in different compartments under severe redox stress and determine how GSH:GSSG is exchanged between the cytosol, mitochondrial matrix and IMS under these conditions. Using a targeted GFP-based pH sensor in yeast strains overexpressing a plasma membrane GSH:GSSG transporter, we examined the changes in pH in the cytosol, mitochondrial matrix and IMS upon addition of GSH or GSSG to the growth medium. GSH and GSSG over accumulation were found to directly impact changes in pH in the subcellular compartments, suggesting concomitant changes in redox potentials as well.

**Beck, Julia**

**Mentor(s) -- Dr. Wendy Valerio**

**Parent's Observations of their Young Children's Music Behaviors**

With the intent of understanding perceptions of early childhood music development, the purpose of

this research is to examine parents' observations of their young children's music behaviors to develop a deeper knowledge of how parents observe, interpret, document, and support their young children's early childhood music development and learning. Data will be collected through video-recorded, early childhood music engagement classes with three-year-old children, parents' interviews regarding their child's music development, and an exit questionnaire. This research has implications for parent and child music interactions. By continued examination of parents' observations and perceptions of young children's music engagement and behaviors, we may increase our understanding of early childhood music development, and we may learn how to help parents better understand their children's music development.

Keywords: Music Learning Theory, Gordon, early childhood, music development, qualitative

**Beck, Jordan**

**Mentor(s) -- Dr. Peter Duffy**

**(Un)common Voices in an Age of Common Core**

According to a 2012 survey, teacher satisfaction has declined 23 percentage points since 2008, (62% to 39% very satisfied) to the lowest level in 25 years. Concurrently, scholars cannot agree what percentage of new teachers leave education in their first year of teaching with numbers ranging from 20-50 percent, the vast majority agreeing that the number is growing. Coupled with teacher shortages in states like South Carolina, and low enrollment in professional teacher prep programs across the county, the national conversation around teacher retention, job satisfaction, and the role of the teacher is heated.

Using qualitative research methods, a group of pre-service theatre teachers has collected a growing number of interviews (over 50) from teachers who've left education for reasons other than retirement, as well as teachers who've been in education for more than 20 years. The goal is create a piece of performed research which seeks to explore the tensions, problems, and policies which keep teachers in schools, or push them out.

As a member of this group of preservice teachers, the subject of my research was 6 90+ minute interviews done in the fall and spring of the 2018 school year. The subjects came from several states (Maine, South Carolina, Oregon, Washington, Arizona, Washington DC), from a variety of contexts, with a diverse set of backgrounds. The goal of the research is to collect more data for the project, and make sure that the performed research is the best reflection of the data collected by coding and processing the data for the ensemble.

**Becker, William**

**Mentor(s) -- Dr. Mitzi Nagarkatti, Dr. Prakash Nagarkatti**

**Cannabinoid receptor activation induces unique changes in the murine gut microbiome associated with the induction of anti-inflammatory myeloid-derived suppressor cells and T regulatory cells.**

$\Delta$ 9-tetrahydrocannabinol (THC), the main psychoactive ingredient found in the Cannabis plant, has been shown to activate cannabinoid receptors CB1 and CB2. Synthetic THC is currently being used to treat anorexia in people with HIV/AIDS, patients undergoing chemotherapy, multiple sclerosis, neuropathic pain, and spasticity. Moreover, use of marijuana for recreational and medicinal purposes is getting increased attention globally. The mammalian intestine harbors a diverse array of bacteria which are known to regulate and respond to many stimuli including that of the immune and nervous system. In the current study, therefore, we investigated the immune-modulatory capacity of THC, and its resulting effects on the gut microbiome. We tested the effect of acute or chronic exposure of C57BL/6 mice to THC on the murine immune system, and correlated these immunological changes to the flux of intestinal bacteria. Intraperitoneal exposure of mice to THC caused significant migration

of CD11b+Gr-1+ myeloid-derived suppressor cells (MDSCs) from the bone marrow to the peritoneal cavity where they proliferated based on a dose dependent increase in Ki-67 expression. Mice administered THC displayed an increase in the number of colonic lamina propria ROR $\gamma$ t+ FoxP3+ bacteria-associated T regulatory cells (Tregs). The acute induction of anti-inflammatory cells we observed was mirrored by an acute increase in the short chain fatty acid, butyrate, a bacterial metabolite known to have many beneficial effects in the colon. To determine the receptor mediating these changes, Cnr1 $^{-/-}$ , Cnr2 $^{-/-}$ , and Cnr1Cnr2 $^{-/-}$  double knockout mice were administered THC, revealing that CB1 ligation is responsible for the alterations in butyrate levels; however, both CB1 and CB2 are needed to maintain normal levels of butyrate and acetic acid in the murine intestine. These data suggest a role for THC in reducing inflammation in the gut, as well as a role for cannabinoids in regulating the microbiome and healthy intestinal function. (Supported in part by NIH grants R01MH094755, R01AI123947, R01AI129788, P01AT003961, P20GM103641 and R01AT006888).

**Bennett, Amanda**

**Mentor(s) -- Dr. Karen McDonnell, Mr. David Gallerani, Dr. Abbas Tavakoli**

**A Baseline Profile of Sleep Quality in African American Survivors of Lung Cancer and Their Family Members (Dyads)**

**Background:** Improving the quality of life of survivors of early stage lung cancer (Stages I - IIIa) requires attention to persistent, burdensome symptoms, including sleep disturbances. While research exists regarding sleep quality in patients diagnosed with cancer, there is minimal research regarding sleep disturbances of early stage lung cancer survivors and their family members.

**Purpose:** This study will measure and compare sleep quality as a baseline characteristic among African American survivors of lung cancer and their family members who are enrolled in a pilot study testing an adapted version of the Mindfulness-based Cancer Recovery intervention.

**Methods:** Using cancer registry data, survivors were recruited from a medical oncology practice affiliated with an American College of Surgeons Network Cancer Program in South Carolina. Each survivor recruited a family member to participate as a dyad. Eight survivors and eight family members (N = 16) consented to participate. The Pittsburgh Sleep Quality Index (PSQI) measured self-reported sleep quality over a one-month period. Descriptive statistics were used to determine baseline differences for all personal, health status characteristics and sleep quality. To obtain a presenting clinical profile, baseline differences between the the patient group participants and the family member group participants will be analyzed by matched-pairs t-tests (continuous variables) and McNemar's test for dichotomous variables.

**Results:** All participants were African American, 56.3% (n=9) of the participants were male, with a mean age of 61.1 years (SD=10.3), and average time since diagnosis was 26.8 months (SD=12.8). The mean score for the PSQI was 9.3 (SD=3.7); 87.5% of all participants scored 5 or higher, indicating poor sleep quality. The mean PSQI score for survivors was 10.8 compared to 7.9 for family members.

**Discussion:** This study provides insight into the sleep quality of an underserved population of cancer survivors. Lung cancer survivors and their family members experience poor sleep quality. This baseline profile supports the need for effective assessment and intervention strategies to improve sleep quality for survivors of lung cancer and their family members.”

**Berger, Shane**

**Mentor(s) -- Dr. Parastoo Hashemi**

**Does Pesticide Exposure Effect Synaptic Serotonin Transmission?**

Pesticides are frequently used in agriculture to control pests. Many pesticides function by disrupting neurotransmission which raises the question of the impact exposures have on the brain. Here, we apply fast-scan cyclic voltammetry to measurements of serotonin and histamine in mice exposed to chlorpyrifos, an organophosphate pesticide. We explored how different doses of chlorpyrifos affected neurotransmission. Exposure to organophosphates is thought to induce neuroinflammation. Brain-histamine levels are hypothesized to increase during neuroinflammation. Knowing histamine negatively modulates serotonin, we hypothesize that chlorpyrifos/ effects on serotonin are via histamine. The study will allow a greater understanding of the effects pesticide exposures have on the brain.

**Bethlenfalvy, Alexandra**

**Mentor(s) -- Dr. Patricia Sullivan**

**Freedom Summer Revisited: Bernice Robinson and Mississippi Voter Registration Pedagogy, 1964**

Myles Horton and Septima Clark appointed Bernice Robinson as the first Citizenship School teacher in 1957, starting a pedagogical movement in South Carolina that expanded throughout the Deep South and shaped the Civil Rights Movement. The Citizenship Schools developed as an outcome of integrated workshops held at the Highlander Folk School in Tennessee at which civil rights activists such as Rosa Parks, Bob Moses, Ella Baker and countless others worked together to dismantle racial oppression.

Bernice Robinson however engaged in little political involvement prior to her workshop attendance at Highlander. A North Charleston native, Robinson took part in the Great Migration and moved to New York City in 1932 where she attended Pace College for interior design and opened a beauty parlor, making her an entrepreneur. Septima Clark encouraged Robinson to attend a Highlander workshop upon her return to the South in 1951. After six years of training, Robinson became the first Citizenship School teacher on Johns Island, South Carolina where she taught African-American adults how to read and write in order to register to vote, as they were deprived of a formal education. The program expanded throughout the Coastal South because the initial Citizenship School received such acclaim and interest from surrounding African-American communities.

Following the expansion of the Citizenship School programs, Robinson was appointed as Director of the Highlander Folk School, the first woman and African-American individual to do so. Robinson continued to work in voter registration initiatives among African-American adults in the South and combined her efforts with Bob Moses who was spearheading Student Nonviolent Coordinating Committee (SNCC) political endeavors at the time. Evidently there is a connection between the Citizenship Schools and the Freedom Registration Programs that were created for Freedom Summer; Bernice Robinson is the link that bridges the aforementioned political programs. This poster presentation will utilize visual representations of Bernice Robinson's role in Freedom Summer, 1964 to show how Highlander was heavily involved in voter registration long before SNCC, the Congress Of Racial Equality (CORE), and the Southern Christian Leadership Conference (SCLC) were.

**Birmingham, Branden**

**Mentor(s) -- Dr. Kevin Hull**

**Diffusion of News: Crisis Events and the use of Social Media**

The purpose of this study is to analyze the Diffusion of News Theory and how it is applied to media coverage of a crisis. This literature review will analyze 10 research articles in order to examine the similarities and differences of how a news event is diffused in society. The findings reveal that a news event will be diffused faster among certain groups of people if it is significant to them. Additionally, most of the research about the diffusion of news found that a news event was more frequently diffused by word of mouth or Twitter before being reported by the news media.

**Boutté, Alycia**

**Mentor(s) -- Dr. Gabrielle Turner-McGrievy, Dr. Sara Wilcox, Dr. Jihong Liu, Dr. Jan Eberth, Dr. Andrew Kaczynski**

### **Examining associations between baseline stress, depressive symptoms, and diet quality among diverse pregnant women**

**Background:** Optimal diet quality during pregnancy is important for increasing the chances of successful birth outcomes. During pregnancy, women have increased risk of experiencing stress and depressive symptoms, both of which have been associated with poor diet quality. Few studies have examined racial differences in these factors among women who begin pregnancy overweight or obese. Our purpose was to examine the associations between baseline stress, depressive symptoms, and diet quality among women enrolled in the Health in Pregnancy and Postpartum (HIPP) study.

**Methods:** HIPP is a randomized controlled trial targeting excess gestational weight gain (GWG) among overweight and obese pregnant women in South Carolina (N=133 enrolled to date). Baseline demographic and psychosocial data were collected through self-report surveys. Participants completed two ASA24 diet recalls. Pearson correlations, t-tests, and linear regression models were used to summarize the data.

**Results:** At baseline, participants were racially-diverse (65% White, 34% African-American (AA)), young (mean age=30), and generally well-educated (60% college graduates). Participants had low levels of stress (mean Perceived Stress Scale score= 4.7+/-3.2 points, max=16 points) and depressive symptoms (mean Edinburgh Prenatal/Postnatal Depression Scale score= 5.7+/-3.9 points, max=30 points). Participants had poor diet quality (mean Healthy Eating Index (HEI)score = 50.5+/-12.6; max score=100). Stress had a weak negative relationship with total HEI scores ( $r=-0.20$ ;  $P=0.02$ ), while depressive symptoms were not significantly related to total HEI scores ( $r=-0.11$ ;  $P=0.19$ ). There were no differences in stress, depressive symptoms, or overall HEI scores by race ( $P$ 's all  $>0.05$ ). AA participants had significantly higher refined grain consumption (6.6+/-3.18 oz.) compared to their White counterparts (5.3+/-3.4 oz.;  $P=0.04$ ). There were no racial differences in the other HEI diet components. Perceived stress significantly predicted lower HEI scores ( $b=-0.80+/-0.34$ ,  $P=0.02$ ), while depressive symptoms did not significantly predict HEI scores ( $b=-0.37+/-0.28$ ,  $P=0.19$ ). Race did not moderate the relationship between stress and HEI scores ( $b=0.10+/-0.69$ ,  $P=0.88$ ).

**Conclusions:** Overall, higher stress significantly predicted lower diet quality among HIPP participants and overall diet quality was poor; however, race was not a moderator. Future research should examine if stress management interventions can improve diet quality in pregnancy.

### **Bowling, Heather**

**Mentor(s) -- Dr. Teri Browne, Dr. Allison Marsh, Dr. Lucy Ingram**

### **Aphasia Patients and Caregivers Have Their Say**

Approximately one million people in the United States currently live with aphasia, a language disorder commonly acquired after stroke. The language comprehension and production impairments often negatively impact individuals' ability to gain and maintain employment and preserve functional independence in daily life, leading to declines in overall quality of life and well-being as well as additional burden on families and caregivers. At the University of South Carolina, there is a community of individuals with aphasia who regularly engage in recovery groups provided by the Aphasia Laboratory throughout the year. With an increase in enrollment in recent years, there were opportunities for expansion of the program to include more options for social interaction and support for people with aphasia and their families. Researchers began by conducting a needs assessment for people utilizing group therapeutic services at the Aphasia Lab and forming a Governing Board with representatives from each stakeholder group: people living with aphasia, family members or caregivers of people living with aphasia, speech and language therapists affiliated with the Lab, rehabilitation professionals working in the community, and social work faculty. The needs assessment indicated a desire for social and recreational activities as anticipated, therapeutic and mutual support groups, and the development of aphasia-friendly resources in the community. To meet therapeutic and community devel-

opment needs, researchers developed three social work internship placements. Based on a follow-up survey of potential participants, researchers conducted two pilot groups, one each for patients and caregivers. Group participants were screened for quality of life and depression before and after group meetings with validated measures.

**Brar, Gagandeep**

**Mentor(s) -- Dr. Nicole Berge**

**Comparative Life Cycle Assessment of a Wastewater Treatment Technology using GaBi software**

In this study, comparative life cycle assessment of an existing ASP WWTP in Columbia, SC is done with MBR technology as it is hypothesized that MBR technology might be a better option than an ASP for the environmental sustainability.

**Brown, Michael**

**Mentor(s) -- Dr. Sarah Williams**

**Delphine Ugalde: Defying Gender Norms both On- and Off-Stage in 19th Century Paris**

The social and professional networks that grew out of Paris' vibrant theatrical and salon culture in the late 19th century supported a number of female artists in somewhat "non-traditional" roles. While the careers and influence of artists such as the sculptor Hélène Bertaux and singer-composer Pauline Viardot have been thoroughly researched in recent years, little attention has been paid to the life and work of the coloratura soprano, actor, pedagogue, and composer Delphine Ugalde. During her performing career, Ugalde was highly regarded for her ability to portray both male and female characters. After retiring from the stage, she engaged in many musical pursuits which were traditionally male-dominated such as composing and directing. Utilizing digitized historical records and archival materials obtained during my recent SPARC-supported trip to Paris, my research establishes a more complete biographical sketch of Ugalde's life and career and shows how her work paved the way for such figures as renowned 20th century composer-pedagogues Nadia and Lili Boulanger.

**Buchanan, Anna Marie**

**Mentor(s) -- Dr. Parastoo Hashemi**

**In Vivo Fast Scan Cyclic Voltammetry Analysis of Serotonin in a Neurodegenerative Disease Model**

Over the past decade, there has been a significant increase in the prevalence of neurodegenerative diseases. While the mechanisms into the cognitive and motor functions of these diseases have been studied extensively, the early symptoms of anxiety and depression that accompany neurodegenerative diseases, which are highly debilitating, are not well understood. One challenge to understanding these symptoms is the lack of methods available to study the underlying neurotransmitters and ions in vivo. To better understand this problem, fast scan cyclic voltammetry (FSCV) was used to measure serotonin in vivo in a Parkinson's Disease Model. Additionally we discuss data observing significant differences in the chemistry between normal and neurodegeneration models. Future studies aim to better understand the non-motor symptoms of neurodegenerative diseases.

**Calva, Coleman**

**Mentor(s) -- Dr. Jim Fadel, Mrs. Habiba Fayyaz**

**Neurochemical and anatomical effects of intranasal orexin-A administration in aged rats**

Hypothalamic orexin/hypocretin (OX) neurons send widespread projections to rostral and caudal brain regions, including the neocortex and all subdivisions of the basal forebrain cholinergic system (BFCS). Prior work from our lab has demonstrated an age-related reduction of OX neurons in rats. Together, these observations suggest that orexins play a role in the cognitive and homeostatic dysfunctions observed during aging. Intranasal orexin-A (OxA) has been suggested as a novel thera-

peutic for the treatment of age-related cognitive disorders, including Alzheimer's disease. We have previously demonstrated that intranasal OxA activates cortical and basal forebrain regions involved in attention and memory, and enhances prefrontal cortical acetylcholine and glutamate efflux in young rats. Accordingly, we sought to investigate the effects of intranasal OxA administration in aged animals. Here, aged (26-28 months) male Fisher344/Brown Norway rats received intranasal administration of vehicle (0.9% saline) or OxA (50 ul; 100uM solution). Two hours post-treatment, animals were sacrificed and their brains were processed for immunohistochemical detection of the neuronal activity marker c-Fos and phenotypic markers of specific neuronal populations. Intranasal OxA significantly increased c-Fos expression in the prelimbic medial prefrontal cortex (mPFC) and agranular insular cortex (AIC) compared to vehicle treatment. The medial prefrontal (mPFC) and agranular insular cortices (AIC) modulate exteroceptive and interoceptive attention, respectively. Interestingly, c-Fos expression in parvalbumin positive (PV+) GABAergic interneurons was decreased in the mPFC. Intranasal OxA also increased c-Fos expression in PV+ GABAergic neurons of the nucleus basalis/ventral pallidum/substantia innominata (VP/SI/NBM). Intranasal OxA also increased activation of cholinergic neurons in the diagonal band of Broca (DBB) and in the NBM/VP/SI continuum. NBM/VP/SI provides cholinergic innervation to the cortex while the diagonal band supplies cholinergic innervation to hippocampal and olfactory regions. Intranasal OxA did not alter c-Fos expression in all cortical and basal forebrain regions, suggesting that these effects are not a global phenomenon. In summary, these data show that intranasal OxA administration activates brain regions and neurotransmitter systems that decline with age, and suggests that intranasal OxA administration may be a viable therapeutic option for treating age-related cognitive disorders.

**Cannizzo, Zachary**

**Mentor(s) -- Dr. Blaine Griffen, Prof. Carol Boggs**

**Habitat specific impacts of Hurricane Matthew on a range expanding species**

As range-shifting species colonize new ecosystems they may experience novel conditions that may alter their ability to mitigate impacts of periodic disturbances. We explore how the impact of Hurricane Matthew on the mangrove tree crab (*Aratus pisonii*) differed between its historic and colonized habitats. As this species responds to flood waters by climbing structure, we predicted that structural differences between habitats would generate habitat dependent impacts. Through field surveys, we found that crabs in the historic mangrove habitat, where tall structure remained unsubmerged, showed no reduction in body size as a result of the hurricane. In contrast, crabs in the colonized salt marsh ecosystem, where all structure was submerged, exhibited a reduction in body size suggesting large crabs were disproportionately impacted. Further, crabs found on docks within the salt marsh exhibited a body size reduction in only one of three sites. Docks are more structurally similar to mangroves and may have provided more micro-habitat refuges for large crabs than marsh grasses. Thus, structural differences between habitats appear to have altered the hurricane impact experienced by this species. The ability to mitigate disturbance impacts under novel conditions could contribute to the success of range shifting species as they colonize new ecosystems.

**Carson, Margaret**

**Mentor(s) -- Dr. Geoff Scott**

**Stormwater Outfall Relocation in Myrtle Beach and North Myrtle Beach and Near Surf Zone Bacterial Exceedances**

INTRODUCTION: Ocean water quality monitoring informs the public of waterborne pathogen-induced illness risk, which allows for informed decisions on ocean water contact recreation throughout the year. The Greater Myrtle Beach Grand Strand Region, including Myrtle Beach and North Myrtle Beach, has extensive bacterial pollution ocean monitoring. This program involves weekly water monitoring at North Myrtle Beach and Myrtle Beach stations during beach season. High *Enterococcus* bacteria levels in water, increase the risk of human illness. Beach monitoring and issuance of needed

advisories are key human illness risk reducing measures related to ocean water exposure. Recent Myrtle Beach and North Myrtle Beach monitoring data indicated frequent exceedances of Enterococcus water quality standards with primary pollution sources emanating from nearshore discharges. Thus, to reduce near bacteria loads storm-water discharges were moved farther offshore.

**METHODS:** Our study's goal was to determine if outfall relocation from the beach to more than 1,000 feet out into the ocean had an effect on the number bacterial standards exceedances. To this end, we analyzed mean levels of both Enterococcus abundance and the percent exceedances for the Enterococcus Single Sample maximum Standard (104 cfu/100ml) were compared before and after the outfalls were moved. To discern differences RStudio Statistical Software and alpha levels of 0.10-0.25 were used. Twelve stations were examined between Myrtle Beach (N=7- WAC-018-WAC-024) and North Myrtle Beach. (N=5-WAC-005A-WAC-009). Enterococci exceedance levels were compared before and after the outfalls were moved which spanned from 1999 to December 2016.

**RESULTS:** After outfall removal both Myrtle Beach and North Myrtle Beach areas demonstrated significant differences in Enterococcus levels. Generally, most outfalls had microbial pollution levels reduced. The number of overall Enterococcus exceedances and average number of Enterococcus bacteria were both reduced after the outfalls were moved.

**DISCUSSION:** Taken together, our results suggest that ocean outfall implementation in Myrtle Beach and North Myrtle Beach, and their movement to further offshore locations could successfully decrease nearshore surf zone high bacteria incidences. Minimizing human contact with high-level bacteria pollution is essential for creating a safe environment for people to use and enjoy ocean recreation and beaches.

**Castell, Dan**

**Mentor(s) -- Prof. Anne Pollok**

**Wisdom 21: Southern Style Sagacity**

What if the world were mostly populated by “wise” persons, i.e., people who are both productive and joyful in their private lives and altruistic towards their neighbors? What if, in addition, we developed methods of sharing and strengthening those traits more generally throughout the civic landscape? This project engaged the community to pilot a process of “wisdom recycling”, whereby actionable memes for prudent living were (a) garnered from community elders and (b) evaluated and updated by local youth, via a process (c) facilitated and published for general edification by the scholar. The results suggest that this kind of trilateral dynamic can build a positive feedback loop whereby insights about living can flow from experienced elders, engage young minds, and lay a groundwork for burgeoning social sagacity.

Step one used primarily group settings and open-ended questions derived from analogous field work in sociology (Pillemer 2011) and psychology (Baltes 2000, 2002, 2004), to poll elder community members about the nature, typology, and implementation of wisdom. Every attempt was made to work initially within their lexicon, interests, and conceptual framework to build a primary database. Results were tabulated and weighted by number of corresponding responses. Step two moved to engagement with adolescents to poll their undirected responses to the original prompts as well as more narrowly to their elders' pooled responses. These results were likewise tabulated and weighted. Step three is the ongoing work of publishing these results in assorted venues.

Preliminary findings indicate a strong preference among the public, across ages, for a pragmatic and personal notion of “wisdom”—what is usually denominated prudence or phronesis in the specialized literature—revolving around such somewhat commonplace admonitions to focus on education before marriage, marriage before children, and career before recreation. At the same time, strong reliance upon spiritual (“faith-based”) belief and commitment to family were notable if not universal themes. Hopefully, further work in this direction will create ongoing dialogue as an adjunct to both a general understanding and broader fostering of such prudential wisdom.

**Chapagai, Danda**

**Mentor(s) -- Dr. Micheal Wyatt**

**Selective inhibition of Polo-like Kinase 1 PBD for cancer therapy**

Polo-like kinase 1 (PLK1) is only expressed in dividing cells and plays an important role in cell cycle regulation and mitotic progression. PLK1 has been shown to be over-expressed in a number of tumors, and its expression has been shown to be adversely related to prognosis, thus making it a good therapeutic target. PLK1 is comprised of two structural domains: the kinase domain, containing the ATP binding site; and the protein substrate recognition polo-box domain (PBD). Although several ATP-binding site inhibitors of PLK1 have advanced to clinical trials, there is concern about the selectivity of these compounds for PLK1. ATP-based compounds inhibit three of the four known mammalian PLKs to various extents. Moreover, a single mutation in PLK1 (Cys67Val) confers substantial resistance to several structurally unrelated ATP-binding site inhibitors. An alternative approach to developing potent and selective PLK1 inhibitors is to target the PBD.

We generated fragment ligated inhibitory peptides (FLIPs) through a strategy called REPLACE. This is a computational and synthetic approach that uses structure activity relationships of peptide inhibitors to generate pharmaceutically acceptable lead molecules. Fragments are docked into the crystal structure of a truncated peptide/receptor complex, then prioritized for synthesis with the peptide and subsequently tested in an in vitro binding assay. PBD-interacting protein (PBIP) and Cdc25c are natural substrates of PLK1. We replaced individual amino acid residues in the PBIP (PLHSpTAI) and the Cdc25C PBD substrate peptides (LLCSpTPNGL) with benzoic acid fragments. Here we show PLK1 specificity for PBD inhibitors in vitro. A fluorescent polarization (FP) competitive binding assay to the PBD of PLK1 was used to determine binding specificity. A PLK3 counter screen was used to determine the binding selectivity of our PBD inhibitors. To measure the PLK1 inhibitory activity of the FLIPs in cells, phosphorylation of the mitotic protein BubR1 was measured. FLIP 6091 induces mitotic arrest and blocks PLK1 mediated BubR1 phosphorylation in human cancer cells. Overall these results highlight that targeting the PBD of PLK1 has promise as an antitumor strategy.

**Chinaeke, Eric**

**Mentor(s) -- Dr. Kevin K Lu, Prof. Gene Reeder**

**Economic Burden of HIV among Medicare Beneficiaries Post Medicare Part D**

Background: Contrary to the public perception that HIV is mainly among young adults, HIV epidemiology in older population has been changing and worsening dramatically in the past decade. Little is known about the economic burden of HIV after the Implementation of Medicare Part D.

Method: The study objective was to determine the economic burden of HIV/AIDS among Medicare beneficiaries. A pooled cross-sectional study in Medicare Current Beneficiary Survey data (2006-2012) was used; expenditures was estimated by Generalized Linear Model (GLM) with a log link and a gamma distribution.

Results: We estimated economic burden of HIV infection among elderly Medicare beneficiaries between HIV beneficiaries and non-HIV beneficiaries across 6 years post Medicare Part D. Annually, HIV beneficiaries had higher total mean healthcare cost compared to non-HIV beneficiaries (\$29,879.58 vs \$11,870.27). Specifically, HIV patients had higher annual mean expenditure for outpatient services (2088.41 vs. 1963.57) and prescriptions (10,406.5 vs. 4681.23) compared to non-HIV beneficiaries. After adjusting for sociodemographic characteristics and comorbidities, beneficiaries with HIV incurred more on annual health care expenditures (\$11,727.52, 95% CI: \$1,394.21, \$22,060.83,  $p < .0001$ ); prescriptions (\$7069.41, 95% CI: 4929.30, 9209.52,  $p < .0001$ ); outpatient services (\$4333.91, 95% CI: 49.92, 8617.91,  $p = 0.0474$ ) compared to non-HIV beneficiaries. Particularly, non-HIV beneficiaries incurred higher out-of-pocket spending compared to HIV beneficiaries across all services categories. Annual expenditures on healthcare were higher amongst HIV patients compared to non-HIV patients across variety of payers – (Medicare, \$10,942, 95% CI, 2845.31, 19040.10,  $p = 0.0081$ ; Medicaid, \$1,965.23, 95% CI: 1450.82, 2479.66,  $p = < .00010$ ).

## Conclusion.

Our study showed that HIV poses a significant additional economic burden to the payers, to patients, and the society as a whole; prescriptions account for a disproportionately high portion of the total cost difference between HIV and non-HIV patients. Patients' out of pocket costs were significantly different between the two groups. Our study suggests that HIV infection has played an important role in the economic burden of the older population. We found that direct medical costs of HIV resulting from infections diagnosed post-Medicare Part D are substantial. Future studies should focus on productivity loss, tangible costs and other costs.

**Cho, Yoo Jin**

**Mentor(s) -- Dr. James Thrasher**

### **Use and perceptions of a cigarette innovation in South Korea: how are flavor capsule cigarette smokers different from other smokers?**

#### Background

Flavor capsule (FC) cigarettes contain a capsule in the filter which smokers can crush at any time to release a liquid that flavors the smoke. 2017 tobacco industry analysts highlight how market share for FC cigarettes has rapidly grown in recent years; but limited information is available regarding the perceptions and profiles of FC cigarette smokers. South Korea ranks in the top 10 for countries with the largest market share of FCs, providing an important opportunity to explore the potential impact of this product innovation. This study aimed to assess the characteristics and perceptions of Korean smokers who prefer FC cigarette brands.

#### Methods

Data came from a representative sample of 1940 adult smokers who participated in the 2016 telephone-based International Tobacco Control Project Policy Evaluation Survey in South Korea (ITC South Korea). Participants who indicated having a regular brand were queried on the brand name, product perceptions (e.g., taste), and the length of the time since adopting their brand. Those who adopted their current usual brand for less than 1 year were queried on the reason for choosing the brand.

#### Results

Overall, 18% of smokers indicated that their regular brand variety was a FC. Compared to regular cigarette users, FC cigarette users were more likely to be younger (e.g. AOR [Adjusted odds ratio] 29-38 vs. 19-28: 0.38,  $p < .001$ ), female (AOR: 1.51,  $p < .05$ ), and report lower nicotine dependence (AOR: 0.87,  $p < .01$ ). They were also more likely to report that their cigarette varieties are lighter in taste (b: 0.18,  $p < .01$ ) and smoother on their throat (b: 0.12,  $p < .05$ ). FC cigarette users were more likely to report that they had smoked their current usual brand less than 1 year (AOR: 4.81,  $p < .001$ ) and that they chose their brand because of its taste (AOR: 4.55,  $p < .05$ ).

#### Conclusions

Preference for FC cigarettes is high in Korea, especially among smokers who are younger and female. Given that FC users report favorable perceptions of taste and sensory experience, both of which promote misperceptions of reduced harm, regulators should ban this newly introduced cigarette design innovation.

**Choi, Ran Hee**

**Mentor(s) -- Dr. Ho-Jin Koh**

### **Tribbles 3 Regulates Skeletal Muscle Mass in Fasting-induced Atrophy**

Tribbles homolog 3 (TRB3) is a pseudokinase that has been found in multiple tissues, including skeletal muscle, in response to various stress stimuli, such as insulin resistance, nutrient deprivation, and

endoplasmic reticulum stress. TRB3 has been mainly known as a negative regulator of Akt, which is an essential protein kinase to control protein synthesis and breakdown. Recently, our lab has demonstrated that TRB3 decreases protein synthesis and increases protein degradation in mouse skeletal muscle at basal state. However, it still remains to be determined whether TRB3 regulates skeletal muscle mass under atrophic conditions. Here, we hypothesized that TRB3 has a detrimental effect on skeletal muscle mass under 48hr fasting-induced atrophy. We utilized C57BL/6 wild type (WT) mice and fasted them for 48hr to induce skeletal muscle atrophy. Our fasting strategy significantly reduced body weight and effectively decreased skeletal muscle mass. In addition, TRB3 protein and mRNA expression was significantly increased in fasted muscles, which was associated with elevated atrogin-1 and MuRF-1 mRNA expression. Phosphorylation of Akt (T308) was significantly decreased after 48hr fasting and FOXO1 and FOXO3a were activated, whereas protein synthesis was not affected. Next, we fasted muscle-specific TRB3 transgenic (TG) and WT mice for 48hr in order to determine if TRB3 overexpression worsens the fasting-induced atrophy. Interestingly, we found a significant reduction in muscle mass in TG mice compared to WT while the change in body weight was similar. In TG mice, Akt phosphorylation (T308) was significantly decreased after fasting along with suppressed S6K1 and activated FOXO1 and FOXO3a signaling. The fasting significantly decreased protein synthesis rate in both groups, but the degree of reduction was prominent in TG mice compared to WT. Lastly, we studied 48hr fasting-induced atrophy in TRB3 knockout (KO) mice to determine if the deletion of TRB3 could prevent fasting-induced atrophy. Although both genotypes significantly reduced body weight, KO mice interestingly preserved ~10% more muscle mass in fasted muscles. These data suggest that TRB3 could be a key regulator of protein synthesis and breakdown through the Akt/mTOR/FOXO signaling under 48hr fasting-induced atrophy.

**Chowdhury, Towhid**

**Mentor(s) -- Dr. Krishna Mandal**

### **Solid-state Neutron Detectors with Front-end Readout Electronics for Macromolecular Crystallography**

Structure-aided drug design requires state-of-the-art crystallography to understand the relationship of protein structure to its function in disease causing organism to lead the way in designing novel effective drugs without any side effects. Neutron diffraction provides a unique approach to investigate the structural biology by determining the position of hydrogen atoms, which are critical to structural stability and effective function but are unobservable by x-rays. Our research program is to develop a new solid-state, large-area, and position sensitive neutron detector based on boron-doped amorphous selenium (a-Se) alloys for macromolecular neutron crystallography. The detector would offer high spatial resolution, high detection efficiency, fast response and reset time, excellent gamma discrimination, and high radiation hardness. The proposed detector is inexpensive for industrial mass production. We have investigated on zone-purification of selenium (Se) precursors, synthesized heavily boron-doped a-Se (As, Cl) alloys, designed and fabricated detectors, and evaluated performance using Am-241 (5.5 MeV) radiation sources. Other than neutron diffraction for structural biology, the developed detectors would find widespread application in, neutron scattering research, nuclear non-proliferation, and in high priority national program of Homeland Security.

**Chua, Chei Hwee**

**Mentor(s) -- Prof. Leigh Anne Liu, Prof. Li Ma, Prof. Zhi-Xue Zhang, Prof. Cordula Barzantny**

### **Differential Effects of Broad and Deep Foreign Experience in Intra- and Intercultural Negotiations**

We explore how and when foreign experience influences negotiation outcomes in intracultural and intercultural negotiation contexts. Four studies with negotiators from multiple cultural backgrounds with varied negotiation cases reveal differential effects of deep and broad foreign experiences on negotiation outcomes. As expected, deep foreign experience significantly influences intercultural nego-

tiation, and the effect is mediated by global identity. Somewhat surprisingly, broad foreign experience significantly influences negotiation outcomes in intracultural settings, and the effect is mediated by local identity. Our findings demonstrate a sophisticated alignment among foreign experience, cultural identity, and the context of social interactions such as negotiation, providing a new way of seeing how experience and identity affect social interactions.

**Clark, Gregory**

**Mentor(s) -- Dr. Joshua Cooper**

**Modeling Dark Net Markets**

From the beginning of ecommerce, the web has enabled and facilitated illicit trade. The exchange of pirated digital goods has been robust and well-studied. Similarly, non-digital goods have also found an outlet in ecommerce: counterfeits and diverted/stolen goods, particularly pharmaceuticals, have populated online marketplaces. Despite their growing presence today, black market transactions were most prevalently studied immediately after the Second World War. Since then, the field of mathematics, in particular graph theory, has flourished while the marketing tools requisite to understand these Dark Net Markets have gone undeveloped. We define a Dark Net Market to be a social network graph that arises from trade within an online market where the vertices are taken to be the users, which we will call consumers, and edges denote an interaction, specified when necessary, between two consumers. In this talk we present our advances in constructing a model of Dark Net Markets. This research was supported by a SPARC grant.

**Clark, Jamie**

**Mentor(s) -- Dr. Daniel Speiser**

**Restoration of visual performance and opsin expression during eye regeneration in the Florida fighting conch (*Strombus alatus*)**

Conch are slow-moving, herbivorous, marine gastropods that possess prominent camera-type eyes at the ends of long, flexible stalks. Compared to the eyes of other gastropods, those of conch are large (up to 1.5 mm in diameter) and have sophisticated optics that include a lens with a graded refractive index and a retina with densely packed photoreceptors. Conch also have a remarkable ability to regenerate eye tissue: after an eye is lost, a new eye will develop to take its place within weeks. Eye regeneration in conch appears to occur rapidly compared to eye regeneration in other gastropods. Despite our knowledge of the complexity and regenerative abilities of the eyes of conch, we know little about the visual responses of these animals either when their eyes are intact or while they are regenerating. Therefore, we measured rates of eye regrowth and tested how visual performance changes during the process of eye regeneration in the Florida fighting conch *Strombus alatus*. We found that rates of eye regrowth were greatest in *S. alatus* between 3-6 weeks following amputation but began to slow down thereafter. We also found that conch with two intact eyes respond consistently to the sudden appearances of objects with angular sizes of 23° or greater. When we amputated either one or both eyes from 24 conch and recorded the behavioral responses of these animals to visual stimuli once a week for twelve weeks, we found that animals with one amputated eye regained normal visual performance after five weeks whereas conch with two amputated eyes exhibited normal visual performance after seven weeks. Opsins (which are the proteins that confer light-sensitivity to photoreceptors) are present in the retina and presumably are re-expressed as visual performance is also restored. Regenerating eyes at various time points were immunolabeled with antibodies to analyze the presence of opsins to ultimately correlate structure and function of a conch's visual system. By studying the restoration of visual performance and opsin expression during eye regeneration in conch we will further be able to understand how a regenerating sensory system reconnects with an intact nervous system.

**Cochran, Garner**

**Mentor(s) -- Prof. Eva Czabarka**

### **Quick Trips in Networks**

The study of the structure of networks has been studied by mathematicians for a while. The earliest mathematician to study this was Euler when he noticed that the system of bridges in the city of Königsburg (now Kaliningrad) could be represented by a set of dots representing each land mass and a set of edges, or lines between them representing each bridge. Applications of the study of these structures, called graph theory, are many, including social and biological network analysis, computer systems, and transportation networks.

The study of the structure of networks has been studied by mathematicians for many years. One of the earliest mathematicians to study this was Euler, when he noticed that the system of bridges in the city of Königsburg (now Kaliningrad) could be represented by a set of dots representing each land mass and a set of edges, or lines between them representing each bridge. Applications of the study of these structures, called graph theory, are many, including social and biological network analysis, computer systems, and transportation networks.

I in particular did a theoretical analysis of the structure of networks with certain properties. If one imagines the structure of transportation network, you can consider the nodes to be intersections on a road network or stops on a subway network, and the edges exist between two nodes if there is a road or train that goes directly between them. I showed that if I was given a network with certain properties, you can change all the two way streets to one way streets in such a way that the longest possible trip in the network is not that much further than if you had two way streets to travel on.

**Cox, De Anna**

**Mentor(s) -- Dr. Sue Heiney, Dr. Bev Baliko**

### **An evidence-based practice change to increase provider adherence to mammography guidelines within a local primary care practice**

**Background/Significance:** Breast cancer is the most prevalent cancer among women ages 18 to 64 years of age. Mammography screening is the most effective method for early detection of breast cancer which decreases mortality and morbidity. The American Cancer Society recommends women ages 45 to 54 be screened annually and women age 55 and older to have biennial screening.

**Purpose:** The purpose is to increase mammography adherence.

**Methods:** The plan, do, study and act process (PDSA) is being utilized to examine current guideline concordant care in the practice and develop changes to improve recommendations for mammography. The planning phase included observation of current clinic practices and examination of medication records. Data from this work indicated that only 12 % of patients received mammography. Process observation of clinic flow and examination of the EMR noted that no system was in place to alert the provider to the need for the mammogram. We propose to initiate a patient checklist that will be given to the patient at reception for check-in. This checklist will then be given to the provider who will review and then counsel patients about breast cancer prevention. Based on this plan, the PICOT is as follows: Among providers at the clinic, does the use of a patient screening checklist increase use of breast cancer screening guidelines for women aged 45 or older at average risk for breast cancer initiation.

**Results:** The implementation phase is planned for spring 2018. Post intervention data collection is planned for spring 2018.

**Conclusions/Implications:** Increasing guideline concordant screening guidelines may increase early detection of breast cancer. Further, the practice is initiating use of a different EMR which may allow for more automated flags for screening. Results from this project could be used to develop that part of the EMR.

**Cranston, Michael**

**Mentor(s) -- Dr. Rosemarie Booze, Dr. Charles Mactutus, Dr. Steven Harrod**

**Sex differences in voluntary wheel running in the HIV-1 transgenic rat.**

Within the HIV-1+ population approximately half of patients self-report apathy and decreased motivation; however the role of sex in these motivational deficits is unknown. In the current study, we examined sex differences in the motivational state of the HIV-1 Transgenic (Tg) rat using voluntary wheel running. Adult HIV-1 Tg female animals (n=10) and F344/N female control animals (n=10) were compared to adult HIV-1 Tg male animals (n=10) and F344/N male controls (n=10). Animals were provided nocturnal access to a running wheel (34cm diameter) for 67 minutes per session for 42 consecutive days. First, we found a significant effect of sex on wheel running distance ( $p \leq .05$ ), with females running greater distances compared to males (females=392.7±35.8 m/session vs. males=128.8±35.8 m/session). Second, we found evidence of a sex effect on maximal running speed (95th Percentile), with females running significantly faster (females=21.1±1.1 m/min, males=12.3 ±1.1 m/min) than their male counterparts ( $p \leq .05$ ). We found no significant differences due to animal genotype on either distance or maximal running speed. Third, we examined if female cyclicity (estrous) had an influence on overall wheel running behaviors and found females in estrus had significantly increased wheel running distances ( $p \leq .05$ ; Estrus=457.7±51.4 m/session vs. non-estrus=364.7±48.6 m/session). These data provide evidence of a pronounced sex effect in voluntary wheel running, independent of HIV-1 transgene. In contrast, our previous microstructural analysis of running bouts found reduced number of running bouts/session in the HIV-1 Tg animals compared to controls, suggestive of a dysregulation of motivation in the HIV-1 Tg rat. Thus, bout analysis of running behaviors may provide a more accurate index of motivation than either running distance or speed measures in the HIV-1 Tg rat and other models of impaired motivation.

**Culbertson, Robyn**

**Mentor(s) -- Prof. Cathy Arnot, Dr. Stacy Fritz, Prof. Harvey Mathews, Ms. Kaci Handlery, Ms.**

**Joanna Malcom, Dr. Troy Herter**

**KinesioTape® Has No Effect on Shoulder Proprioception, Strength, or Control of Movement When Using Robotic Assessment**

Introduction: KinesioTape® (KT) is widely used clinically due to its purported muscular, joint, articular, and cutaneous effects, but evidence for those benefits is limited.

Purpose: To determine if KT produces significant increases in upper extremity (UE) proprioception, strength, or movement control compared to sham tape when using robotic assessments, and to determine if a larger effect would be seen in subjects symptomatic for subacromial impingement compared to asymptomatic subjects.

Subjects: 41 subjects [82 shoulders, mean age 25 (3.4) years]. Inclusion criteria: 100 degrees bilateral shoulder flexion/abduction, full cognitive abilities and ability to see visual stimuli. Exclusion criteria: contraindications to tape application or history of shoulder condition that would affect task performance. Neer, Hawkins Kennedy, and Internal Rotation Resisted Strength tests were employed to screen for shoulder impingement [symptomatic n=8].

Methods: Study was a prospective, double-blinded, cross-sectional, randomized control trial with a cross-over design. Subjects were randomly allocated to 1 of 2 treatment-order groups. Facilitative taping, using 5-cm Kinesio Tex Gold Tape or Cover-Roll Stretch tape, was applied to the deltoid by a trained PT. Subjects and outcome assessors were blinded to tape condition. Subjects performed 3 trials per arm (no tape, tape condition 1, tape condition 2) on tasks designed to assess UE proprioception (KINARM Arm Position Matching, Biodex Joint Angle Matching), movement control (KINARM Visually Guided Reaching), and strength (Biodex Isometric Strength). Proprioception was measured with Absolute Error and Active Joint Position Difference. Movement control was measured with Movement Time. Strength was measured with Maximal Torque. Differences between baseline and tape conditions were calculated for each variable. Distributions of differences were assessed for normality

then analyzed for significant differences.

Results: No significant differences were observed for any dependent variable for either tape condition ( $p > .05$ ). Analysis of presence of impingement revealed no significant differences ( $p > .05$ ).

Conclusion: Our results suggest that facilitative taping of the deltoid with KT does not improve UE proprioception, strength or movement control compared to sham.

**Culclasure, Emmie**

**Mentor(s) -- Dr. Kenn Apel, Ms. Victoria Henbest**

### **The Development of Orthographic Knowledge: Exploring Results**

The purpose of this study was multi-fold. First, the development of elementary-age students' lexical orthographic knowledge (knowledge of specific written words) and sublexical orthographic knowledge (knowledge of rules/patterns that govern print) was examined. Second, whether the students' performance on orthographic knowledge tasks explained variance in their reading and spelling performance above other known contributors (e.g., phonological awareness, vocabulary) was investigated. Analyses of these results prompted further questions including the developmental trajectory of orthographic patterns represented in each orthographic knowledge task, and whether this differed from the students' overall development on these tasks. Additionally, whether performance on the patterns on the lexical task was related to performance on patterns on the sublexical task was explored.

A total of 143 students ranging from kindergarten through sixth grade completed tasks measuring their lexical orthographic knowledge, sublexical orthographic knowledge, sight word efficiency, phonemic decoding efficiency, spelling, expressive vocabulary and phonological awareness. A year later, 89 of these students were tested again using the same tasks, with the exception of the orthographic knowledge tasks, which were modified to increase difficulty and potentially guard against ceiling effects observed during the first round of testing.

Results from the first year of testing suggested that both lexical and sublexical orthographic knowledge develop increasingly until third grade, where a plateau in performance was observed. However, the development of specific orthographic patterns differed from the overall developmental trajectory. Both lexical and sublexical orthographic knowledge contributed to the students' word reading and spelling abilities above what was accounted for by age, phonological awareness, and vocabulary. Performance on specific patterns on one task were found to be related to performance on the same patterns on the other task. Increasing the difficulty of the orthographic knowledge tasks did not eliminate the plateau in performance observed at grade three.

The results indicate that children's orthographic knowledge develops until 3rd grade and that this knowledge is important for success with reading and spelling. Given that the developmental trajectory for each specific pattern differed from the overall performance pattern indicates the need for future studies on the development of specific orthographic patterns.

**Da, Wendi**

**Mentor(s) -- Dr. Shan Qiao, Dr. Xiaoming Li**

### **Occupational stress, social support for work, and burnout: Testing the stress-buffering hypothesis among health care providers (HCPs) caring for people living with HIV (PLHIV) in China**

Background: Occupational stress and burnout have been reported commonly exist among health care providers (HCPs) caring for people living with HIV (PLHIV). The stress-buffering hypothesis posits that social support can buffer the impact of stress on burnout, yet little is known regarding the role different sources of social support play in this process. This study aims to examine how social support for work from family vs. coworkers impact the stress-burnout relationship. Methods: In 2013, 379 HCPs were recruited for an HIV parental disclosure intervention from 44 clinics across 16 cities/counties in Guangxi, China. This study used baseline data for analysis. A hierarchical multiple regression was conducted to test the stress-buffering hypothesis. A simple slope analysis using high (one SD

above the mean) vs. low social support (one SD below the mean) was further conducted if significant interactions were found. Results: Burnout was significantly associated with stress ( $\beta = 1.57$ , 95% CI 1.26, 1.89), but not with social support from family ( $\beta = -0.27$ , 95% CI -0.60, 0.07) or coworkers ( $\beta = -0.33$ , 95% CI -0.86, 0.21). Significant interaction was found between stress and social support from coworkers ( $\beta = -0.10$ , 95% CI -0.19, -0.009), but not family ( $\beta = 0.011$ , 95% CI -0.052, 0.075). Simple slope analysis showed that although a positive association between stress and burnout existed at low levels of social support ( $\beta = 1.91$ , 95% CI 1.49, 2.34), it significantly attenuated (difference = 0.59, 95% CI 0.05, 1.13) at high levels ( $\beta = 1.32$ , 95% CI 0.92, 1.72). Conclusions: Social support for work from coworkers served as a stress-buffer for burnout among HCPs caring for PLHIV, while no effect was found for social support from family. Future burnout-reduction interventions should focus on improving social support from coworkers and be conducted in tandem with stress-reduction interventions.

**Dahl, Alicia**

**Mentor(s) -- Dr. Gabrielle Turner-McGrievy, Dr. Sara Wilcox, Dr. Jihong Liu, Dr. Rachel E. Davis**  
**The Healthy Motivations for Moms-to-be Study: A Mobile Health Intervention for Targeting Gestational Weight Gain among Pregnant Women**

**INTRODUCTION:** Almost one-half of all pregnant women in the U.S. exceed the Institute of Medicine's (IOM) gestational weight gain (GWG) guidelines. The Healthy Motivations for Moms-to-be (HM2B) Study is a mobile health intervention for pregnant women living in the U.S. The intervention condition receives targeted GWG goals and evidence-based behavioral strategies to encourage healthy GWG, while the comparison condition receives content related to stress management. The purpose of this study was to understand the demographic, anthropometric, weight-related behaviors, and perceived stress of women enrolled in HM2B.

**METHODS:** Women in early pregnancy (<20 weeks), living in the U.S., who owned a smartphone and bathroom scale, were recruited to participate in the HM2B Study. Participants (N~142) completed an online self-report survey at baseline and completion of the intervention that included adapted questions from the Pregnancy Risk Assessment Monitoring System (PRAMS), Rapid Eating Assessment for Participants (REAP), exercise frequency questionnaire, and the Perceived Stress Scale (PSS). Descriptive statistics were conducted to summarize the data presented in this abstract. Pre-post analyses will be conducted using one-way ANCOVA prior to Discover USC.

**RESULTS:** Body Mass Index (BMI) was calculated from self-reported pre-pregnancy height and weight. Results indicated that 44.3% (n=63) were normal weight and 55.7% (n=79) were overweight or obese. Mean gestational age was 13.9+4.1 weeks. Of the 142 pregnant women, 56.3% (n=80) of participants were primigravida, 84.5% (n=120) were married, 75.4% (n=107) had a Bachelor's degree, and 61.3% (n=87) were employed for wages full time. Most participants reported eating less than two servings of fruits (52.8%, n=75) and two servings of vegetables (53.5%, n=76) a day. On average, participants reported moderate physical activity on two days per week and an average of 6.41+0.52 hours of sedentary activity per day. Perceived stress levels were low among all participants (mean PSS score=4.8+2.7 points out of 16).

**DISCUSSION:** Overall, physical activity and dietary behaviors are below recommendations, and perceived stress levels are low at baseline. The HM2B Study provides participants with group-based health behavior goals and tracking features related to healthy eating, exercise, weight, and stress management. This study will inform future e-Health interventions for pregnancy.

**Dahl, Alicia**

**Mentor(s) -- Dr. Gabrielle Turner-McGrievy**  
**mHealth for moms: A review of mobile apps for tracking gestational weight gain**

**INTRODUCTION:** Fifty percent of pregnant women exceed the Institute of Medicine's (IOM) guidelines for gestational weight gain (GWG). Mobile apps hold promise as a beneficial tool for facilitating

healthy GWG. However, there is a need to examine apps on the market to determine if they provide users information consistent with IOM guidelines and behavioral strategies to help facilitate healthy GWG. The aim of this study was to review mobile apps on Apple and Android platforms that focused on GWG tracking and evaluate their features for meeting the IOM GWG guidelines, as well as if they contained behavioral tools.

**METHODS:** Trained research staff downloaded and conducted a review of apps that focused on tracking GWG. The apps were assessed by two reviewers, using a profile of an overweight pregnant woman at 12-13 weeks gestation. The reviewers entered predetermined weights daily for eight consecutive days. The weekly rate of weight gain was set above 0.6 lbs. per week, which exceeded IOM guidelines for healthy GWG for an overweight woman. Apps were independently scored based on presence of weight-related features and guidelines.

**RESULTS:** Initially 296 apps were screened for review. Among these apps, 196 were excluded from further review because they (1) did not have a pregnancy focus or option, (2) were not in English, or (3) were not able to be downloaded or were no longer available. Another 13 apps were excluded because of technical issues. The final review included 87 apps. Overall, 73 (84%) apps had a weight tracking feature, 19 (22%) apps provided accurate weight gain guidelines, eight (9%) apps included calorie (kcal) recommendations, and seven (8%) apps included exercise guidelines.

**DISCUSSION:** Overall, there is a paucity of apps for tracking GWG that use IOM guidelines and promote evidence-based healthy weight-related behaviors during pregnancy. This is a missed opportunity because currently available weight-tracking apps may not be effective in preventing excessive GWG without providing accurate, individualized GWG recommendations or behavioral modifications necessary for healthy weight gain. Furthermore, this review demonstrates the importance of health care practitioners' role in providing accurate information and behavioral support for achieving healthy GWG.

**Davis, Eleanor**

**Mentor(s) -- Dr. Kirstin Dow, Dr. Gregory Carbone, Dr. Cuizhen (Susan) Wang**

**What's salt got to do with it? Responses, Barriers, and Opportunities for Agricultural Adaptation to Soil Salinization in Hyde County, NC**

By the end of the century, intermediate sea level rise scenarios project approximately 1.3 meters (4.2 feet) of sea level rise along the coast of the southeastern United States. One of the most vulnerable areas is the Albemarle-Pamlico Peninsula in North Carolina, where 56 percent of the land is below 1.5 meters. Such a rise of 1.3 meters would endanger 4,200 people, 440 square miles, and 40 million dollars of property in Hyde County, which occupies the southeastern point of the peninsula. Agriculture covers a substantial portion of the peninsula, and farmers depend on fertile soil to maintain their way of life. As sea level rise increases soil salinity and reduces the arability of their soil, some of these farmers have already begun to plant salt resistant cotton varieties and apply salt-mitigating chemicals. Major hurricanes and subsequent flooding events such as Hurricane Matthew in 2016 exacerbate the gradual sea level rise and salinization problems. This research draws on a combination of landowner interviews, remote sensing, and soil sampling in order to map the extent of salinization, identify farmer's current adaptation responses and barriers to address salinity changes, and categorize areas of intervention to overcome barriers in Hyde County, NC. By presenting concrete evidence of salinity changes and identifying barriers to adaptation, this research aims to identify specific interventions to facilitate adaptation in the coastal Carolinas.

**Davis, Anthony**

**Mentor(s) -- Dr. Roger Sawyer**

**Duplication and Divergence of Multiple Loricrin Orthologs in Birds has Accompanied the Evolution of Novel and Morphologically Diverse Phenotypes**

The adaptation of novel and mechanically resistant skin appendages is the major event that allowed

amniotes to adapt to a fully terrestrial lifestyle. Epidermal appendages form via the cornification of keratinocytes which involves the covalent crosslinking of distinct structural proteins. This results in the formation of a specialized cornified envelope (CE) that replaces the plasma membrane. In mammals, many of the genes involved in the cornification process including Loricrin, the main protein component of the CE, are located in the Epidermal Differentiation Complex (EDC). A homologous locus has been identified in birds and reptiles which also contains Loricrin. In the chicken, there are three differentially expressed Loricrin genes. We screened the genomes of 48 phylogenetically distinct bird species for Loricrin and confirmed the conservation of three Loricrin genes across birds and provided evidence for their continued lineage specific evolution. We also demonstrate that the evolution of the avian specific Loricrin1 (LOR1) coincided with the innovation of the avian scutate scale, which supports the hypothesis that avian scutes evolved independently from the scales of other reptiles. Together with the finding that Loricrin genes vary significantly in the length of their repeat domains, even among closely related species, we provide evidence that the evolution of diverse Loricrin proteins were key events in the appearance of novel skin appendages such as feathers and scales in birds.

**DeHaven, Baillie**

**Mentor(s) -- Prof. Linda Shimizu**

**Probing the formation of reactive oxygen species by a porous self-assembled benzophenone bis-urea host**

Sensitized photooxidations are of interest due to their diverse range of applications spanning from wastewater treatment to medicinal chemistries, including photodynamic therapy for cancer treatment. Sensitized photooxidations occur through two distinct reactive oxygen species, singlet oxygen and superoxide. Superoxide is generated through a one-electron reduction of molecular oxygen, which can go on to form a variety of peroxide species such as hydrogen peroxide and hydroxyl radicals. Conversely, singlet oxygen is a simple yet reactive oxidant generated through a triplet-triplet annihilation pathway when molecular oxygen is irradiated in the presence of a photosensitizer at an appropriate wavelength. Here, we investigate the role of oxygen in the selective photooxidation of small molecules within a self-assembled benzophenone bis-urea macrocycle (host 1) using electron paramagnetic resonance (EPR) and UV visible spectroscopy. EPR studies indicate that host 1 can activate O<sub>2</sub> to singlet oxygen as well as superoxide. Although superoxide formation was only observed in polar protic solvents, which introduces the possibility of tuning the photooxidation mechanism based on solvent choice. We further explored the quantum yield for singlet oxygen production by host 1 using UV-vis and EPR spectroscopy in order to compare the two methods. Current work is focused on applying this host to mediate singlet oxygen photoreactions of small alkene guests catalytically.

**Denton, Adam**

**Mentor(s) -- Dr. Rosemarie Booze, Dr. Charles Mactutus**

**Analysis of Behavioral Markers of Depression in HIV-1 Transgenic Rats Treated with Escitalopram**

HIV infection is a serious condition affecting approximately 37 million people worldwide as of 2015. Consequently, the condition is estimated to affect roughly 0.8% of individuals ages 15-49. Of this population, approximately 50% of individuals will develop some degree of HIV-associated neurocognitive disorder. Such conditions potentially include the development of depressive and apathetic symptoms. In the United States, an estimated 20-40% of HIV-infected persons will develop some degree of clinical depression over the course of their lifetime.

Moreover, the prevalence of suicide among such infected individuals is three to five times higher than individuals not affected with HIV, despite the potential for antiretroviral therapy. Previous research from our laboratory has demonstrated impairments in the dopamine system in HIV-1 transgenic rats. Neuropathology of the dopaminergic system is potentially induced by Tat and gp120 protein expression. Such proteins are hypothesized to produce deleterious effects upon the dopaminergic system

and the neural circuitry underlying reward pathways. While depression is typically framed as a classical disorder of the serotonergic system, a large body of research also heavily implicates the dopaminergic system in the neuropathological trajectory of depression. Thus, catecholamines (dopamine, serotonin) are important to examine relative to affective disorders found in HAND. The present study seeks to examine the therapeutic efficacy of the selective serotonin reuptake inhibitor (SSRI) escitalopram in the treatment of HIV-1 induced depression in a transgenic rodent model. Escitalopram (Lexapro/Cipralext) is an SSRI medication commonly prescribed for major depression and anxiety, among other conditions. To evaluate depressive symptoms, a multi-task battery of behavioral assays associated with dopaminergic and serotonergic function was performed.

**Desrosiers, Lauren**

**Mentor(s) -- Mrs. Whitney Dobek, MS, CGC, Ms. Emily Quinn, MS, LCGC, Dr. Stuart Cramer**  
**Integrating Genetic Counseling and Testing in the Pediatric Oncology Setting: Parental Attitudes and Influencing Factors**

Cancer predisposition syndromes (CPS), caused by germline pathogenic variants in tumor suppressor genes and oncogenes, are conditions that put an individual at increased risk to develop a specific set of cancers throughout their lifetime. It is estimated that 10-15% of children with cancer have an underlying CPS. Although genetic testing for these conditions has become routine in the adult setting, incorporation of germline genomic technologies into pediatric cancer care has not occurred as rapidly. The purpose of this study is to assess desire for genetic counseling and testing services among parents of children with cancer to provide parental insight in the incorporation of genomic technologies in this health care setting. Forty-five parents of individuals diagnosed with cancer less than 18 years of age completed either a paper (n=9) or online survey (n=36) regarding their child's cancer history, personal perspectives on genetic counseling and family/demographic information. Interest in genetic testing for CPS was variable, with 50% of respondents indicating they would be interested in pursuing genetic testing for their affected child while one-third of respondents indicate that they were unsure if they would pursue genetic testing. The factors most commonly cited as impacting interest in genetic counseling/testing include provider recommendation and the potential for modification of medical care based on results. A subset of parents expressed that concerns for insurance discrimination and potential negative impacts on mental health would negatively impact their interest in genetic testing for CPS. Genetic counselors have an ideal skillset to help families weigh the benefits and drawbacks of genetic testing for CPS in childhood in order to facilitate decision-making among this population as the availability and clinical utility of genomic testing increases.

**Dickerson, Shelby**

**Mentor(s) -- Dr. Sheryl Wiskur**

**Investigating the Photophysical Properties of Silicon Phthalocyanines for Photocatalytic Organic Transformations**

Photocatalysis has become a major focus as a sustainable pathway for chemical reactions with visible light photocatalysts performing a large range of reactions such as redox reactions, cyclization reactions, and energy transfer reactions. Silicon phthalocyanines (SiPcs) (Figure 1) have been largely ignored as photosensitizers in photocatalytic reactions, despite their low energy excitation, long triplet lifetimes, and their ability to form singlet oxygen. Using cyclic voltammetry and Stern Volmer quenching studies, we have shown SiPcs are capable of acting as electron donors or acceptors with appropriate substrates. We have successfully used a SiPc catalyst in a reductive quenching reaction where Hünig's base served as a sacrificial electron donor. In addition to being redox-active, our preliminary data also shows SiPcs are capable of performing energy transfer reactions, by performing a reaction that utilizes singlet oxygen as a reactant. These reactions, as well as the photophysical and electrochemical experiments will be presented.

**Dickson, Johnathan**

**Mentor(s) -- Dr. Dirk den Ouden**

### **Vowel Formant Stability as a Treatment Outcome Measure in Aphasic and Apraxic Speakers**

Background: Strokes affect about 795,000 people each year and can affect many functions including expressive/receptive language and motor functions. Speech disorders that commonly affect individuals following a stroke include aphasia and apraxia. Aphasia is characterized by various difficulties in expressive and receptive language. Apraxia of speech is characterized by difficulties in motor planning and results in poor articulation. Furthermore, speech can be broken down into sound waves, which can be analyzed by extracting and analyzing various frequency bands, known as formants. Different vowels are characterized by different formant frequencies. Purpose: Because apraxia and aphasia are marked by difficulties with coordination between language, speech, and motor function, this study's purpose was (1) to determine if individuals with apraxia of speech present varying vowel formants compared to both individuals with aphasia and individuals with no impairment and to (2) to examine changes in vowel formants in individuals with apraxia of speech prior to speech intervention and following speech intervention. Participants: Twenty individuals with aphasia or apraxia of speech secondary to stroke were selected to participate. Three speech samples were collected from each participant prior to initiation of intervention, during intervention, and following completion of intervention. Method: Speech samples were obtained by obtaining narratives. Participants were required to tell the story of Cinderella or Little Red Riding Hood on three occasions over a four-week treatment regimen (pre-treatment, two weeks into treatment, and post-treatment). The speech samples were then analyzed using PRAAT, a computer program that takes the auditory input and transfers this input into sound waves. Formants were then extracted from each vowel produced in each sample. A statistical analysis was then performed to compare the three trials to determine levels of progress made throughout the study. Results/Conclusion: Since study is not complete, the results are not conclusive as to whether individuals with apraxia of speech present varied vowel formants compared to individuals with aphasia and individuals with no impairment. Further research examined through this study may help to reveal whether individuals with apraxia of speech present with articulatory differences compared to individuals with aphasia and individuals without impairment.

**Dolgoplova, Ekaterina**

**Mentor(s) -- Dr. Natalia Shustova**

### **Photophysics and Electronic Structure of Metal-Organic Frameworks**

The current landscape of technological and industrial related fields is looking for novel materials with enhanced performances, which will not only improve various fields in science, but also can ensure increased environmental safety. Recently, metal-organic frameworks (MOFs) have been shown as a promising type of material for a wide range of applications including gas storage and separation, sensing, and heterogeneous catalysis. The main advantages of MOFs rely on their modular structures as well as their porosity. Thus, these materials could be utilized as a tool to address the current need in enhancement of material performance.

In our work, we demonstrated a new way to mimic the protein  $\beta$ -barrel structure by utilization of artificially engineered MOFs. We have developed three different approaches of chromophores integration inside porous scaffolds, resulting in emission maxima similar to those observed in natural fluorescent proteins. As a result, we have engineered multi-chromophore scaffolds with significant chromophore coupling, which resulted in a high efficiency of ligand-to-ligand and guest-to-host energy transfer. Furthermore, highlighting the versatile nature of MOFs, we developed an integrated approach of tuning electronic properties of bimetallic MOFs while preserving their porosity. We control MOF electronic properties as a function of the presence of a second metal and/or unsaturated metal sites in the metal node as well as scaffold topology.

Thus, my work shows the possibility of MOF engineering towards various applications ranging from photocatalysts to optoelectronic devices.

**Domlyn, Ariel**

**Mentor(s) -- Dr. Abraham Wandersman**

**Expertise of health coalitions: Refining an implementation model to achieve health equity**

As part of their 100 Million Healthier Lives campaign, the Institute for Healthcare Improvement recruited 18 community health coalitions around the United States to become leaders in achieving unprecedented levels of health equity. After two years implementing improvement methods, select coalition members were invited to participate in a Delphi process. A Delphi builds consensus through multiple rounds of surveys completed by content experts. This study aimed to refine an implementation model and transform the refined model into a tool to aid their efforts. This model – R=MC2 – conceptualizes coalition readiness for an innovation (a program, policy, or practice new to a setting) as a combination of 18 motivation and capacity factors. Participants in this program lent their expertise in implementing community-level innovations to determine which factors were most important, when they were most important, and how easily they could be changed. The Delphi process undertook three rounds and a focus group to create the refined readiness model and determine a potential tool for aiding implementation efforts. As coalitions embark on an ambitious spread of health equity from community coalitions into regional networks, this tool will be utilized to identify barriers and facilitators of spreading health improvement methods.

**Dopkins, Nicholas**

**Mentor(s) -- Dr. Mitzi Nagarkatti, Dr. Prakash Nagarkatti**

**Role of gut microbial metabolite tryptamine in the amelioration of Experimental Autoimmune Encephalomyelitis**

Recent technological advances have spurred research interest on the role of microbiota in immunomodulation, although the mechanisms are poorly understood. Here, we focused on assessing the role of tryptamine, a bioactive molecule derived from gut microbial catabolism of the amino acid, tryptophan, and its regulatory role in limiting neuroinflammation in Experimental Autoimmune Encephalomyelitis (EAE), a model of Multiple Sclerosis (MS). MS is an incurable autoimmune disease in which the host immune system recognizes antigenic peptides present in the myelin basic sheath surrounding neurons. MS is characterized by pro-inflammatory lymphocyte infiltration in the central nervous system (CNS), blood brain barrier (BBB) breakdown, and paralysis combined with weight loss. For this purpose, EAE was induced in C57BL/6 mice which were treated i.p. with tryptamine (25mg/kg) or vehicle. Tryptamine treatment led to amelioration of clinical symptoms of EAE by reducing paralysis and weight loss when compared to vehicle-injected group. Flow cytometric analysis of mononuclear cells in brain showed a decrease in the number of total infiltrating lymphocytes with a concomitant decrease in the number of CD4+ and CD8+ T lymphocytes following treatment with tryptamine, which are known hallmarks of inflammation in EAE and MS. Similar changes were observed in secondary lymphoid tissues such as spleens. In addition, 16S rRNA sequencing analysis of the gut microbiome revealed significant increase in abundance of the commensal bacterial families, Clostridiaceae and S24-7 in the tryptamine-treated mice when compared to vehicle-treated group. Both these families regulate inflammation due to induction of short chain fatty acids (SCFAs) and T regulatory lymphocytes (Tregs). Furthermore, our studies also demonstrated a predominant role for carbohydrate metabolism including glycolysis and gluconeogenesis, fructose and mannose metabolism as well as pentose phosphate pathway in microbiota from vehicle-treated mice which was decreased following tryptamine treatment. This study demonstrated that the tryptamine ameliorated neuroinflammation and altered gut dysbiosis which led to amelioration of clinical symptoms of EAE.

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**Eekhoff, Lauren**

**Mentor(s) -- Ms. Janice Edwards**

**Assessing the Barriers to Cardiac Care in Carriers of Duchenne and Becker Muscular Dystrophy**

Duchenne and Becker muscular dystrophy are X-linked conditions due to mutations within the dystrophin gene that cause progressive muscle weakness, respiratory insufficiency, and cardiomyopathy in affected males. Approximately two-thirds of women who have a son with DBMD are carriers of the condition. Carriers typically do not manifest muscular symptoms but are at risk for cardiac abnormalities such as ventricular dilation and dilated cardiomyopathies. The American Academy of Pediatrics (AAP) recommends that carriers of DBMD receive a complete cardiac evaluation by a cardiologist that includes echocardiogram and electrocardiogram. Re-evaluation should happen every five years. According to a recent study, as many as 35.6% of carriers are not adhering to the recommendations despite having knowledge of their carrier status. To date, limited research has been conducted into the barriers that carriers face in accessing recommended cardiac screening. We surveyed 65 carriers of either DMD or BMD and conducted semi-structured telephone interviews with 11 carriers who in the last five years had not seen a cardiologist, had an echocardiogram, had an EKG, or a combination to determine the perceived challenges that carriers face in obtaining appropriate cardiac care. From the interviews, major themes emerged: 1) A lack of awareness exists among healthcare providers in general about the cardiac risks associated with being a carrier as well as the AAP recommendations for carriers 2) Carriers are left to take initiative for their own healthcare needs and must be their own advocates 3) Carriers don't feel they are at risk for cardiac problems because of a lack of family history or because they lead healthy lives 4) Carriers put the needs of their children and families before their own healthcare needs. Our research is the first to attempt to gain insight into the barriers that carriers of muscular dystrophy experience in obtaining cardiac care so as to address the needs of this population.

**Epperson, Tabitha**

**Mentor(s) -- Dr. Shelley Smith**

**Hooking Up or Holding Out?**

Relationships during young adulthood have changed - both in how they are started and what they are. Hooking up is very prevalent on college campuses today and traditional dating is less and less common. Sociologists have noted for years (Durkheim 1915) the social control that religion can exert on followers. Religions have a prescribed set of behaviors that describe how humans should live their everyday lives. Whether religious participants follow these set of directives or not depends on their religious adherence, which is whether a person dutifully sticks to his or her religious beliefs even when no one else is observing his or her. Examples could include things such as not eating forbidden foods or praying the prescribed number of times a day. In this research project, the behavior observed will be college students' hook-up behavior. Despite it being common enough to be considered a social norm while in college, most religions discourage it. Adherence to one's religious beliefs (abstaining from pre-marital sex) will be observed through participation in the hook-up culture in college. Also, as society becomes more affluent, it also becomes less religious through secularization (Mayhew 1968). Noting this, social class would be expected to play a role in whether college students hook up or not because as college students aspire to a better life (social position), their desire for economic success could override their religious beliefs. Therefore, studying hooking up in college is a great way to explore the relationship between religion and social class's influence on religious adherence.

**Erichsen, Jennifer**

**Mentor(s) -- Mr. Coleman Calva, Dr. Lawrence Reagan, Dr. James Fadel**

**Neurochemical and behavioral effects of intranasal insulin administration in young and aged**

## **rats**

Alzheimer's Disease (AD) is the most common form of dementia that affects ~10% of individuals over 65. Recently, insulin administration has been suggested as a potential therapy for AD patients, as individuals with insulin resistance and type 2 diabetes have demonstrated impaired memory and cognitive function. Peripheral administration of insulin can induce side effects like hypoglycemia, but intranasal (IN) administration allows direct access to the brain without affecting systemic insulin or glucose levels, is non-invasive, and easy to administer. Additionally, IN insulin enhances memory in rodents, healthy individuals, and those with AD, although the mechanistic basis for these pro-cognitive changes has yet to be elucidated. Young (3 months) and aged (26-28 months) F344xBN F1 rats were administered IN insulin or IN saline and various techniques were employed to begin to assess the effects. Young (n=4) rats were administered 250 µg biotin-labeled IN insulin and brain sections were prepared for immunohistochemistry for insulin receptor localization. Staining appeared in the medial septum, diagonal band of Broca, medial forebrain bundles, islands of Cajella, piriform cortex, and spinal trigeminal tract, indicating that the IN method effectively delivers insulin to the brain. Food intake was assessed for 18 hours after IN administration of 250 µg insulin or saline in both young (n=8) and aged (n=5) rats. In the young animals, food intake between two and four hours after insulin administration ( $0.3\pm 0.2\text{g}$ ) was significantly less ( $p=0.023$ ) than after saline ( $1.4\pm 0.3\text{g}$ ). In the old animals, food intake between four and six hours after insulin administration ( $1.2\pm 0.5\text{g}$ ) was significantly less ( $p=0.024$ ) than after saline ( $2.3\pm 0.7\text{g}$ ). Thus, IN insulin administration altered feeding behavior and this effect may be delayed in aged animals. Finally, brain neurochemistry was assessed with microdialysis and analyzed using high performance liquid chromatography. Differences in acetylcholine and glutamate levels in the six hours after IN administration of insulin vs. saline were observed, indicating that changes occur at the neurotransmitter level. More studies are needed to fully understand the molecular and behavioral changes following IN insulin administration, but these data demonstrate the capacity for IN insulin to rapidly target the brain and influence neurotransmission and feeding behavior.

## **Feng, Zhuo**

**Mentor(s) -- Dr. Jie Guo**

### **Digesting Gender: The Pleasure of Eating in Late Qing and Republican Chinese Literature**

"Digesting Gender: The Pleasure of Eating in Late Qing and Republican Chinese Literature," investigates how literary writings represented and produced the pleasure of eating and shaped gender relations accordingly during the late Qing (1895–1911) and Republican period (1911–1949). The word "digesting" refers to the process in which individuals internalized gender norms through analyzing, enjoying, and regulating this bodily pleasure. In this discursive production of the pleasure of eating, various social, political and economic changes intersected to influence the formation of modern female subjectivity.

## **Ferster, Brady**

**Mentor(s) -- Prof. Subra Bulusu**

### **Confirmation of ENSO-Southern Ocean Teleconnections**

The Southern Ocean is the focus of many physical, chemical, and biological analyses due to its global importance and highly variable climate. This analysis of sea surface temperatures (SST) and global teleconnections shows that SSTs are significantly spatially correlated with both the Antarctic Oscillation and the Southern Oscillation, with spatial correlations between the indices and SST anomalies approaching 1.0. Here, we report that the recent positive pattern in the Antarctic and Southern Oscillations are driving negative (cooling) trends in SST in the high latitude Southern Ocean and positive (warming) trends within the Southern Hemisphere sub-tropics and mid-latitudes. The coefficient of regression over the 35-year period analyzed implies that temperatures have warmed at a rate of  $0.0142^{\circ}\text{C}$  per year between 1982-2016 with a monthly standard error in the regression of  $0.0008^{\circ}\text{C}$ .

Further regression calculations between the indices and SST indicate strong seasonality in response to changes in atmospheric circulation, with the strongest feedback occurring throughout the austral summer and autumn.

**Feys, Roel**

**Mentor(s) -- Prof. George Khushf**

### **Health Care Reform: Changing the Rules of the Game**

The American health care system is inefficient, ineffective, unjust, and unsustainable. The Patient Protection and Affordable Care Act (ACA), better known as Obamacare, has done little to mitigate these shortcomings. An incremental reform, Obamacare only made relatively minor changes to a flawed system, yet the reorganization was and continues to be controversial. In light of the ACA, comprehensive health care reform is virtually inconceivable. Why is it so difficult to effect health care reform in the United States? New institutional economics, the study of institutions as sets of rules, provides a novel answer to this question: health care reform will only take place if the benefits (b) of introducing a new set of rules outweigh the costs (c) of the rule change ( $b > c$ ). Even though patients and citizens would likely benefit from an overhaul of the health care system, the condition is all but impossible to fulfill from the perspective of the political, medical, and corporate actors that bear the responsibility for effecting reform.

**Fisher, Miranda**

**Mentor(s) -- Dr. Jill Turner**

### **Disruption of Hippocampal NRG3-ErbB4 Signaling Ablates Nicotine Withdrawal-Induced Anxiety-like Behaviors**

Addiction to nicotine and the ability to quit smoking are influenced by genetic factors. Identifying altered gene networks and how those networks contribute to nicotine dependence and withdrawal will only accelerate therapeutic development of new smoking cessation aids. Previous work from our lab and that of our collaborators demonstrate that SNPs across the Neuregulin 3 (NRG3) gene and its cognate receptor, ERBB4, are associated with smoking cessation outcomes. Significance. Our aim is to interrogate the functionality of this signaling pathway during nicotine and withdrawal, and examine how nicotine-induced changes in NRG3-ErbB4 signaling may contribute to affective withdrawal phenotypes in mice. Methods. Our current studies show that both mRNA and protein levels of NRG3 and ErbB4 are upregulated selectively in the hippocampus during nicotine and withdrawal, suggesting that aberrant NRG3 signaling in this structure may underlie select nicotine withdrawal phenotypes. To evaluate the role of hippocampal NRG3-ErbB4 signaling in mediating affective withdrawal phenotypes, we disrupted this pathway via conditional hippocampal ErbB4 deletion in ErbB4-floxed mice and evaluated nicotine withdrawal anxiety-like behaviors. Results. We found that ErbB4 deletion results in the ablation of withdrawal-induced anxiety-related behaviors as measured by both the novelty-induced hypophagia test and the open field exploration task, demonstrating a potential role of this signaling pathway in mediating affective withdrawal phenotypes. Ongoing studies are utilizing single molecule fluorescence in situ hybridization coupled with immunofluorescence to identify the underlying cell type and circuit-specific modulation of NRG3 signaling by nicotine within the hippocampus of these animals. Conclusion. Collectively, these data will provide insight into NRG3-ErbB4 dependent mechanisms underlying nicotine withdrawal-induced phenotypes.

**Foster, Shandrea**

**Mentor(s) -- Mrs. Debera Zvejnieks**

### **Understanding Barriers to Genetic Testing for Sickle Cell Trait: The African-American Male Perspective**

This research project studied educational, psychosocial, and physical barriers associated with genetic testing for sickle cell trait (SCT) in African-American men. Genetic counselors commonly see

individuals with SCT and counsel them on the recurrence risk for sickle cell disease (SCD). Research and anecdotal experience has shown that African-American men are reluctant, or less likely, to test based on insights gathered from research involving African-American female counterparts. Given this information, this study hypothesized that a lack of education and awareness of SCD and SCT are the biggest contributing factors to the reluctance from males to not have genetic testing to confirm their trait status. To answer the research question, 124 African-American men, ages 18 to 50+, were asked to take a survey featuring questions on knowledge, risk perception, barriers, and motivating factors in genetic testing for SCT. Preliminary results showed a discordance between perceived carrier frequency and perceived personal risk for SCT, highlighting a lack of awareness within the context of the condition. The most significant barrier to testing identified in the study was lack of information about SCT or testing options from primary care physicians, while the largest motivating factor for testing was personal health reasons. Genetic counselors have a skillset capable of addressing the educational and psychosocial aspects involved with a genetic condition, such as SCD. Having a better understanding of these issues will be useful for genetic counselors when counseling at-risk couples and open a dialogue that hopefully improves the uptake of African-American men undergoing genetic testing for SCT, allowing for an accurate recurrence risk for couples during pregnancy.

**Fuller, Keith**

**Mentor(s) -- Dr. Joseph Quattro**

**Using Satellite Telemetry to Track Environmental and Geographic Preference of a Juvenile Scalloped Hammerhead Shark (*Sphyrna lewini*)**

Despite advances made in the use of satellite telemetry to track large-scale movements of oceanic predators, there is still a significant degree of uncertainty regarding behavioral traits in specific life stages of many shark species. Specifically, younger life stages of many species still remain relatively unexplored, primarily due to difficulties in such data. New studies have shown that the harm done by attaching satellite tags to smaller sharks than previously studied may have a negligible effect on survivability while providing a strong source of novel data. As many coastal species make use of nursery areas wherein the young grow to maturity, and as these nursery usage periods are thought to be critical to the sustainability of the population, identifying environmental preferences at this point in the life cycle of coastal shark species is an area of immediate conservation importance. As scalloped hammerheads are classified as globally endangered, and as cryptic species described in 2013 within that complex may represent a historical overestimation of the population health, it represents a valuable application of this novel approach.

Using a pop-up archival satellite tag (PSAT), the geographic movement, temperature, and depth preferences of a scalloped hammerhead will be tracked over a period of 8 months. This data will provide a valuable, original source of data concerning the ecological preferences of an endangered species, while also serving as a proof of concept for the use of such technologies on juvenile sharks.

**Galloway, Ashley**

**Mentor(s) -- Dr. Pavel Ortinski, Dr. Jill Turner, Dr. Sajish Mathew**

**Dopamine facilitates CTCF-dependent genomic remodeling of astrocytes in culture.**

Dopamine is critical for processing of reward and etiology of drug addiction. Astrocytes throughout the brain express dopamine receptors, but consequences of astrocytic dopamine receptor signaling are not well-established. We found that extracellular dopamine triggered rapid concentration-dependent stellation of astrocytic processes that was blunted by inhibition of D1-like and D2-like dopamine receptors, as well as Gq/PLC-linked D1/D2 heteroreceptors. Functionally, dopamine reduced duration and increased frequency of astrocytic Ca<sup>2+</sup> transients. Whole-genome RNA sequencing revealed prominent dopamine-induced enrichment of genes containing the CCCTC-binding factor (CTCF) motif, suggesting involvement of chromatin restructuring. CTCF binding to promoter sites depends on activation of poly-ADP-ribose polymerase 1 (PARP1). Accordingly, antagonism of PARP1 occlud-

ed dopamine-induced morphological changes, whereas a PARP1 agonist facilitated morphological changes on its own. Our findings highlight regulation of chromatin landscape as a critical factor in the rapid astrocyte response to dopamine with implications for reward processing and drug addiction.

**Gao, Chuanji**

**Mentor(s) -- Dr. Svetlana Shinkareva**

### **Temporal Dynamics of Audiovisual Affective Processing**

Despite a strong consensus that our affective experiences are jointly created from visual and auditory channels, the time course of auditory, visual, and audiovisual affective processing remains unclear. In our manuscript we examined temporal stages of audiovisual affective processing and test for neural correlates of audiovisual integration. First, to elucidate the nature of affective integration behaviorally, we applied information integration theory, which indicated that the full pattern of data was explained by a five parameter differential weight averaging model. These results provided evidence for three affect integration phenomena in our behavioral data: visual dominance, congruency, and negativity dominance effects. Second, we examined how ERP data relate to these three established behavioral effects. Our results from standard ANOVA and modelling analyses showed that visual dominance and congruency effects arise during early processing stages, whereas negativity dominance effects largely occur at late processing stages. Moreover, we demonstrated an interactive effect of elaborative processing of affect, wherein the LPP was only sensitive to manipulations of auditory valence when auditory stimuli were combined with visual stimuli. These findings provide a basis for mapping out the temporal dynamics underlying several audiovisual affective integration effects.

**Garces, Natalie**

**Mentor(s) -- Dr. Declan Walsh**

### **Cancer Survivorship Care Plans: Clinician Engagement and Accountability in a Large Hospital Network**

Background: Challenges to Survivorship Care Plan (SCP) implementation persist and guidelines to facilitate provider engagement and accountability are needed (Birken and Mayer, 2017). In 2014, Levine Cancer Institute (LCI), one of the largest Commission on Cancer networks, instituted a SCP delivery model with the survivor's oncology physician or advanced care provider.

Purpose: The primary goal is to illustrate methods used to enhance provider engagement and accountability in the SCP program. The secondary goal is to show the effectiveness of these methods.

Methods: In 2016, survivorship section leaders partnered with the cancer committee to develop a system to further enhance provider engagement and accountability.

Strategies included:

- 1) emailed SCP metrics monthly to administrators, clinic managers, providers and tumor site section leaders;
- 2) presented section- and clinic-specific SCP performance reports at quarterly cancer committee, NAPBC leadership and operational meetings;
- 3) partnered with tumor site section leaders to clarify SCP eligibility criteria, set monthly goals and to optimize delivery;
- 4) discussed SCP metrics at each monthly tumor site section meeting to highlight participation rates of providers and clinics; and
- 5) required newly hired outpatient ACPs to get SCP training and included SCP delivery in goals.

Results: Enhanced provider engagement and accountability led to substantial growth

Conclusions: LCI developed and implemented a multilayer partnership strategy that enhanced engagement and accountability at the leadership, clinic and clinician level. Since 2014, more than 3,100 SCPs have been given at LCI. Cancer programs within large hospital networks may benefit from replicating these methods.

**Garlick, Kristin**

**Mentor(s) -- Prof. Virginia Shervette**

**Impacts of introduced Flathead Catfish *Pylodictis olivaris* in South Carolina: assessment of mercury bioaccumulation for a nuisance species**

The flathead catfish is native to Gulf of Mexico drainages. It was introduced to southeastern Atlantic slope drainages, and now occurs in aquatic systems from Florida to New Jersey. Filling in biological and ecological gaps in our understanding of this nuisance species is critical to managers tasked with establishing effective policies that will protect native species and ecosystems from large, invasive gamefishes. Additionally, the popularity of flatheads as a food fish has associated environmental justice concerns for subsistence fishers, especially within the acidic blackwater river systems of South Carolina where water pH is significantly negatively correlated to Hg concentrations in fish tissue. Documenting the relationship between Hg in flathead catfish muscle tissue and age, sex, and size will be the first step in assessing the potential harm of consuming flathead catfish from the Edisto system.

**Garvin, Monique**

**Mentor(s) -- Dr. Lucy Ingram, Dr. Allison Marsh**

**Adolescents' perception of college and workforce readiness**

Abstract: The question of the student achievement gap has been widely debated in the field of education, with scholars creating arguments centered around factors that predict student outcomes. However, current literature neglects to capture the true essence of student achievement beyond test scores. Furthermore, the field of education neglects to assess how schools prepare students using data that includes the community. In this study, I report on the outcomes of community-based research designed to assess college and workplace readiness of high school students by targeting high school seniors, parents, teachers, and recent alumni. This project uses high school student responses to provoke dialogue about how effective local high schools are in preparing students for the workplace or post-secondary education from the perspective of students, alumni, and parents.

**Girnary, Zahra**

**Mentor(s) -- Dr. Crystal Hill-Chapman, Dr. Jessica Klusek, Dr. Allyn McConkie-Rosell**

**Is current fragile X syndrome genetic counseling enough? Expanding the clinical phenotype of fragile X in premutation and intermediate allele carriers**

Fragile X syndrome is one of the leading causes of intellectual disability and autism and is caused by a trinucleotide (CGG) repeat expansion on the FMR1 gene. Individuals with >200 CGG repeats are said to have FXS, while people with 55-200 repeats and with 45-54 repeats are said to have the FMR1 premutation and intermediate allele, respectively. These varying lengths of the CGG repeat sequence can manifest a variety of different phenotypes, primarily autism and intellectual disability in individuals with FXS, and Fragile X-associated tremor/ataxia syndrome (FXTAS) and Fragile X-associated primary ovarian insufficiency (FXPOI) in individuals with the FMR1 premutation. However, recent studies have suggested that there may also be psychiatric manifestations experienced by individuals with the premutation. Currently, there are no established clinical features associated with carrying an intermediate allele.

This study had three primary aims: 1) to study individuals with the FMR1 premutation about their knowledge regarding their risks of not only FXTAS and FXPOI, but also the recently published psychiatric manifestations that are now potentially being seen in these populations; 2) to study intermediate allele carriers and which features, if any, they exhibit and 3) to study which resources are most helpful for patients. The study was completed using survey methodology and participants were recruited through online Facebook support groups for fragile X syndrome and related disorders. Results showed that carriers of the FMR1 premutation and intermediate allele carriers overestimated their chances for FXS-related disorders, and that more education is needed about the clinical features as-

sociated with these repeat lengths. Individuals in both the premutation group and intermediate allele group altered reproductive decision-making due to their genetic status. These findings reveal that genetic counselors should place more emphasis on not only the genetics of FXS, but also the risks of developing the associated phenotypes, as this information is taken into account when making reproductive decisions. Additionally, counselors can direct newly diagnosed patients to some of the online Facebook support groups that are widely being used today, as they were reported to be helpful by individuals in both groups.

**Gong, Hua**

**Mentor(s) -- Dr. Nicholas Watanabe**

**The Impact of the NBA Tanking Strategy on Game Attendance**

This study investigates the relationship between tanking and game attendance in the National Basketball Association (NBA). Previous studies provide evidence that tanking occurs when NBA teams intentionally lose games in order to improve their chances to pick higher in the draft. However, fans may not explicitly recognize tanking behavior on the court as teams are not likely to admit they are tanking, since this could lead to a decline in attendance as well as punishment from the league. Nevertheless, consumers' perception of tanking for a given NBA team may potentially affect their decisions to attend games. Based on this, the current study attempts to advance the literature by examining whether fans' interest in attending NBA games may be sensitive to perceptions of tanking. In order to conduct such an analysis, this study used the volume of local newspaper articles discussing tanking as the proxy of consumer perception for whether each NBA team may be tanking. Based on this, attendance models indicate that when consumers perceive tanking in the current or previous season, that there is a significant decline in attendance. In particular, perceptions of tanking behavior in prior seasons is found to cause a greater decline in attendance in the current season. Overall, the current research helps to advance the theoretical and empirical literature, as it highlights even the perception of tanking or shirking can lead to negative consequences for sports organizations. Additionally, the results also provide useful managerial implications in regards to how the NBA league office may need to control the perception of such behaviors, as their presence can impact the integrity and economics of their product.

**Gray, Stephanie**

**Mentor(s) -- Dr. Lauren Sklaroff**

**Restoring America: Historic Preservation and the New Deal**

While the Great Depression was a time of immense hardship, the New Deal initiated a period of cultural reinvention. One significant, yet overlooked, part of the New Deal's cultural agenda is the restoration of historic landmarks. Politicians, architects, and preservationists across the nation, inspired by the Roosevelt administration's unprecedented federal support of arts projects, went to work preserving and restoring the historic places that mattered to them as a method of refashioning America. A "restored" America – as evinced through its preserved historic architecture – celebrated past American achievements, ingenuity, and diverse local histories that gave the nation its distinctive multicultural character. Restoring the places that told the nation's history in physical form sent a message of prosperity that combated current hardships the country faced. My dissertation, titled "Restoring America: Historic Preservation and the New Deal," is comprised of three cases studies that explore this important story of historic preservation as a materialized method of cultural production and national recovery.

**Gummadidala, Phani**

**Mentor(s) -- Dr. Anindya Chanda**

**Flooding is Associated with Increase in Relative Abundance of *Aspergillus* and *Penicillium* spp. in Built Environment: Implications to Human Health**

United States experiences approximately 5 million cases of respiratory problems that are largely correlated with exposures to *Aspergilli* and *Penicillium* in built environments. Since Americans spend 90% or more of their time indoors, mold related health costs are likely to increase with the rise in weather events such as hurricanes and tidal floods. Current evidence suggests that *Aspergillus* and *Penicillium* are largely associated with water-damaged buildings. However, it is not understood whether flooding caused by such extreme weather activities determine the relative abundance of these mold genera in built environment. To address this knowledge gap we conducted a survey of flooded and non-flooded buildings (both residential and non-residential; n=6 per group) that were impacted by two major weather events in South Carolina: the '100 year flood' and hurricane Matthew. Air sampling in these moldy buildings were performed using 'settle plate'. Colonies that grew on the agar plate after 5-7 days of incubation were identified colony-by-colony using internal spacer sequence 1 (ITS1) analysis coupled with phylogenetic identification of the species. Our results demonstrated significant increase (> 2 fold) in relative abundance of *Penicillia* and/or *Aspergilli* in homes where mold problems were flood-associated, as compared to non-flooded homes. Finally, we investigated indoor air samples of buildings (n=6) in New Jersey, which experienced mold problems five years after flooding post hurricane Sandy. We observed a 90% abundance of *Penicillium* spp. in all these homes, suggesting that the dominance of flood-associated rise of these genera in built environment is long-lasting. Finally, a retrospective review of existing literature on the most abundant *Aspergillus*/*Penicillium* spp. identified in our survey include *A. flavus*, *A. fumigatus* and *P. rubens* which are well known pathogens and associated with fatal respiratory and neurological illnesses in immunocompromised patients, children and the elderly. Our findings support our proposed model that contaminants in floodwater may provide new nutrient source for selective overgrowth of pathogenic molds from genera *Aspergillus* and *Penicillium*, their sporulation and the emission of their VOCs, which can collectively deteriorate the indoor air quality and detrimentally impact human health.

**Gunn, Brett**

**Mentor(s) -- Dr. R. Davis Moore**

### **Attention Deficit Hyperactivity Disorder Increases Anxiety and Depression in Concussed College Athletes**

**Purpose:** The purpose of this study was to compare symptom profiles of anxiety and depression in athletes with ADHD, a history of concussion, a history of concussion and ADHD, and controls. We hypothesized collegiate athletes with ADHD who experienced a concussion would report higher levels of anxiety and depression than other athletes.

**Methods:** Nine-hundred seventy-nine NCAA Division-I college athletes at the University of South Carolina (USC) were surveyed as part of a larger performance health and wellness management program at USC. We acquired ADHD diagnoses, history of concussion, physician diagnosed concussions, State-Trait Anxiety Inventory (STA-I), and Center of Epidemiological Studies Depression Scale (CES-D). Athletes were divided into four groups 1) ADHD with Concussion, 2) ADHD no concussion, 3) ADHD no concussion, and 4) No ADHD no concussion for comparison.

**Results:** State Anxiety scores were significantly higher in the ADHD with concussion group ( $42.1 \pm 14.2$ ) compared to all other groups ( $33.4 \pm 8.9$ ). Depression scores were also significantly higher for ADHD with concussion group ( $25.5 \pm 10.2$ ) than all other groups ( $16.3 \pm 5.7$ ). Tukey post hoc revealed both the anxiety mean difference of 8.4 (95%CI [.68-6.2]) and depression mean difference of 9.7 (95%CI [4.2-15.1]) were statistically significant ( $p < .05$ ).

**Discussion:** These findings suggest ADHD may have a cumulative effect on state anxiety and depression beyond that of either ADHD or concussion alone. Therefore, athletes with ADHD should receive extra care and management as they will likely experience more severe symptoms following injury.

**Gupta, Malini**

**Mentor(s) -- Dr. Caryn Outten**

## **Interaction between Grx4, Fep1 and Fra2 regulates low iron response in *S. pombe***

Interaction between Grx4, Fep1 and Fra2 regulates low iron response in *S. pombe*

Iron is an essential micronutrient in all living organisms. As heme, Fe-S clusters or in its ionic form, iron associates with proteins involved in critical biological functions such as respiratory electron transfer chain, oxygen transport, growth and differentiation, DNA metabolism and repair, and photosynthesis. Intracellular iron regulation is critical since both excess iron and iron deficiency have deleterious physiological consequences. In the model eukaryote *S. pombe*, the iron-dependent transcriptional repressor Fep1 represses expression of iron uptake genes under iron replete conditions. Under iron deplete conditions the Fep1 de-represses the iron uptake genes whereas the iron utilization genes are repressed by a separate mechanism. Previous results suggest that under iron deprivation, interaction of cytosolic Grx4 with Fep1 deactivate its DNA binding domain rendering it inactive. In vivo coimmunoprecipitation and bimolecular fluorescence complementation experiments show Fra2 associates with Fep1 in the nucleus independent of cellular iron levels. TAP-pull down experiments reveal the formation of a Fep, Grx4 and Fra2 complex of unknown function. Here we are using purified proteins to characterize the Fe-dependent interactions between Fep1, Grx4 and Fra2 and to probe the molecular details of this interaction.

**Hann, Claire**

**Mentor(s) -- Dr. Johannes Stratmann, Dr. Paula Vasquez**

### **Modeling Responses to Multiple Stressors in Tomato**

Plants have developed mechanisms to perceive multiple specific threats, and to respond to them in concert to minimize fitness tradeoffs. We now understand how a stimulus perceived by a small group of cells can eventually protect the entire plant body. Plant stress studies have revealed how different species respond to individual stressors, but less is known about how a second stressor affects typical physiological responses to an initial stressor. Research on combined stressors suggests that the gene expression profile expected for one stress may be different in the presence of a second stress. Effects on the response to the first stressor may be synergistic, suppressive, additive or neutral. Therefore, we must gather data on the quantitative features of a second stressor's effects on a signaling pathway. This project focuses on gathering data in tomato on responses to two stressors with predictable signaling outcomes. My hypothesis is that quantification of initial stress signaling, hormone synthesis, and downstream response events will uncover differences between the effect of single and double treatments at points of both pathways, and that these will be useful for modeling purposes. Data from highly controlled dual-stressor experiments will be generated as a starting point to build a deliberately simplified mathematical model. A more complete model would eventually aim to predict how plants respond to complex environmental stresses. Once the original mathematical model is tested, additional modules could be added to the set of equations to expand the model with data on more stress combinations and conditions. The jasmonic acid (JA) pathway is stimulated using mechanical wounding. NaCl is used as an abiotic stimulus of osmotic stress, which engages the abscisic acid (ABA) pathway. Perception of the input stimulus is quantified via MAPK1/2 activity and by measuring levels of JA and ABA. We measure expression of wound-responsive genes and osmotic/NaCl stress-responsive genes as outputs. Preliminary data collected on responses to simultaneous salt and wounding treatments showed that MAPK1/2 kinetics after wounding were altered by NaCl treatment, along with changes in hormone synthesis, and gene expression.

**Hanna, Sara Walden**

**Mentor(s) -- Dr. Julius Fridriksson, Dr. Alexandra Basilakos, Dr. Brielle Stark**

### **Examining the Relationship Between Brain Lesion Site and Naming and Comprehension Ability Post-Stroke: A Dual Stream Model Investigation**

Rationale: Advances in neuroimaging have allowed us to identify regions of post-stroke damage that relate to language impairments in aphasia. The dual stream model identifies two neural streams that

process speech and language information: a ventral stream that networks with speech comprehension systems and a dorsal stream that networks with speech production systems (Hickok & Poeppel, 2004). However, research involving large numbers of participants with stroke damage to these two neural pathways is lacking. Therefore, in considering the dual stream model, this study investigated the relationship between the location and size of brain lesions in a large population of stroke survivors with naming and comprehension ability on the Western Aphasia Battery diagnostic assessment to allow for the future prediction of specific deficits based on lesion site.

**Methods:** 176 participants (65 female, 111 male) were included in this study. Participant behavioral and neuroimaging data was obtained retrospectively from the University of South Carolina (USC) and the Medical University of South Carolina (MUSC). Criteria for participant inclusion in this study involved past experience of a left-hemisphere stroke, completion of the Western Aphasia Battery, and an MRI scan.

**Results:** Participants had varying degrees of naming and comprehension deficits. We analyzed the brain damage associated with naming and comprehension deficits. Results show as expected. Comprehension deficits were associated with ventral stream damage, specifically the anterior and posterior temporal cortex. Naming deficits were associated with both dorsal and ventral streams, particularly in the angular gyrus, in the temporal parietal junction, and extending through the insula.

**Conclusion:** These results show that damage associated with naming and comprehension deficits, as measured by the Western Aphasia Battery, map onto dorsal and ventral stream regions. Results facilitate the clinical management of aphasia by facilitating the prediction of post-stroke language deficits. These findings also aid in the development of effective treatments for aphasia.

**Harrison, Adam**

**Mentor(s) -- Dr. Troy Herter, Dr. Robert Davis Moore**

**Feasibility of using neurophysiological biomarkers from a continuous task to assess deficits in error detection**

Error detection is a cognitive process that requires the continuous integration of information across multiple neural systems. Adequate error detection is vital for learning how to efficiently process information and interact with our environment during dynamic, real-world situations, but is frequently impaired in neurological disorders, such as stroke and concussion. Error-related negativity (ERN) and error positivity (Pe) are two neurophysiological signals, known as, event-related potentials (ERPs), that are commonly used to monitor error detection processes. Traditional studies of ERN and Pe frequently use discrete variants of the Go/No-Go task with a single response (e.g., button press). However, this fails to mimic the demands of most real-world tasks. The objective of this study is to establish the feasibility of measuring ERN and Pe during a continuous Go/No-Go task that captures the complexity of real-world tasks. To address this objective, we have used a robotic device within a virtual environment to create three versions of the traditional Go/No-Go task that vary in complexity: 1) discrete button-press response, 2) discrete task with reach response, and 3) continuous task with reach response. We are collecting neurophysiological data from 10 healthy, young adults while they perform these three Go/No-Go variants. To test the feasibility of measuring ERN and Pe during the three variants, we will use repeated measures ANOVAS to compare the mean amplitude and latency of ERN and Pe measures obtained from the three variants. We hypothesize that the timing and amplitude of both the ERN and Pe waveforms collected from the continuous task will be quantitatively similar to those obtained from the two discrete variants of the Go/No-Go task. If the data support our hypothesis, these findings will demonstrate that meaningful measures of ERN and Pe can be obtained from continuous tasks that mimic real world scenarios. This will subsequently allow us to improve the validity of using the ERN and Pe to identify neurological deficits and track recovery following neurological injuries.

**Haun, Daniel**

**Mentor(s) -- Dr. Kevin Hull**

**Like, Share, Follow: Measuring Brand Engagement Through Purposive Behaviors On Instagram**

Jones and Pittman (1982) found that purposive behaviors are delineated into several categories: ingratiation, self-promotion, intimidation, exemplification, and supplication. Building on the work of Jones and Pittman, this study seeks to define how brands cultivate a desired perception of themselves, and in so doing seeks to define parallels between a person and brand's self-presentation and impression management techniques. This study will examine Instagram posts to explore self-presentation phenomena as measured by likes and comments on Instagram. In order to explore engagement, this study will conduct a content analysis of Instagram posts from the most valuable brands as identified by Forbes.

**Hayes, William**

**Mentor(s) -- Dr. Douglas Wedell**

**Analyzing Individual Differences in Contextually-Based Choice**

Decoy alternatives are alternatives added to a choice set that alter the relative preferences of the other alternatives in the choice set. Several different types of decoys have been proposed and have been theorized to derive from either common or different contextual choice mechanisms. Much of the work studying decoy effects compares different groups of participants who experience different conditions so that analyses are at the group level. In a simulated grocery shopping task, we explored the effects of several different decoys using a within-subjects design consisting of repeated choices between three items (a targeted alternative, a competitor, and a decoy option). This design allowed for the study of individual differences in choice behavior and examination of the relationships between different types of decoys. We investigated these differences in three ways. First, we compared the adequacy of the fit of different models to individual choice patterns across five decoy types. Second, we used Multidimensional Scaling to characterize these differences. Third, we use structural equation modeling to evaluate the underlying factor structure. The results of this study help us better understand the cognitive processes underlying context effects in choice, as well as how individuals differ in their utilization of these processes.

**Haynes, Venice**

**Mentor(s) -- Dr. Heather Brandt, Prof. Daniela Friedman**

**Exploring opportunities for cervical cancer health communication campaigns in Cusco, Peru: A case study**

**Project Purpose**

Cervical cancer incidence and mortality in Peru is among the highest in the world. Cervical cancer educational efforts are minimal among local men and women, thus contributing to higher cervical cancer rates. A study was designed to examine existing health communication messages about cervical cancer and to identify opportunities for cervical cancer focused campaigns in Cusco, Peru.

**Structure/Method/Design**

Using case study methods, a study was conducted over a one-month period (June 2017) across urban and rural areas of Cusco, Peru. Mobile Pap test campaigns were provided by a local clinic that provides Pap tests to local women and mobilizes to rural locations to provide Pap tests to indigenous women who do not have access to Pap test services. Observations of 16 districts in the Cusco region were conducted to locate existing cervical cancer information or opportunities to display or provide information if none currently existed. Notes and photos were taken to document the presence of health messages related to cervical cancer as well as other topics regarding women's health. Conversations with clinic staff were also conducted to understand the health communication landscape.

## Outcome/Evaluation

Little to no information was available about cervical cancer absent of the information provided by the clinic that provides free or reduced Pap test to local women. Some locations where Pap tests were performed displayed information about other health issues such as tuberculosis, maternal and child health services, and domestic violence, yet information about regular cervical cancer screening was not included among these topics. Conversations with clinic staff revealed that literacy among indigenous women makes understanding written materials difficult and the sharing of health-related information often occurs through word-of-mouth.

## Going Forward

Multiple opportunities exist for health communication campaigns focused on cervical cancer in the Cusco region. The literacy levels of the indigenous populations, language differences (Spanish vs Quetchua), and cultural beliefs need to be considered in the design of messages. A follow-up study will solicit community input on preferences for specific channels to be used and message content that is culturally appropriate and acceptable in the Peruvian population.

## Hersey, Melinda

### **Mentor(s) -- Dr. Lawrence Reagan, Dr. Parastoo Hashemij | A Multifaceted Approach to Analyze Serotonin's Role in Comorbid Depression and Obesity**

Epidemiological studies estimate that greater than 60% of the adult US population may be categorized as either overweight or obese. There is a growing appreciation that the complications of obesity extend to the central nervous system (CNS) and result in increased risk for neurological co-morbidities like depressive illness. Given the hypothesized role of serotonin (5-HT) in the pathogenesis of depression, it is possible that decreases in brain 5-HT efflux induces depressive illness in obesity.

We previously demonstrated that rodents with a phenotype that is consistent with features of the metabolic syndrome (MetS) exhibit depressive-like behaviors as shown by the sucrose preference test and forced swim test. To identify the potential underlying mechanistic mediators of these behavioral changes in vivo microdialysis and fast-scan cyclic voltammetry were used to determine changes in hippocampal 5-HT levels following administration of a selective serotonin reuptake inhibitor (SSRI). Results suggest fundamental changes in the serotonergic system of obese animals. Plasma cytokine analysis revealed that the pro-inflammatory cytokines (IL-1 and IL-6) and plasma C-reactive protein levels were increased in obese rats. Neurochemical analyses determined that MetS animals exhibited decreased basal 5-HT and diminished hippocampal 5-HT efflux following SSRI administration.

Collectively, these data support studies indicating that obesity and MetS increase the risk for mood disorders and suggest that changes in 5-HT levels may be a shared feature between depressive illness and metabolic disorders. Additionally, results identify pharmacological differences that provide a mechanistic basis for the decreased efficacy of SSRIs in the treatment of depressive illness in obese individuals. Changes in pro-inflammatory cytokines and other inflammatory markers could also be an important mediator of comorbid obesity and depression.

## Hill, Elaina

### **Mentor(s) -- Dr. Lesly Wade-Woolley**

#### **The relationship between music, reading, and reading-related skills in children**

Purpose:

Previous research has shown that, in addition to phonological awareness, prosodic awareness is an important predictor of reading skill. Music shares rhythm- and pitch-related features with prosody. The purpose of this study, therefore, is to examine how children's music skills relate to word reading

fluency, after considering contribution made by phonological awareness and prosodic awareness.

Method:

Seven and eight year old typically developing English-speaking children were recruited from after school activities in the greater Columbia area to participate in an hour-long assessment of reading, language and music. The assessment was comprised of standardized measures of pitch and rhythm discrimination skills, phonological awareness, and word reading fluency and decoding skills, and an experimental measure of prosodic awareness. The parent or guardian of each child then completed a brief questionnaire in order to gather information about each child's extracurricular music experience and parental education level.

Results:

The results will be analyzed to examine the relationship between music discrimination skills, phonological awareness, prosodic awareness, and word reading fluency. Descriptive statistics for all measures will be reported. Correlations, where appropriate, will be used to construct composite variables. A regression analysis using word reading fluency as the dependent variable will also be run, and known predictors (such as phonological awareness and prosodic awareness) will be entered prior to music variables.

Conclusion:

Based on previous research and our current understanding of the relationship between reading and music skills, we predict that children with increased music discrimination skills will have increased performance on measures of reading and reading related skills. However, this relationship may become attenuated when controlling for the more proximal measures of phonological and prosodic awareness.

**Hinderliter, Jillian**

**Mentor(s) -- Dr. Allison Marsh**

### **Jewish Women and Community Health Activism in Columbia, South Carolina**

In the late 1960s, women's health activists began to redefine the relationship between patient and healthcare practitioner. Spearheaded by women in the New England, the women's health movement challenged healthcare to become a proactive, informed process for all patients. The Boston Women's Health Book Collective, the National Women's Health Network, and others laid the groundwork for a nationwide movement emphasizing health education, empowerment, and advocacy. Among this "founding generation" of health activists were Jewish women who understood their activism as profoundly linked to their experiences as women and as members of the American Jewish community. Although the women's health movement grew out of second wave feminism, Jewish women are still active today as new generations of health activists and advocates take on major health challenges in their own communities. While their work is not framed as part of the women's health movement directly, the work of these activists reflects a longer tradition linking Jewish women to health education and reform. Jewish women in South Carolina have shown their participation in health activism through roles as medical practitioners, social workers, and community organizers. This project pulls forward recent narratives of community health activism in the Midlands and considers how regional health issues in the Columbia compare to national conversations about health and the American Jewish community. Blending oral history evidence with an analysis of local health education programs and services, I argue that the work of health activists in Columbia's Jewish community reflects national trends as well as additional concerns of Jewish South Carolinians. While the national conversation

often focuses on genetic screening and mental health, engaging with the Jewish community of Columbia has revealed that diabetes and the health impacts linked to rural poverty are prevalent issues locally. This research complicates the common perceptions of which health issues are of vital interest to American Jews. My presentation will discuss the roles of Jewish women as health activists in the Columbia area while providing historical context exhibiting the tradition of Jewish women's health activism over time.

**Hirschhorn, Rebecca**

**Mentor(s) -- Dr. Susan Yeargin, Dr. Robert Moore**

**Comparison of self-reported concussion symptoms and scores on the Beck Depression Inventory-II, Beck Anxiety Inventory, and the Anger Index.**

Context: Concussive injuries are an increasing public health concern. Although alterations in mood are the greatest predictor of abnormal recovery following concussion, few clinicians assess these domains beyond traditional symptom lists. Objective: To determine if differences exist between symptoms reported on the Sport Concussion Assessment Tool-3 (SCAT-3) and validated psychological assessments of depression (Beck Depression Inventory-II; [BDI-II]), anxiety (Beck Anxiety Index; [BAI]), and anger (Anger Index [AI]) in concussed athletes and controls. Design: Prospective cohort study with matched controls. Setting: Research Lab Participants: Club sport and varsity student-athletes that sustained a concussion between August and December 2017 and un-injured matched controls. Control subjects had no history of concussion within the past year and were matched based on gender, age, academic year and sport. Interventions: Concussion subjects completed the SCAT-3, BDI-II, BAI, and AI within 72 hours of injury and 45 days after clearance to return to play. Control subjects completed the assessments within the same time interval. Main Outcome Measures: Total symptoms (TS) and symptom severity (SS), BDI-II, BAI, and AI scores. Descriptive statistics, repeated measures ANOVA, observed power, and effect size (Cohen's d) were calculated. Results: Eight concussion and 9 control subjects were enrolled (11 males, 6 females). There was a significant effect of time for TS ( $p=0.017$ ) and SS ( $p=0.038$ ), but not for BDI-II ( $p=0.085$ ), BAI ( $p=0.066$ ) or AI ( $p=0.746$ ). There was a significant interaction effect of time x concussion for TS ( $p=0.014$ ), SS ( $p=0.025$ ) and BAI ( $p=0.033$ ), but not for BDI-II ( $p=0.076$ ) or AI ( $p=0.114$ ). Observed power was not adequate ( $<0.80$ ) to detect significant differences. Large effect sizes were found for concussion participants for TS ( $d=1.364$ ), SS ( $d=1.144$ ), BDI-II ( $d=0.882$ ) and BAI ( $d=1.044$ ). Conclusion: Concussion subjects reported no residual concussion symptoms following return to play. While large changes in BDI-II and BAI occurred, a significant difference was not detected between time points or compared to controls. Future research with larger samples sizes is necessary to determine if the BDI-II and BAI can provide meaningful information beyond the SCAT-3 for monitoring psychological symptoms. Clinicians should still use these assessments when evaluating depression and anxiety indicators in student-athletes.

**Holmes, Jordan**

**Mentor(s) -- Dr. Parastoo Hashemi**

**Enzyme-free Glutamate Sensing at Ionophore-Grafted Carbon Fiber Microelectrodes**

In recent years there has been a push to expand the boundaries of fast-scan cyclic voltammetry (FSCV) to measure a suite of physiologically relevant signaling molecules in real-time. Our group, among others, has spearheaded this movement with in vivo serotonin and histamine sensing. In this study, our focus shifts towards a fascinating analytical challenge: measuring glutamate, which is one of the most abundant neurotransmitters and was previously thought to be non-electroactive. Glutamate is particularly difficult to analyze with voltammetry because it electropolymerizes at biological pH and is structurally similar to many other amino acids found in the extracellular space. For the first time, we introduce a voltammetric method for direct glutamate detection using an optimized waveform. We approach selectivity issues from a unique angle by designing a novel ionophore for glutamate binding incorporating Cu(II). Glutamate detection coupled with Cu(II) FSCV provides a strategy

capable of rapid, sensitive, and stable responses. Here, we describe in detail the development of this novel glutamate sensor and characterize the electrochemical response both in vitro and in vivo. The future of this work is to gain an in depth understanding of glutamate transmission in health and disease comparable to that of other analytes measurable by FSCV.

**Holt, Hope**

**Mentor(s) -- Dr. Melissa Moss**

### **Transport of Amyloid- $\beta$ Across the Blood Brain Barrier by P-glycoprotein: A Novel Therapeutic Target in Alzheimer's Disease**

Alzheimer's disease (AD), the most common neurodegenerative disorder, affects over 5 million people and is the 6th leading cause of death in the US. AD is characterized by accumulation of aggregated amyloid- $\beta$  protein (A $\beta$ ) in the brain. One prospective therapeutic approach is the transport of excess A $\beta$  out of the brain through the single endothelial cell thickness of the blood-brain barrier (BBB). P-glycoprotein (P-gp), an ATP binding cassette transporter located on the apical side of the BBB, has been shown to transport A $\beta$ . While monomeric A $\beta$  is inert, oligomeric A $\beta$  exhibits neurotoxicity and leads to the formation of A $\beta$  fibrils that accumulate as plaques in the brain. However, formation of oligomeric A $\beta$  may be important to Ab clearance from the brain. To explore this hypothesis, this study sought to determine the A<sup>2</sup> aggregation state (monomer, oligomer, fibril) that most effectively interacts with P-gp.

An ATPase activity assay was used to quantify A $\beta$  binding by P-gp. In this assay, when a ligand binds to P-gp, ATP is hydrolyzed to release inorganic phosphate (Pi). Inverted vesicles containing P-gp are incubated alone (negative control), in the presence of verapamil (positive control), or in the presence of A $\beta$  prepared to optimize different assembly states: monomer, oligomer, fibril, and sonicated fibril. Addition of MgATP initiates binding, which is halted for analysis by the addition of SDS. The concentration of Pi is then measured via absorbance to quantify binding relative to the negative control (reported as a fold-increase).

Effectiveness of transport is observed to decrease from A $\beta$  oligomer, to A $\beta$  sonicated fibril, to A $\beta$  fibril, this study shows that the size of the A $\beta$  aggregate species plays a crucial role in the binding of A $\beta$  to P-gp for transport. This is most likely due to the large size of A $\beta$  fibrils when compared to the size of the binding site available on P-gp. Future studies will investigate the potential for cooperative transport of A $\beta$  using additional P-gp substrates occupying alternate binding sites.

**Horton Dias, Cindy**

**Mentor(s) -- Dr. Robin Estrada**

### **Qualitative Inquiry into the Dietary Practices of Shift-work Nurses in Hospitals**

Background/significance: Nurses, like the general American population, are not meeting dietary recommendations for health promotion and chronic disease prevention. As the largest healthcare profession, healthy nurses are imperative to meet the healthcare needs of the nation. Nurses' health is impacted by the dietary choices made every day, including while at work. Factors affecting dietary choices are complex and include environmental, social, affective, and cognitive influences. It is not known to what extent nurses prioritize healthy eating while at work or what nurses perceive as major influencers in the hospital setting. Understanding the unique influences that nurses encounter is paramount to the development of programs that target healthy eating in the workplace.

Purpose: The purpose of this study is twofold: 1) to explore nurses' experiences with dietary behaviors in the workplace; and 2) examine nurses' perceptions of barriers and facilitators related to shift work and the hospital setting on making healthy nutritional choices.

Methods: This qualitative descriptive study is guided by the Theoretical Domains Framework, and has already been approved by the USC IRB. Participants will include Registered Nurses working 10-12 hour shifts in any specialty within a regional hospital system. After consent is obtained, interviews and focus groups will be audio-recorded and transcribed for analysis. Data will be analyzed using a

thematic analysis approach, which will include iterative readings of the transcripts, code identification, and theme generation.

Results: Anticipated findings will include primary influences on eating behaviors most relevant to nurses.

Implications: Diet is the leading contributing factor in long-term health promotion and chronic disease prevention, and should be emphasized in programs targeting nurses' health. More information is needed about the unique influences on dietary choices that nurses encounter in the hospital setting, especially for those working shifts. Findings can inform hospital food policies, workplace wellness program interventions, nursing administration practices, and nursing education.

**Hosseini, Nozhan**

**Mentor(s) -- Prof. David Matolak**

### **WIDE BAND CHANNEL CHARACTERIZATION FOR LOW ALTITUDE UNMANNED AERIAL SYSTEM COMMUNICATION USING SOFTWARE DEFINED RADIOS**

In the near future, there will be a need for accommodating large populations of fast moving Unmanned Aerial Systems (UAS) operating in uncontrolled, very low level (VLL) (below 500 ft) airspace. As is well-known, real-time knowledge of the wireless propagation channel is essential for the effective design and optimization of wireless communication systems. As an example, for multicarrier schemes, the subcarrier spacing, and the appropriate cyclic prefix length (for complete elimination of inter symbol interference) in Orthogonal Frequency Division Multiplexing depends on the Doppler spread, and delay spread values, respectively. In this paper, we propose a software defined radio (SDR) based channel sounder employing a wideband linear frequency modulated continuous wave (FMCW) or chirp waveform technique for low altitude air to air (AA) links. This paper discusses both matched filter and heterodyne detector implementations in the receiver, and investigates advantages and disadvantages of both architectures for an SDR implementation in an AA scenario. We also discuss proper windowing techniques in the transmitter. Some proof of concept measurement results using SDRs are presented for a simulated UAS scenario.

**Huggins, Erin**

**Mentor(s) -- Dr. Richard Ferrante, Dr. Steven Skinner, Mrs. Lauren Baggett**

### **Family Planning Decisions Following a Child's Diagnosis of Rett Syndrome: A Pilot Study**

Rett syndrome (RTT) is a rare X-linked neurodevelopmental genetic disorder that affects primarily females. Most often, RTT occurs spontaneously in affected individuals, thus implying a low chance of recurrence in families (~1%) except in rare cases of germline mosaicism and carrier mothers. It is well understood that families interpret recurrence of inherited conditions based on numerous factors, such as perception of numerical risk estimates, feelings of guilt and anxiety, and abstract concepts such as fate and spirituality. However, parental perception of the chance for recurrence of RTT in the family is poorly described. In addition, it is still unclear how these perceptions factor into family planning, such as parental genetic testing and the decision to have future children. This current study uses survey methodology to assess the information parents of a child diagnosed with RTT are given about inheritance, the genetic basis of RTT, the chance of recurrence, and how this information is applied to family planning decisions.

**Hughes, Ruthanne**

**Mentor(s) -- Dr. Elaine Chun**

### **Director and Mister: James Comey's Narrative Construction of Identity**

Narratives present a version of reality, never an objective truth. They are a site for "reflective awareness" on one's identity and a place where participants can be situated in "morally organized past, present, and possible experiences" (Ochs & Capps, 1996). In the tradition of discourse analysis, this paper examines the narrative that James Comey, former Director of the FBI, presents in his testimo-

ny before the Senate Intelligence Committee on June 8, 2017 regarding potential Russian influence in the 2016 elections. Using researcher-transcribed excerpts of the publicly available testimony, this paper examines instances of terms of address, institutional ritual, metadiscursive practices, and his invocation of the audience in order to trace how Comey constructs both his identity and the identity of President Trump. During the hearing, Comey narrates the events leading up to, including, and following his being fired as Director of the FBI and frames himself, President Trump, and the FBI as moral beings. He engages in “doubled-role participant-denoting discourse” (Wortham, 2003) to construct a patriotic, dutiful self as he situates himself both as an in-group and an out-group member of the FBI, ultimately contrasting this constructed self with his construction of Trump. In doing so, he is able to simultaneously maintain his identity as the respected Director of the FBI and as a private citizen, positioning himself in contrast to Trump and bolstering his credibility.

**Illenberger, Jessica**

**Mentor(s) -- Dr. Steven Harrod, Dr. Rosemarie Booze**

### **Modulation of novelty response by VTA-AcbSh circuitry**

The mechanism of how specific mesolimbic pathways modulate behaviors, such as the response to novelty, is still unknown; however, previous studies show that dopamine activity in the nucleus accumbens is critical for orientation and response to novel stimuli, such as removal of background noise. **METHODS:** Pharmacogenetic techniques (retroDREADDs) were used to activate the G protein-coupled receptors (GPCR) on dopaminergic neurons in the ventral tegmental area (VTA) during a novel experience to investigate the role of dopaminergic efferents in responses to novelty. First, selectivity and expression DREADDs were confirmed in primary neuronal cell cultures. Second, AAV-CMV-GFP-CRE was selectively expressed in the nucleus accumbens shell (AcbSh). Infusion of AAV-hSyn-DIO-hM3D (Gq)-mCherry (a presynaptic enhancer in the presence of its cognate ligand clozapine-N-oxide, CNO) into the VTA triggered hM3D-mCherry production specifically in VTA neurons connected to the AchSh. Finally, in vivo administration of CNO was infused to activate designed muscarinic receptors in mCherry expressing cells. **RESULTS:** Immunohistochemical analysis confirmed production of hM3D in neurons of the posterior limb of the VTA (pVTA); these AcbSh projection neurons were both dopaminergic and non-dopaminergic. Activity was increased in the presence of novelty ( $p \leq 0.008$ ) and the response to novelty was extended with CNO administration (CNO dose X min;  $p \leq 0.031$ ). Importantly, animals that received DREADDs did not display a deficit in auditory information processing ( $p > 0.05$ ). Collectively, stimulation of the dopaminergic neurons in the pVTA that project to the AcbSh extended the selective responses to novelty, without altering gross locomotor behavior. In sum, selective retroDREADD pathway analysis provides insights into the circuitry underlying particular overt responses to changes in the environment (e.g., novelty).

**Islam, Kazi Moinul**

**Mentor(s) -- Dr. Sarah Gassman, Dr. Mostaqur Rahman**

### **Field and Laboratory Characterization of Subgrade Resilient Modulus for MEPDG and its application in Pavement Performance.**

Pavements are multi-layered structures typically formed with compacted granular materials placed over compacted subgrade soils and sealed with flexible or rigid surfacing. A major failure criterion used in Mechanistic-Empirical Design Guide Methods (MEPDG) for flexible pavement is the fatigue cracking which initiates at the bottom of the surface. The resilient modulus (MR) represents the material stiffness under cyclic loading conditions and is defined as the ratio of the cyclic deviator stress to the resilient strain. The MR is practically used as the elastic modulus of pavement materials, and it is the key properties for determining the performance of pavement layers. Field and laboratory testing programs will be conducted to develop a practical methodology for estimating resilient modulus (MR) values of subgrade soils for use in the design of pavement structures. The findings of this study will be expected to be helpful in the implementation of the pavement design in South Carolina and else-

where.

**Jahan, Merina**

**Mentor(s) -- Dr. Mark J. Uline**

**Divalent metal ion binding to co-polyelectrolytes: effect of sequence heterogeneity, salt concentration and grafting density**

Aptamers or single stranded DNA/RNAs make an excellent candidate for biosensing and drug delivery applications due to their high affinity and specificity towards target substances. Being polyelectrolytic in nature, aptamer structure and chemical properties are dramatically affected by their surrounding solution environment under physiological conditions, such as pH, presence of metal ions and ionic strength. To comprehensively determine the potential of aptamers for different applications, it is very important to understand their physicochemical behavior during metal ion binding. But most of the theoretical studies involving metal-ion binding to aptamers treat them as homopolymers albeit of their heteropolymer nature. With this gap in current aptamer research, my study focuses on finding the effect of sequence heterogeneity of ssDNA aptamers in Mg<sup>2+</sup> ion binding. I also studied how the ionic strength and grafting density of the aptamer chains affect the ion binding. I use a Self Consistent Field Theory (SCFT) approach to build the molecular model for the co-polyelectrolytes grafted to planer a surface and surrounded by cations. The molecular model properly accounts for the structural, thermodynamic and electrostatic properties of all the species present in the system. The highly non-additive coupling between various interactions creates a varying local environment near each polyelectrolyte chains that ultimately results in collapse of the chain. The ion binding is taken into account with an equilibrium binding reaction. Extent of cation binding for different sequences is analyzed at different pH, salt concentration and polymer grafting density. This model gives an exhaustive framework to demonstrate multivalent cation induced structural change in co-polyelectrolytes tethered to a surface for drug delivery and biosensing applications .

**Jayne, Julianna**

**Mentor(s) -- Dr. Christine Blake**

**The Shape of the Army: BMI Trajectories of U.S. Army Soldiers from 2011-2014**

Objective: Establishing the shape and determinants of body mass index (BMI) trajectories among Soldiers is critical given the importance of weight management to military service requirements. The objectives of this study were to (1) model the overall BMI trajectory of active-duty U.S. Army Soldiers, (2) find the most common trajectory groups among Soldiers, (3) investigate the relationship between BMI trajectories and sociodemographic and military specific characteristics, and (4) determine if there were Soldiers with large variability in BMI caused by weight fluctuations.

Methods: The study population included all U.S. Army Soldiers on active-duty between 2011 and 2014 who were age 17-62 (n=827,126). Using longitudinal data from the Stanford Military Data Repository, we used group-based trajectory modeling to identify trajectories of male and female Soldiers and multinomial logistic regression to estimate the associations between Soldier characteristics and trajectory membership.

Results: The overall BMI trajectory of Soldiers increased with age, peaking at 43 years of age for men and 41 years of age for women. Among Soldiers, four distinct BMI trajectory groups were found: increasing, decreasing, constant, and inconstant. Three trajectories were identical in shape and percentage in men and women (constant, increasing, and decreasing). The constant trajectory had the fewest Soldiers who exceeded weight standards or had duty limitations. The increasing trajectory was associated with marriage and fewer service years. The decreasing trajectory was associated with older age, more years of service, and higher educational attainment. The inconstant trajectory differed in shape between men and women with a decrease followed by an increase for men and an

increase followed by a decrease for women. Over 6% of men and 12% of women had fluctuations in BMI indicative of weight cycling.

Conclusions: Characteristics of Soldiers, such as service years, age, and limitations to duty are associated with BMI trends. These characteristics differed between men and women indicating gender differences in the processes influencing the BMI trajectories of Soldiers. Understanding and utilizing these characteristics may assist the Army to better target resources aimed to improve Soldier health and combat readiness.

**Jensen, Owen**

**Mentor(s) -- Dr. Gene Yogodzinski, Dr. Michael Bizimis, Dr. Jeffrey Ryan**

### **Linking Boron to Sources in Aleutian Volcanic Rocks**

Boron is a fluid-mobile, incompatible element which undergoes stable isotope fractionation so that isotopically heavy B preferentially partitions into fluid versus solid phases. Prior workers interpreted correlations between B enrichments and Pb, Sr, and B isotope ratios to indicate that fluids contributing isotopically heavy B to arc lavas derive predominantly from seawater-altered oceanic crust (AOC), with a small contribution of light B from sediment.

Along the Aleutian arc, an east-to-west decline in subduction rate produces a decline in sediment influx, and an increase in slab temperature. Geophysical and geochemical evidence indicate that western Aleutian seafloor volcanoes erupt over a hot, aseismic slab, with no measurable sediment contribution. East-west changes along the arc therefore provide an opportunity to constrain relative contributions of different fluid sources to arc magmatism.

Analysis of B abundances in 140 samples spanning the entire Aleutian arc shows a broad, east-to-west trend toward lower and less variable B concentrations and enrichments over other incompatible elements. Boron concentrations range from 5-68 ppm in eastern and central Aleutian lavas to 4-14 ppm in the western Aleutians. Higher B enrichments in the eastern-central arc are linked to enriched Pb, Sr, and Nd isotopes, indicating a primary source for B in sediment. Western Aleutian lavas have B concentrations ~4x higher than Pacific MORB, but have depleted Pb, Sr, and Nd isotopes, which in end-member samples are indistinguishable from Pacific MORB and are inconsistent with a source for B in AOC, which should carry radiogenic Sr. Consequently, B in the western arc must be from a B-rich source with little Pb, Sr, or Nd, which cannot be sediment or AOC. This source may be fluid from serpentinite in the mantle section of the subducting plate.

These results point toward sources for B that are likely to be distinct, with isotopically heavy B in lavas linked to subducted sediment, and light B linked to serpentinite internal to the subducting plate. Global variation in  $\delta^{11}\text{B}$  vs Nb/B (Ryan & Chauvel, 2014 Treatise v.3) indicates that both sources likely contribute to common arc volcanic rocks.

**Jiang, Yanping**

**Mentor(s) -- Dr. Xiaoming Li, Dr. Junfeng Zhao, Dr. Guoxiang Zhao**

### **of peer victimization and self-harm behaviors: The roles of depressive symptoms**

Background: Self-harm behaviors is becoming a global public health issue in youth, and suicide is still a leading cause of death in children under 14 years of age. One of the most widely identified risk factors that contribute to self-harm behaviors is peer victimization. Peer victimization, including but not limited to physical, verbal, and relational forms, is also a major public health issue among school-aged children worldwide. The mechanisms by which peer victimization increases the risk of self-harm behaviors, however, remain not fully understood. In this study, we proposed a mediation model to test the roles of depressive symptoms underlying the longitudinal relationships between different types of

peer victimization and self-harm behaviors among children affected by parental HIV.

**Methods:** Longitudinal data were collected from a subsample of 521 children affected by parent HIV between the ages of 6-12 years (275 boys, Mage at the baseline assessment =  $10.69 \pm 1.28$ ) from a larger prospective research project. Of 521 children, 428 participated at the 12-month follow-up assessment (T2, 90.4%), and 428 participated at the 24-month follow-up assessment (T3, 82.1%). Peer victimization, depressive symptoms, and self-harm behaviors were self-reported.

**Results:** Controlling for T1 self-harm behaviors, T1 verbal victimization, but not physical or relational victimization, contributed to an increased risk of self-harm behaviors at T3 ( $b = 0.28, p = .002$ ). And such a longitudinal relationship was mediated by T2 depressive symptoms. T1 verbal victimization significantly contributed to T2 depressive symptoms, which in turn increased T3 self-harm behaviors, controlling for T1 depressive symptoms and T1 self-harm behaviors (indirect effect = 0.04, 95%CI [0.01, 0.09]). No longitudinal relationships between T1 physical and relational victimization and T2 depressive symptoms were observed, controlling for T1 depressive symptoms.

**Conclusion:** The findings highlight the role of depressive symptoms underlying the association between verbal victimization and changes in self-harm behaviors among children under 14 years of age, which provide important implications for developing promising interventions targeting victimization-related self-harm behaviors in children.

**Johari, Karim**

**Mentor(s) -- Dr. Roozbeh Behroozmand**

### **Cathodal Stimulation improves motor timing deficits in Parkinson's disease during speech production and hand movements**

Parkinson's disease (PD) is associated with deficits in production of temporally precise movements. Studies have suggested that PD patients have difficulties in perception of timing information and reproduction of temporal intervals during self-paced finger tapping tasks. Recent studies showed that unlike, healthy subjects, PD patients cannot benefit from external timing information to enhance movement production. The aim of present study was to apply High Definition Transcranial Direct Stimulation over left motor cortex in PD patients to examine the effects of the HD-tDCS on the neural and behavioral mechanisms of temporal processing during speech production and hand movement. Twelve non-demented PD patients was enrolled to study. Half of Patient was randomly assigned to receive Cathodal HD-tDCS over the left frontal, and the remaining half received sham stimulation on a non-target area. Event-related potentials (ERPs) were recorded in two groups while they were visually-cued to prepare to produce a steady vocalization of a vowel sound or press a button in a randomized order, and to initiate the cued movement following the onset of a go signal on the screen. Experiment was conducted in two counterbalanced blocks in which the time interval between visual cue and go signal was temporally-predictable (fixed delay at 1000 ms) or unpredictable (variable between 1000 and 2000 ms). Behavioral results revealed that Cathodal stimulation accelerated speech and hand movement response times compared to sham condition regardless of stimulus timing. ERP analysis showed that Cathodal, but not Sham, stimulation decreased the amplitude of pre-movement neural activities over left frontal and parietal areas before speech and hand movements onset. Additionally, this decrease in the pre-movement ERP amplitude during cathodal, but not sham, stimulation was correlated with faster reaction time regardless of response modality and stimulus timing. Our findings may indicate that HD-tDCS cathodal stimulation can to improve motor timing deficits in PD. In this study we validated the use of cathodal stimulation as new way to improve motor timing deficits in PD, however clinical trial studies will elucidate stimulation effects on long term.

**Josey, Michele**

**Mentor(s) -- Dr. Jan Eberth**

**Colorectal Cancer: A look at outcomes before and after a diagnosis**

Background

Colorectal cancer (CRC) is the third most common cancer in the U.S., and the fourth leading cause of cancer death in South Carolina (SC). Colonoscopy, is the preferred screening modality, and is recommended by the US Multi-Society Task Force due to its ability to detect and remove potentially cancerous lesions. However, only 63% of the eligible population report receiving any kind of CRC screening. Research has shown that the barriers to CRC screening include lack of awareness, affordability, distance to a screening facility, and views of cancer fatality. In addition, adherence to 1-year surveillance colonoscopies after a diagnosis is lower than the screening prevalence. This dissertation work seeks to investigate screening and surveillance patterns of SC residents using the population-based SC Discharge Database.

Project 1

The purpose of this project is to illustrate and describe the catchment areas (CA; i.e. service area) of facilities in SC providing screening colonoscopies in 2014. We will utilize hierarchical Bayesian logistic regression to model the catchment area for each facility (n=91). We will include sex, age group, race, insurance, and county of residence as covariates. Thus, we will be able to estimate the proportion of patients (from each county) that chose to visit a given facility. We will map the CAs to show the vulnerability of regions and use descriptive statistics to compare the demographics of patients inside and outside the CAs of select facilities.

Project 2

This project will examine whether racial disparities in adherence to surveillance to prevent recurrence of CRC are less pronounced in older survivors (65+ vs. <65) due to improved access to health insurance. We will merge colonoscopy records to the SC Central Cancer Registry (SCCCR) database to create a retrospective cohort. Then, we will determine which survivors attended the 1-year surveillance colonoscopy. We expect the racial disparity for the 65+ population to be significantly reduced or eliminated due to more equitable access to care (Medicare).”

**Karakchi, Rasha**

**Mentor(s) -- Dr. Jason Bakos**

**A Dynamically Reconfigurable Automata Processor Overlay**

Datasets comprised of symbolic data, such as genomic sequences, item sets, and graph edges, are growing rapidly in both size and importance. Computing with such data, such as performing tasks such as approximate string matching, edit distance, and association rule mining, is often algorithmically reducible to evaluating a deterministic or non-deterministic automaton. When evaluating automata for large datasets, general purpose CPU architectures suffer from poor memory system performance, which has motivated recent efforts to develop special-purpose automata processing architectures that exploit both fine-grain parallelism and specialized on-chip memory structures. These efforts have revealed a fundamental design tradeoff between the design’s flexibility to adapt to arbitrary types of workloads versus the overheads required to reconfigure the processor for a new workload. The Micron Automata Processor represents one end of this spectrum, in that it is specialized for specific types of workloads but may be reconfigured quickly, while FPGA-based approaches may be optimized for a specific workload but suffer from long reconfiguration times. Our approach strikes a balance between these competing goals by implementing a reusable overlay architecture on top of an FPGA, allowing for both flexibility and fast reconfiguration.

**Karapetyan, Nare**

**Mentor(s) -- Dr. Ioannis Rekleitis**

## **Multi-robot Dubins Coverage with Autonomous Surface Vehicles**

In large scale coverage operations, such as marine exploration or aerial monitoring, single robot approaches are not ideal, as they may take too long to cover a large area. In such scenarios, multi-robot approaches are preferable. Furthermore, several real world vehicles are non-holonomic, but can be modeled using Dubins vehicle kinematics. Our work focuses on environmental monitoring of aquatic environments using Autonomous Surface Vehicles (ASVs). In particular, we propose a novel approach for solving the problem of complete coverage of a known environment by a multi-robot team consisting of Dubins vehicles. It is worth noting that both multi-robot coverage and Dubins vehicle coverage are NP-complete problems. As such, we present two heuristics methods based on a variant of the traveling salesman problem—k-TSP—formulation and clustering algorithms that efficiently solve the problem. The proposed methods are tested both in simulations to assess their scalability and with a team of ASVs operating on a 200 km<sup>2</sup> lake to ensure their applicability in real world.

**Kauroo, Shahin**

**Mentor(s) -- Prof. Mitzi Nagarkatti, Dr. Joyce Govinden-Soulange, Dr. Mala Ranghoo-Sanmukhiya, Ms. Kathryn Miranda, Prof. Mitzi Nagarkatti, Prof. Prakash Nagarkatti**

## **Molecular and functional profiling of extracts of select endemic plants from the Republic of Mauritius towards unveiling of their pharmacological properties**

Mauritius Island located off the southeast coast of Africa in the Indian Ocean, is a biodiversity hot spot, endowed with endemic plants found nowhere else in the world. Although, the endemic flora is reported in traditional pharmacopoeia representing a reservoir of new biologically active compounds, most plant species have not been scientifically validated. We investigated the anti-cancer properties of Mauritius endemic plant families Asteraceae, Ebenaceae, Sapotaceae and Erythroxylaceae using Luciferase+ EL-4 lymphoma (EL4-luc) and B16F10 Melanoma cells. We performed MTT assay to determine viability following culture with various concentrations of plant extracts and demonstrated that the family Asteraceae at the highest dose (25µg/ml) showed a decrease in the viability of both EL4-luc and B16F10 cells. All four plant families efficiently killed melanoma cells. In TUNEL assay performed to determine apoptosis, EL4-luc and B16F10 cultured in the presence of APL extract from Asteraceae family underwent dose-dependent apoptosis. In addition, treatment of EL4-luc induced dose-dependent increase in early apoptotic cells, while treatment of B16F10 induced a dramatic increase in late apoptotic cells determined by Annexin V-PI assay. We further investigated the apoptotic pathways underlying cancer cell death by APL (25µg/ml) and noted that apoptosis induced in B16F10 cells was blocked by caspase 8 inhibitor suggesting that the death-receptor pathway may be involved. Further, both caspase 8 and 9 inhibitors partially blocked apoptosis in EL4-luc cells suggesting the involvement of both the death receptor and mitochondrial pathways. The mitochondrial membrane potential ( $\Delta\psi_m$ ) determined using DIOC6 was decreased in both EL4-luc and B16F10 cells, indicating that APL used the mitochondrial pathway of apoptosis to kill cancer cells. We also studied their anti-inflammatory activity on conA-activated T cells using 3H-Thymidine assay. Our studies showed anti-inflammatory activity of Asteraceae extracts whereas treatment with some of the extracts from Ebenaceae and Erythroxylaceae led to increase in T cell response indicative of immune enhancement. Sapotaceae extracts have both suppressive and enhancing effects on T cells based on doses used. Our studies demonstrate the beneficial effects of Mauritius endemic flora as potential anti-cancer and immunomodulatory agents.

**Kay, Jacob**

**Mentor(s) -- Dr. R. Davis Moore**

## **Metabolic rate and aerobic capacity at symptomatic threshold in individuals with persistent concussion symptoms.**

Purpose: Research on exercise for concussion rehabilitation is gaining considerable attention. However, unless adequately prescribed, exercise can induce/exacerbate symptoms and impede recovery.

Therefore, the primary purpose of this investigation was to determine the metabolic rate and aerobic capacity at symptomatic threshold in concussed individuals.

Methods: Thirty-seven concussed individuals (22.97yrs,  $\pm$  5.13) completed a graded exercise test on a stationary bike. Symptoms (SCAT-4) and physical exertion (Borg Scale) were periodically monitored. Exercise testing ceased at the induction/exacerbation of symptoms. Aerobic capacity was assessed using an estimated VO<sub>2</sub>max calculation (ACSM). Descriptive and correlation statistics were computed using MATLAB (Mathworks Inc., Massachusetts) with an apriori alpha level of  $<.05$ .

Results: We observed that symptoms were induced/exacerbated at a mean power output of 95.24W ( $\pm$  34.30), which corresponded to a mean estimated VO<sub>2</sub>max of 21.29 ( $\pm$  5.84) ml/kg/min and a mean metabolic equivalent of 6.08 ( $\pm$  1.67) METs. No significant differences between males and females were observed. Interestingly, neither total number of symptoms, nor total symptom score (SCAT-4) correlated with metabolic rate or aerobic capacity at symptomatic threshold ( $p > .05$ ).

Conclusions: These results help to establish the symptomatic threshold in concussed individuals during exercise. Our data can be used to design safer graded exercise protocols that aim to enhance rehabilitative efficacy. Further, MET conversions provide a useful tool in guiding rehabilitation of concussed individuals in every day environments. Our data indicate that concussed individuals would benefit from initiating physical activity at an intensity level below the metabolic and aerobic capacity thresholds described herein.

**Keane-Dawes, Antony**

**Mentor(s) -- Dr. Matt Childs**

**Reimagined Community: Imperial Occupation and Liberation in Santo Domingo, 1818 – 1833**

“Reimagined Community” explores the origins of a royalist movement in the Dominican Republic from 1818 until 1833. This dissertation uses mid nineteenth-century Dominican Republic how its unification with its island neighbor Haiti in 1822 affected Dominican political allegiances the new regime and the old regime of Spain. Since the 1960s and 1970s, scholars have gone from examining the ideas and moved away rhetoric of the European descended Iberian Creole elite to highlight how blacks, Indians, and other marginalized groups engaged with and reinterpreted ideas of liberalism and nationalism. This scholarship includes royalists, those segments of the population saw monarchy as a viable option as opposed to republicanism. Nevertheless, these studies have not spent as much time analyzing how royalist engaged with nationalists on a discursive level. My project examines how the Dominican Republic was a meeting point between conflicting forces of republicanism and royalism while under Haitian rule. These sides a representation of larger struggles of sovereignty between Spanish and Haitian forces over Santo Domingo as royalist ideas became the basis for Dominican nationalism during the nation’s independence movement in 1844. I use government correspondences, petitions, pamphlets, and newspapers I examine the development of competing notions of national belonging that envisioned different visions for the future of Santo Domingo. By looking at pro-Spanish or Haitian texts as pieces of performance, my textual analysis illustrates how Dominican historical actors articulated aspects of their identity to appeal to either Spanish or Haitian forces.

**Kellis, Devin M.**

**Mentor(s) -- Mrs. Kris F. Kaigler, Dr. Marlene A. Wilson**

**Individual Differences in Cholinergic Modulation of 22 kHz Distress Vocalizations in Rats during Fear Conditioning and Extinction**

Post-traumatic stress disorder (PTSD) develops in some, but not all, individuals after traumatic experiences, suggesting that neurobiological factors may confer resiliency, or risk, to the long-term negative effects of traumatic stressors. Our laboratory has demonstrated that outbred Long-Evans

rats show individual differences in conditioned fear behaviors, particularly during extinction of cue-induced freezing behavior following fear conditioning, suggesting that this strain may serve as a useful model for characterizing the neurobiological mechanisms that underlie differential responses to traumatic stress. The cholinergic system may be of particular importance for stress-related disorders as it mediates attention to environmental cues and provides neuromodulatory input to brain regions that regulate conditioned fear and fear extinction. We hypothesized that in addition to individual differences in freezing behavior during fear extinction, rats would also display differences in 22 kHz ultrasonic distress calls during the acquisition of conditioned fear or fear extinction, and that these vocalizations would be modulated by administration of the muscarinic acetylcholine receptor antagonist scopolamine (SCOP). Therefore, we recorded 22 kHz ultrasonic vocalizations (USVs), which are often emitted by rats during aversive situations, as well as freezing behavior during fear acquisition, re-exposure to the context, recall of cue-conditioned fear, cue extinction, and cue generalization. Scopolamine (SCOP, 1.0 mg/kg, ip,) was given 30 min prior to extinction or cue-conditioned recall to examine effects on freezing behavior and 22 kHz USVs. We found that rats exhibiting highest freezing behavior and poor cued fear extinction showed more 22 kHz USVs (higher number and longer total duration) during acquisition, cue-conditioned recall, extinction, and tone generalization trials compared to the low freezing rats. SCOP before cue-conditioned recall attenuated USVs during extinction learning and extinction recall, which is consistent with studies demonstrating a relationship between cholinergic (muscarinic) activation and the emission of 22 kHz USVs. We speculate that muscarinic receptors may play a role in extinction learning related to 22 kHz distress vocalizations and SCOP might blunt negative affective processing during re-exposure to conditioned cues.

**Kessler, Jenna**

**Mentor(s) -- Dr. Suzanne Adlof, Dr. Alison Hendricks**

### **Morphosyntax Production in children with Developmental Language Disorder who speak two dialects of American English**

Some morphosyntactic features, such as past tense (PT) and third person singular (3SG), are produced variably in non-mainstream American English dialects (NMAE). For example, within NMAE dialects PT and 3SG are not always overtly marked (cf, She walked the dog. and He walkø away.) These features have been called contrastive features because they contrast with MAE where they are obligatorily marked. These differences across dialects contribute to the difficulty in assessing language ability in children who speak NMAE dialects. Researchers had previously thought that contrastive markers offered limited information about language ability in children who speak NMAE dialects. However, recent research has shown that contrastive features may be helpful in identifying developmental language disorder (DLD) when comparing within a dialect group. The current study examines the production of contrastive (PT and 3SG) and noncontrastive features (Plural) in children who differ in their dialect use and language ability.

Research Question: Do school-age children with and without DLD who speak NMAE and MAE differ in their production of morphosyntax?

Methods:

89 first and second graders (46 girls and 43 boys) completed standardized and experimental measures of language, reading, and general cognition (1st Grade, n = 31; 2nd Grade, n = 58).

The Diagnostic Evaluation of Language Variation, Norm-Referenced (DELV-NR) assessed language ability and the Diagnostic Evaluation of Language Variation, Screening Test (DELV-ST) was used to determine the child's dialect status. Children were grouped according to language ability (TD: DELV-NR > 85 vs. DLD: DELV-NR ≤ 85) and dialect status (MAE vs NMAE). 22 participants were categorized as TD-NMAE, 45 as TD-MAE, 16 as DLD-NMAE, and 6 as DLD-MAE.

A sentence completion task assessed the children's use of the three morphosyntactic features. Sentences included semantic markers indicating the required tense or number ("yesterday" e.g., Today the boy is painting. Yesterday he did the same thing. Yesterday he \_\_\_\_.) Research assistants calculated the percentage of correct responses in each category for each of the three groups of children (TD-MAE, TD-NMAE, DLD-NMAE).

Results: Analyses will be conducted to determine whether there are differences in morpho-syntactic between impairment groups within same dialect.

**Kim, Hyunglok**

**Mentor(s) -- Prof. Venkat Lakshmi**

**Role of satellite observations and their limitations in current weather forecasting systems**

Recent findings regarding the role of water in the topsoil layer reveal that the average 8-mm thin layer of water covering all land surface plays a key role in the earth climate system. Specifically, the interaction between land and atmosphere is governed by the amount of moisture content on the topsoil layer, since the amount of soil moisture determines the partitioning of outgoing energy flux into latent and sensible heat fluxes. The latent and sensible heat fluxes, which are controlled by surface soil moisture and vegetation, have shown to be connected with extreme climate events such as droughts, floods, wildfires, and dust outbreaks; thus, knowing the amount and dynamics of the surface soil moisture and vegetation is of utmost importance for climate forecasting on short-term and seasonal timescales. Role of the satellite in determining soil moisture contents and the degree of vegetation present shows tremendous potential for observing large-scale patterns of hydrological changes.

Despite its immense importance, the understanding of the physics of diurnal water and energy cycles on a global-scale still has many uncertainties. In particular, the coverage of satellite-based observations is not spatially and temporally continuous; this limitation hampers researchers in elucidating fundamental processes controlling the surface hydrologic cycle and land-atmosphere interaction, across both time and space domains. Consequently, a clear comprehension of the spatiotemporal variability of the diurnal surface hydrologic cycle and land-atmosphere interaction would give us a better understanding of the role of hydrometeorological factors on extreme natural disasters and help us to more accurately parameterize land surface variables in extreme weather forecasting.

In this presentation, I will expound on the current state of satellite observation practices, the limits of those observations on making the prediction about weather events, and the possible solutions to overcome those limitations.

**Kim, Jeongsuk**

**Mentor(s) -- Dr. Jangmin Kim**

**Student bystanders' willingness to report school violence in Caribbean community**

Introduction

This study drew on the person-in-environment perspective and examined how multidimensional factors at individual, family, and school levels are associated with student bystanders' behavior of reporting school violence in Caribbean countries.

Method

We used survey data from 512 middle and high school students in five Caribbean countries. Among 512 students, 327 students were selected for our analysis, who witnessed at least one of the fifteen violent and unsafe activities within their schools. A dependent variable indicates whether students reported the school violence they witnessed to school personnel. Independent variables include individual factors (violence perpetration and violence victimization), family factors (family cohesion and family violence history), and school factors (school bonding, participation in school activities, and

access to drugs and weapons). Descriptive statistics and binary logistic regression were employed to test our hypotheses using Stata 13.0.

## Results

We found that 41% of students who witnessed school violence reported their witnessing violence to school personnel. We also identified significant factors that affected students' reporting behavior. For individual factors, students who were females and those who were victimized were more likely to report their witnessing school violence. Family factors including family cohesion and family violence history did not appear to be significant factors of students' reporting behavior. For school factors, students were more likely to report the school violence to school personnel when they more actively participated in school-based activities. However, the likelihood of their reporting behavior significantly decreased when they had easier access to drugs and weapons in their schools.

## Implications

The results of this study suggest the relative importance of school factors as compared to other individual and family factors in understanding student bystanders' willingness to report school violence. More specifically, the results showed that active participation in school activities was a stronger protective factor to promote student bystander' willingness to report school violence. The results call for developing a collaborative approach to ensuring a safe school environment that allows students to create trustful relationships with their peers and make them feel comfortable in sharing information with adults in schools.

## **Kimono, Diana**

**Mentor(s) -- Dr. Saurabh Chatterjee**

### **Gulf War Illness: Cues from the Silent Liver**

Gulf War Illness (GWI) is described as a series of pathological events that plagues the veterans who participated in the first Persian Gulf War. Most of the associated pathologies have been ascribed to chemical exposures like Pyridostigmine Bromide (PB) and insecticide Permethrin, diethyltoluamide (DEET) and organophosphates. We recently showed that chemical exposure in GWI caused microbial dysbiosis and decreased butyrate generating bacteria in mouse models that was linked to increased gastrointestinal and neuronal inflammation. Since increased number of veterans complain of metabolic complications as they age, the present study was focused to assess the liver metabolic functions. Using a rodent model of GWI, both wild-type and transgenic mice were used for the study. Results showed that GWI mouse liver showed a significant decrease in PPAR- $\gamma$ , glucose transporters Glut-1 and Glut-4 while SREBP-1c was significantly decreased in these mice. Butyrate administration or deletion of TLR4 significantly restored the gene expression patterns of these metabolic markers. Interestingly, TLR5 which has been shown to be protective against steatosis and complications involving fatty liver, was decreased significantly at the mRNA level in GWI mouse models but was reversed when the protein levels were assessed raising the possibility of an adaptive role of this important innate immune mediator. The TLR4 KO mice showed an inverse relationship with the TLR5 protein expression while butyrate decreased TLR5 protein in hepatocytes that correlated well with its significant role in preventing GWI liver abnormalities. In conclusion, we report a mechanistic approach to identify increased metabolic abnormalities in GWI that can be key to therapeutic strategies in aging veterans who face metabolic complications, weight gain and risks of chronic fatigue.

## **King, Sarah**

**Mentor(s) -- Ms. Jackie Knight**

### **Improving the Walkability of a University Campus one STEP at a Time**

Background/Purpose: University campuses serve as ideal settings for physical activity due to their expansive landscape and pedestrian infrastructure. However, only half of U.S. college students, facul-

ty, and staff meet physical activity recommendations. After assessing the walkability of the University of South Carolina (UofSC)-Columbia campus through environmental scans and campus member surveys, UofSC partners were able to enhance the campus environment based on the assessment's recommendations to encourage students, faculty, and staff to become more physically active. Such improvements included the installation of yield to pedestrian signs, raised pedestrian walkways, and re-stripping of crosswalks. The purpose of this Graduate Civic Scholars project was to investigate how perceptions of campus environment may have altered due to the efforts made to increase the walkability of UofSC-Columbia campus.

**Methods:** Perceptions of campus walkability were assessed using a campus member survey. The survey investigated participants' familiarity with the term walkability, whether they considered walking as a form of physical activity, time spent walking around campus each week, and attitudes toward seven walkability characteristics, including perceptions of sidewalks, crosswalks, and lighting on walking paths throughout the UofSC-Columbia campus. Responses to this survey will be compared to the previous campus member survey that was administered during the initial walkability assessment. Data will be analyzed using description and inferential statistics in SPSS 24.0.

**Results:** Results will be analyzed in March 2018. Significant findings and notable changes from the original survey will be listed on poster presentation.

**Conclusion:** Campus walkability is impacted by both the physical environment and university members' perceptions of the environment. This study was able to investigate how changes in the environment may impact survey participants' walkability perceptions, which could possibly encourage campus members to use more active forms of transportation while on the UofSC-Columbia campus. Further research may be done to assess the campus environment as continues to evolve.

**Knight, Aubrey**

**Mentor(s) -- Dr. Lesly Wade-Woolley, Dr. Suzanne Adlof**

### **Impacts of Specific Language Impairment and Dyslexia on Processing of Prosody**

**Purpose:** Previous studies demonstrated that prosodic language skills in 1st and 2nd grade predict reading comprehension skills at the end of 3rd grade. This study explores prosody at the word and discourse level in school-age children who are typically developing, have SLI, or have both SLI and dyslexia. Past research has shown that these groups differ in their code-related and meaning-related language abilities, but no studies have directly compared their prosodic language skills.

**Method:** Twenty children aged 8-11 years in 3rd-5th grade participated in this study. Participants were recruited from a previous study focusing on students with SLI and/or dyslexia (Adlof, et. al., 2017). Group classifications were re-confirmed with the administration of CELF Recalling Sentences and the Test of Word Reading Efficiency (TOWRE). Participants then completed two experimental prosody assessments. The first focused on word level prosodic awareness. Twenty words were presented auditorily. The child was asked to identify the stressed syllable in each word. The second focused on discourse level prosody. Each child was presented with 20 short paragraphs. After each paragraph, two sentence options were given. One sentence emphasized the word carrying vital, meaning-related information and the other emphasized an unimportant word. Each child was instructed to identify the sentence that correctly emphasized the word carrying vital information.

**Predicted Results:** Analyses will examine group differences in prosody at the word and discourse level. We predict that children with only SLI have difficulty processing language-related features of text. This would lead to poor performance on discourse-related elements that are cued by prosody. However, we predict no phonological-process deficits among this group. Therefore, we predict that the SLI group of children will perform higher at word-level prosody tasks than the group with SLI and dyslexia. We predict that children with both SLI and dyslexia have difficulty processing language related features of text and phonological processes of individual words, resulting in poor performance of word

and discourse-level prosody. Typically developing children are expected to outperform both groups of children with SLI on discourse prosody and to surpass children with SLI and dyslexia on word level prosody.

**Lambert, Victoria**

**Mentor(s) -- Dr. James Thrasher, Prof. Rachel Davis, Dr. Lucy Popova**

**Ethnicity's influence on interpersonal communication about cigarette health warning labels: A comparison of conversational frequency and subsequent quit attempts between Latino and White smokers**

**Significance:** This study explored ethnic differences in communicating about cigarette health warning labels (HWLs), which prior research found to have an independent association with subsequent quit attempts.

**Methods:** Longitudinal data were analyzed from an online cohort of US adult smokers. From January 2013 to September 2014, approximately 1,300 smokers were surveyed every four months, with an oversample of 400 Latinos at each survey. The sample included Non-Hispanic Whites and Latinos (Individuals:  $n=4,628$ ; Observations:  $n=7,668$ ), classifying Latinos as English- or Spanish-preference according to the language they chose for the survey. One analytic sample included all participants and another only those followed up at least once. Three items assessed frequency of talk about HWLs. When HWL talk was the dependent variable, item scores were summed; when considered an independent variable, tertiles of summed scores were used. At followup, participants reported quit attempts in the prior 4 months. Using the whole sample, Poisson generalized estimating equation (GEE) models regressed HWL talk on study variables. For the follow-up sample, logistic GEE models regressed quit attempts at follow-up on study variables from the prior survey, including interactions between ethnicity and HWL talk, while adjusting for key smoking and sociodemographic characteristics.

**Results:** Report of any HWL talk was highest among Spanish-preference Latinos (85%), followed by English-preference Latinos (59%), and non-Hispanic Whites (35%), with statistically significant differences between these groups in the frequency of HWL talk in an adjusted model. Frequency of talk about HWLs predicted subsequent quit attempts (AIRR<sub>low v none</sub>=1.17, 95% CI=1.02, 1.33; AIRR<sub>high v none</sub>=1.27, 95% CI=1.12, 1.43), although no significant interactions between ethnicity and HWL talk were found.

**Conclusions:** Results indicate that Latinos report talking more frequently about HWLs than non-Hispanic Whites and that HWL talk is consistently associated with smoking cessation across ethnic groups. Anti-smoking campaigns may consider using messages that encourage interpersonal communication to increase cessation.

**Larsen, Kristen**

**Mentor(s) -- Dr. Maria Pena**

**The Role of the Microbiome in 5-FluoroUracil Treatment of Colorectal Cancer**

Colorectal cancer (CRC) is the third most frequent cancer and the second leading cause of cancer related deaths. It is reasonable to consider that diet and the gut microbiome may significantly dictate disease development and progression of CRC. Previous experiments have shown that a folate free (FF) diet can reduce tumor burden in the APCMIN/+ mouse model. Folate is an important metabolite for cancer cells to grow and divide; depleting this nutrient may hinder tumor cells from uncontrolled growth and improve patient prognosis. The goal of this study is to determine changes in the gut microbiome during disease progression of CRC using the APCMIN/+ mouse model. C57Bl/6 and APCMIN/+ mice were placed on rodent chow (RC), folate free (FF), and folate free + 6ppm folic acid (FF+FA) diets and treated with 5-FluoroUracil (5-FU) or control phosphate buffered saline (PBS). This comprehensive study demonstrates the impact of diet, the gut microbiome, and chemotherapy on tumor burden, the tumor microenvironment (TME), and disease outcome.

Preliminary results indicate a dramatic change in the gut microbiome between RC and FF diets with more changes observed in the 5-FU treatment group. A FF diet reduced tumor burden in 5-FU treated mice compared to RC and FF+FA diets. In addition, flow cytometry indicates significant changes to the TME in response to 5-FU across all diets. Mice on a FF diet receiving 5-FU treatment also increased in weight during chemotherapy indicative of disease improvement. These preliminary findings suggest the importance of manipulating the gut microbiome during the treatment of CRC with 5-FU to improve patient outcome.

**Levitt, Jamie**

**Mentor(s) -- Dr. Robin DiPietro**

**An Analysis of Perceptions of Restaurant Authenticity at Food Tourism Destinations in the Southeastern U.S.**

The purpose of this study was to develop a comprehensive scale, containing multiple restaurant attributes and authenticity conceptualizations, to measure restaurant authenticity; to test a model examining the mediators and outcomes of restaurant authenticity at independent, full service Southern-style restaurants at food tourism destinations in the Southeastern U.S.; and to determine if the influences of restaurant authenticity differ between food tourists, general tourists, and locals.

A four-step approach adapted from Netemeyer et al. (2003) was used to develop the restaurant authenticity scale (RAS). Ultimately, the RAS contained six authenticity conceptualizations, 20 items and three dimensions: restaurant heritage and environment, food and beverage, and restaurant diners.

A conceptual model based on social cognitive theory, Mehrabian-Russell model, congruence theory, the consumer-based model of authenticity, and associative network theory was then tested. Overall, the model contained 10 hypotheses and each was confirmed. By confirming these hypothesis, it was determined that relationships between restaurant authenticity and satisfaction and restaurant authenticity and restaurant loyalty were both partially mediated, while a relationship between restaurant authenticity and place attachment was fully mediated.

Lastly, perceptions of food tourists, general tourists, and locals were compared via multigroup moderation analysis and MANOVA. Findings suggested that restaurant authenticity has the strongest influence on locals.

This study contributed to both theory and practice. For theory, it determined which items, authenticity conceptualizations, and dimensions were included in the RAS. By testing the conceptual model, the efficacy of several theories and models were confirmed in the foodservice and food tourism context. Restaurant authenticity's influence on relevant mediating and outcome variables was also confirmed. Lastly, results from the multigroup moderation analysis and MANOVA tests determined that some differences exist between the food tourists, general tourists, and locals with regard to authenticity.

For restaurant practitioners, the structure of the RAS should call attention to certain restaurant attributes with regards to authenticity. Also, the multigroup moderation analysis and MANOVA tests determined that local restaurants should actively reach out to locals. For tourism practitioners, results from the conceptual model suggest that authentic local restaurants may serve as effective venues to engage tourists with certain travel promotions.

**Li, Guangfang**

**Mentor(s) -- Prof. Hui Wang**

**Selective Electrocatalytic Glucose Oxidation on Dealloyed Nanosponge Particles**

We demonstrate the colloidal Au@Cu<sub>2</sub>O core-shell nanoparticles undergo stepwise structural trans-

formations to sequentially evolve into Au@Cu core-shell nanoparticles, alloy nanoparticles with compositional gradient (Alloy-G), and homogeneous alloy nanoparticles (Alloy-H) upon thermal heating in polyol solution. By varying the reaction temperatures, we can maneuver the reactions kinetics to control the intraparticle compositional gradient. Upon percolation dealloying, the Alloy-G bimetallic nanoparticles gradually evolve into nanoparticles with solid Au cores surrounded by nanoporous shells, whereas Alloy-H nanoparticles transform into spongy nanoparticles that are nanoporous throughout the entire particles. The dealloyed nanoparticles possess different surface atomic under-coordinations, which result in their selectively catalytic behaviors toward an important electrocatalytic reaction. This provides a unique way of achieving catalytic selectivity optimization of Au nanocatalysts through deliberate control over the percolation dealloying of bimetallic nanoparticles with interior compositionally gradients.

**Li, Min**

**Mentor(s) -- Dr. Zhengqing Fu**

### **NPR1 Interacts with TCP Transcription Factors to Regulate the Expression of PR5 in Systemic Acquired Resistance**

In Arabidopsis, the expression of pathogenesis-related genes (PR1, PR2, and PR5) are used as molecular markers in plant immunity. Transcription of these three genes are co-regulated by NON-EX-PRESSER OF PR GENES 1 (NPR1) in plant basal defense and systemic acquired resistance (SAR). The transcription of PR1 and PR2 was regulated by the basic leucine zipper domain containing transcription factors TGA transcription factors. Since there is no TGA binding site on the promoter of PR5, the transcriptional regulation mechanism of PR5 was unknown. In this study, we provide biochemical and genetic evidence that the transcription of PR5 in SAR is regulated by the TEOSIN-TE BRANCHED 1, CYCLOIDEA, PCF1 (TCP) transcription factor TCP15 and its homologs. TCP8, TCP14 and TCP15 proteins are found to have physical interaction with the transcriptional co-activator NPR1. Both TCP 15 and NPR1 are found to associate with the promoter of PR5, while TCP15 binds to it directly. Without NPR1, the affinity of TCP15 to the promoter of PR5 is reduced. The expression level of PR5 is increased when we overexpress TCP15 in col-0 background, while this does not happen in npr1-2 mutant background. The expression level of PR5 in systemic leaves of the tcp8-1tcp14-5tcp15-3 triple mutant is significantly lower than that in wide type Columbia 0 (col-0) after they were locally infected with a virulent pathogen. SAR phenotype is also compromised in the tcp8-1tcp14-5tcp15-3 triple mutant. Therefore, this work reveals a role of NPR1 in transcriptional regulation of PR5 through physical association with TCP15 and its homologs to establish SAR.

**Lim, Jeongsun**

**Mentor(s) -- Dr. Scott Price**

### **ATTITUDES AND THOUGHTS ON TONE QUALITY IN HISTORIC PIANO TEACHING TREATISES**

A beautiful tone quality is one of the most important criterion in all music-making. However, what constitutes a beautiful or desirable tone is controversial among physicists, acoustic scientists, pianists, and piano pedagogues. In the late nineteenth century, studies and research began to investigate tone quality with scientific experiments. The experiments conducted by acoustic scientists and physicists revealed that tone quality does not change with different physical touches. They asserted that differences in tone quality are differences in pitch, intensity, duration, and in combinations of tone and noise. John Backus argued that "the pianist cannot control the quality of the tone and pianists as a group remarkably are resistant to this fact." However, composers, pianists and pedagogues believed that pianists have control over tone quality. They claimed that the quality-differences are achievable by the act of touch as well as the mental conception of tone, and it cannot be proved scientifically. Controversy between who believes in the scientific approach and who distrusts such experiments seems to be irreconcilable. Due to the differences of thoughts among various music and scientific disciplines, there are widely variant opinions on what constitutes a beautiful and desirable tone, and how

it is produced on the piano. Therefore the research will examine the thoughts and attitudes on tone quality in historical piano teaching treatises.

**Liu, Zhonghao**

**Mentor(s) -- Dr. Jianjun Hu**

**DeepMHC: Deep Convolutional Neural Networks for High-performance peptide-MHC Binding Affinity Prediction**

Convolutional neural networks (CNN) have been shown to outperform conventional methods in DNA-protein binding specificity prediction. However, whether we can transfer this success to protein-peptide binding affinity prediction depends on appropriate design of the CNN architecture that calls for thorough understanding how to match the architecture to the problem. Here we propose DeepMHC, a deep convolutional neural network (CNN) based protein-peptide binding prediction algorithm for achieving better performance in MHC-I peptide binding affinity prediction than conventional algorithms. Our model takes only raw binding peptide sequences as input without needing any human-designed features and other physicochemical or evolutionary information of the amino acids. Our CNN models are shown to be able to learn non-linear relationships among the amino acid positions of the peptides to achieve highly competitive performance on most of the IEDB benchmark datasets with a single model architecture and without using any consensus or composite ensemble classifier models. By systematically exploring the best CNN architecture, we identified critical design considerations in CNN architecture development for peptide-MHC binding prediction.

**Liu, Yue**

**Mentor(s) -- Dr. Brent Simpson**

**When are diversities beneficial to social solidarity?**

As societies are becoming increasingly diverse, it is critical to understand how social diversities affect social order. Prior studies have overwhelmingly suggested that diversity has a negative impact on social solidarity and integration as diversity leads to perceived conflicts and threats. This study examined specific conditions under which social diversities (vs. homogeneity) are more beneficial or detrimental to group outcomes such as cooperation, trust, trustworthiness, and generosity towards others. Using experimental methods, the study found that perceived positive interdependence with others critically moderates the relationship between diversity and social solidarity. As compared to homogeneity, diversity is beneficial (detrimental) to group solidarity when members perceive high (low) outcome interdependence between one another. The results suggest that a key means to promoting solidarity and cooperation in heterogeneous groups or communities is increasing (perceptions of) positive interdependence.

**Lu, Junyu**

**Mentor(s) -- Prof. Gregory Carbone**

**Uncertainty and hotspots in 21st century projections of agricultural drought from CMIP5 models**

Future climate changes could alter hydrometeorological patterns and change the nature of droughts at global to regional scales. However, there are still considerable uncertainties in drought projections. Here, we focus on agricultural drought by analyzing surface soil moisture outputs from CMIP5 multi-model ensembles (MMEs) under RCP2.6, RCP4.5, RCP6.0, and RCP8.5 scenarios. First, we investigate the MME annual and seasonal percentage change of surface soil moisture and evaluate the statistical significance of change using paired student t-tests for each grid. The annual mean soil moisture by the end of the 21st century shows statistically significant large-scale drying and limited areas of wetting for all scenarios, with stronger drying as the strength of radiative forcing increases. Second, we calculate the duration, frequency, severity, and spatial extent of severe agricultural drought. The MME median frequency of both short-term and long-term drought increases in most

regions and most scenarios. The individual months are more likely to organize into sequences of consecutive dry months to produce longer-term drought for RCP8.5 than RCP2.6. The MME mean projections of the spatial extent of severe drought increase for all regions and all future RCP scenarios, and most notably in Central America (CAM), Europe and Mediterranean (EUM), Tropical South America (TSA), and South Africa (SAF). Third, we quantify and partition three sources of uncertainty associated with these drought projections: internal variability, model uncertainty, and emission scenario uncertainty. Variability between models presents the largest source of uncertainty (over 80%) across the entire 21st century owing to the wide range of precipitation projections, simplified hydrological models in many CMIP5 climate models, and complicated processes controlling soil moisture. The inter-model uncertainty of drought projections is larger for higher emission scenario. Finally, we examine the spatiotemporal variability of annual and seasonal signal to noise (S/N) change in soil moisture anomalies across the globe and for different lead times. The spatial pattern and magnitude of S/N do not change significantly by lead time, indicating that the spreads of uncertainties become larger as the signals become stronger.

**Lucas, Nicole**

**Mentor(s) -- Mrs. Emily Jordon, Dr. Julie Jones, Mr. Ken Corning**

**Parental response to Whole Exome Sequencing reanalysis and its impact on the diagnostic odyssey**

Advances in genomic technology and increase in the number of gene-disease associations have worked to reduce the number of individuals living without a diagnosis. Whole Exome Sequencing (WES) analyzes the entire human exome to determine a molecular etiology for individuals who remain undiagnosed after other clinical or molecular investigations. Still, WES leaves most individuals undiagnosed, resulting in feelings of disappointment and uncertainty. Patients who remain undiagnosed after WES can subsequently undergo WES reanalysis at a later date due to improvements in bioinformatics, software updates, and increase in known gene-disease associations. Recent studies have found the diagnostic yield of reanalysis to be up to 10%, therefore many remain undiagnosed. This is the first study, to the investigator's knowledge, which investigates parental perspective of those undergoing the most current genetic testing available. This study recruited parents of undiagnosed individuals who have completed WES and subsequent reanalysis through Greenwood Genetic Center in order to investigate response to and impact of WES reanalysis on their diagnostic odyssey. Six semi-structured interviews were conducted, recorded, and transcribed verbatim. Transcripts were analyzed using grounded theory and assigned codes to meaningful segments of text. Preliminary results show most participants expected less from reanalysis compared to the initial WES and felt it would not lead to a diagnosis. Participants responded to reanalysis with feelings of disappointment and worry about the future. Some exhibited resilience through remaining hopeful of finding a diagnosis. Most participants recognized that reanalysis has been unhelpful for their child but expressed willingness to contribute to future research. Despite feelings that reanalysis was unhelpful, 5/6 participants would consider reanalysis again for their child. In light of the apparent comprehensive nature of genomic testing, these results show there is a need to balance hope while offering realistic expectations during counseling and consent of WES reanalysis.

**Lutz, Adam**

**Mentor(s) -- Dr. Shana Harrington, Dr. Charles Thigpen, Dr. Ellen Shanley**

**Influence of Post-graduate Orthopaedic Board Certification on Patient Outcomes Across a National Physical Therapy Outcomes Registry**

Background

Prior studies have reported that physical therapists (PTs) with a board-certification in orthopaedics (OCS) display similar patient outcomes when compared to non-OCS PTs for patients with low back pain (LBP). However, these studies represent smaller samples of OCS PTs.

## Research question

The purpose of this study is to compare performance of OCS PTs (n=65) with that of non-OCS PTs (n=512) from a national PT Outcomes Registry.

## Significance/relevance

Clinical development beyond entry level training is thought to be paramount to the advancement of the physical therapy profession. It remains unclear if OCS board certification influences clinical performance.

## Methods

Patients treated for LBP (n=17,781; age  $\geq$  18) were included if they completed pre- and post-treatment Oswestry Disability Index (ODI) and baseline Veteran's Rand 12-item survey (VR12). Physical therapists were included if OCS status and years of experience were known, and if  $\geq$ 10 of their patients met inclusion criteria. A regression model was developed to predict change in ODI (pre-post), controlling for state, years of experience, age, sex, BMI, payor type, and baseline disability (ODI/VR12). A performance ratio of actual to risk-adjusted predicted change was calculated and bootstrapped with replacement to generate 95% confidence intervals (CI) for each PT. The aggregated performance ratios and 95% CIs were then used to compare OCS and non-OCS PTs.

## Findings

Board certified OCS PTs displayed similar performance ratios (0.96; 95%CI .2,2.09) to non-OCS PTs (1.00; 95%CI .09,2.04).

## Conclusions

Risk-adjusted clinical performance of PTs with OCS board certification does not differ from that of non-OCS PTs across a national sample.

## **Mandelbaum, Jennifer**

**Mentor(s) -- Prof. Spencer Moore, Dr. Monique Lyle, Prof. Alexander McLain, Prof. Jason Stewart, Prof. Sue Heiney**

## **Racial differences in diabetes diagnosis among women with chronic stress: Findings from the South Carolina Women's Survey**

Background: Racial and ethnic minorities are disproportionately burdened by type 2 diabetes, and these disparities may be more prevalent in the southeastern U.S. Evidence suggests that stress may be associated with diabetes risk, yet few studies have examined racial differences in this association. The purpose of this study was to assess relationships among chronic stress, diabetes, and race in South Carolina women.

Methods: Data came from the South Carolina Women's Survey, an ongoing study of racially, socio-economically, and geographically diverse South Carolina women that examines society-to-cell influences on aging. A subsample of African-American and white women enrolled in the study (n=290) were included in analyses. Stress was measured using a 19-item scale (Cronbach's alpha=0.84), with responses categorized into tertiles. Diabetes diagnosis was based on participants self-reporting that a health professional told them they had non-gestational diabetes. Data were analyzed using multiple logistic regression, adjusted for sociodemographic characteristics.

Results: Participants were racially-diverse (65.2% white, 34.8% African-American) and ranged in age from 18 to 93 years (mean age=56.6). African-American women were significantly ( $p<0.01$ ) more likely to be in the top stress tertile compared to white women (41.6% compared to 31.4%). Overall, 23.1% of participants reported a non-gestational diabetes diagnosis. African-Americans were significantly ( $p<0.05$ ) more likely to have been diagnosed with diabetes (30.0%) than whites (19.4%). Higher stress was positively associated with diabetes diagnosis among all women ( $b=0.80$ ,  $p<0.05$ ). Race was found to moderate the association between chronic stress and diabetes. African-American women had similar risk of diabetes regardless of stress level ( $p>0.05$ ), yet white women with low to

moderate stress had a lower likelihood of diabetes diagnosis than African-American women with low to moderate stress ( $p < 0.05$ ).

Conclusions: Findings suggest that stress has a differential effect on diabetes diagnosis among African-American and white women. These differences may further exacerbate racial disparities in diabetes. Future research might examine factors that help to explain racial differences in the impact of chronic stress on women's diabetes risk.

**Manna, Uttam**

**Mentor(s) -- Dr. James Austin**

**Blockchain in Trade Finance**

Blockchain based Trading platform not only for private and public equities but also for other trading of goods and services. These platforms can also embody embedded contracts. Using Blockchain technology, individuals and firms can produce and exchange financial contracts. This peer-to-peer contract creation and settlement means that all transactions are cleared on the private or inter-ledger Blockchain with no intermediary involved. Use of blockchain here will streamline financial record keeping along with executable and legally binding contracts – making it cheaper and more accurate.

**Matherly, Sara**

**Mentor(s) -- Dr. Jane Roberts**

**Traditional and Non-Traditional Presentations of Anxiety in Autism Spectrum Disorders**

Given the elevated and impairing impact of anxiety in ASD, recent efforts to increase understanding of the nature of anxiety in ASD has accelerated. This work has identified what is termed “ASD-anxiety presentations” of features that appear unique to ASD (e.g., unusual phobias). In an effort to examine the validity of ASD anxiety features to the standard DSM criteria, Kerns and colleagues have developed a measure that reflects the expression of anxiety unique to ASD. They found impairing anxiety symptoms in 63% of youth with ASD; with 17% meeting criteria for DSM-defined anxiety disorders, 15% for ASD-anxiety disorders and 31% for both. This evidence supports that anxiety in ASD is complex with presentations of comorbid DSM-defined anxiety disorders along with ASD-specific features. This work encompasses training on the Anxiety Diagnostic Interview Schedule and Autism Spectrum Addendum, which capture traditional and non-traditional presentations of anxiety. Training involves listening and reliably scoring at 80% or above on gold standard interviews from the developer, Dr. Kerns. The final step involves administering and reliably capturing behaviors at a rate of 80% or above to the scores of Dr. Kerns. Future directions involve using this interview to measure traditional and non-traditional presentations of anxiety disorders in individuals with autism spectrum disorders from known and unknown genetic origins.

**Mathias, Emily**

**Mentor(s) -- Dr. Anne Bezuidenhout**

**Speech Acts and Moral Responsibility**

In the United States, freedom of speech is something taken seriously. So much so, in fact, that it is mentioned in the first amendment to the Constitution. However, a commonly held exception is that you should not yell out “FIRE!” unless there really is one. The importance of this exception is that it is clearly motivated by an understanding that words can have consequences.

Today, so much of the discussion around moral responsibility focuses on the causal chain of events that culminate in the agency of the action in question. Causation may cover a lot of ground here, but the current understanding of causation is limited to physical acts – think of the over reduced example of a cue ball and billiard balls. This limitation excludes holding anyone accountable for things they have said. This is very problematic. Should we hold the general of an army morally responsible for ordering an unwarranted killing? I think we should. In fact, I argue that speech acts should be account-

ed for when analyzing the conditions of act being morally judged. But before we can do this, we must have a reliable moral analysis of speech acts themselves.

When someone performs a speech act there is an intended audience. In order for the speech act to be successful, that audience needs to not only hear the words, but they need to understand the intention of the speech act as well. Austin, Grice, and Searle have covered this area in detail, but there is more to be said. I will present a viable schema to supplement their work. This schema can be used as a guide for providing analysis of morally questionable acts and situations so that we can have an account for harmful words.

**McCarter, Maggie**

**Mentor(s) -- Dr. Suzanne McDermott**

### **Gestational Infections and BMI: Implications for Intellectual Disability Risk**

Many parents seek answers to the etiology of intellectual disability (ID) in their child, but only a fraction of the cases has known causes, 50-60% being attributed to genetic or chromosomal factors, which are rarely preventable. However, changeable risk factors of ID are increasingly researched, therefore suggesting that some cases of ID are preventable. Obesity and infection have both been researched and confirmed as known causes of adverse birth outcomes that could cause ID in the birthed child such as preterm birth and congenital infection, but little is known on the interaction of these two factors. This retrospective cohort study sought to explore the relationship between gestational infection, obesity, and ID in children, and to further explore the relationship of various kinds of gestational infection (general infection (GI), sexually transmitted infection (STI), and GI & STI co-infection) to ID in children. The study sample (n= 210,176) was derived from multiple linked datasets including SC Medicaid records, SC Department of Education records, and the SC Department of Disabilities and Special Needs database. These datasets included extensive demographic, medical, and behavioral information of both mother and child. After exclusion criteria were applied, 124,047 mother and child pairs were included in this study. Infection and BMI were both categorized and after adjusting for multiple confounders, there was evidence that BMI influenced the relationship between infection as an effect modifier. Underweight and obese mothers who had a general and sexually transmitted co-infection during pregnancy saw the greatest increase in odds of having an intellectually disabled child (OR 2.76 & 1.47, respectively). Additionally, underweight mothers GI & STI co-infection had substantially higher odds of having a child with ID compared to both STI only and general infection only categories (ORs 2.41 & 3.76, respectively). There were no differences between STI and GI categories, however. These findings can be attributed to infection, underweight and obese BMIs all having a common mechanism: inflammation. These findings contribute to filling the gap of exploring the complexities and mechanisms of the relationships between infection, maternal BMI, and intellectual disability.

**McDonald, Elizabeth**

**Mentor(s) -- Dr. Daniel Fogerty**

### **Speech recognition based on amplitude modulation properties of consonants and vowels**

**Aim 1:** Determine the acoustic and perceptual contribution of temporal envelope cues within specific speech events to sentence recognition for younger and older adults

Speech events produce multiple speech timescales that are depicted by their modulation spectrum. Modulation spectrums appear different for vowels and consonants. Vowels are characterized by slow amplitude modulation in low frequency bands, and consonants are characterized by faster modulations in high frequency bands. Consonants and vowels provide listeners with different temporal cues in sentence recognition. This study is designed to investigate the interaction between changes rates and amplitude compression of consonants and vowels in sentence on younger and older adults.

Participants include younger adults (18-30 years with normal-hearing (YNH) and older adults (60-89 years) with normal hearing (ONH) or hearing impairment (OHI). The experimental design and signal

processing for Aim 1 were temporal filtering of the modulation spectrum by increasing or decreasing the rate of consonants, vowels, and full sentences. The experimental design also included amplitude compression of the consonant-vowel intensity ratio. The preliminary results indicate that listeners tend to do worse with the faster pass than the slower; however, they did better with vowels than consonants when presented at a faster rate. Altered modulation does not appear to aid in the listeners ability to process the sentence, and it can negatively impact the listener. OHI listeners require slow temporal filtering to aid in processing auditory information.”

**McDuffie, Cameron**

**Mentor(s) -- Dr. Roozbeh Behroozmand**

### **Effect of Altered Auditory Feedback on Sensorimotor Deficits in Aphasic Individuals**

Aphasia is a communication disorder that occurs following a stroke in the left-brain areas. Although aphasia is associated with a wide range of language impairments, sensorimotor deficits are also implicated in the disorder. The present study aimed to investigate the neural correlates of sensorimotor deficits in aphasic patients using an altered auditory feedback paradigm. Sixteen aphasic patients and sixteen matched neurologically healthy control subjects were recruited for the present study. Participants were instructed to produce a steady vowel sound of /a/ at their normal conversational pitch and loudness for 2 to 3 seconds. A short altered auditory feedback pitch shift, either upward or downward, of 200 ms was randomly applied to each trial at different time intervals between 750 and 1250 ms. Subject's speech signals were recorded and further processed to calculate compensation magnitude in response to pitch-shift stimulus. To identify localized brain damage associated with speech sensorimotor impairments, a univariate lesion-symptom-mapping analysis was performed using the neuroimaging data collected in Aphasic patients. In each region of interest, a mean intensity value was taken and analyzed with voxel-based permutation thresholding to predict diminished speech compensation responses to acoustic auditory feedback. To determine the phases of error processing, the correlation between diminished speech altered auditory feedback response at four points in time and location of the lesion was analyzed. Results indicated that there was a larger magnitude of speech compensation responses to altered auditory feedback in the control group of neurologically intact individuals. Individuals with aphasia scored lower on speech repetition tasks produced a greater number of diminished compensatory responses. Results further indicated that damage to the superior and middle temporal gyri, the inferior frontal gyrus, and the supramarginal gyrus were negatively correlated with the magnitude of compensation in responses to altered auditory feedback. The findings of the current study indicate that damage to these areas predicts specific aspects of sensorimotor impairment in speech error processing in aphasic individuals.

**McGee, Crystal**

**Mentor(s) -- Dr. Caryn Outten**

### **Overexpression of the yeast high affinity glutathione transporter, Hgt1, restores growth in cells lacking $\gamma$ -glutamylcysteine synthetase**

Glutathione (L- $\gamma$ -glutamyl-L-cysteinylglycine) (GSH) is the most abundant low molecular weight thiol in eukaryotic cells. Its ability to serve as a reducing equivalent in several biological reactions offers protection against reactive oxygen species, xenobiotics, and heavy metals. In addition, GSH serves as an iron ligand for some Fe-S binding proteins involved in both iron regulation and the synthesis and maturation of Fe-S proteins. Hence, GSH is important for iron homeostasis. The biosynthesis of GSH occurs via a two-step ATP-dependent enzymatic process. In the first reaction,  $\gamma$ -glutamylcysteine is formed by  $\gamma$ -glutamylcysteine synthetase (Gsh1). In the second step, glycine is added to the peptide via GSH synthetase (Gsh2). Deletion of the  $\gamma$ -glutamylcysteine synthase gene (GSH1) in yeast leads to growth arrest without GSH supplementation. In *Saccharomyces cerevisiae*, extracellular GSH can be imported via a high affinity GSH transporter, Hgt1. The physiological role of GSH depletion on cellular function and subcellular redox status has been well characterized. However, it has

not been determined how cells depleted of GSH ( $\Delta$ gsh1) respond to increased GSH uptake. To study this, our lab employed a  $\Delta$ gsh1 yeast strain engineered to overexpress Hgt1. Yeast strains where Hgt1 is overexpressed have been shown to overaccumulate GSH and glutathione disulfide (GSSG) when GSH is added to the media. Our data suggests that the overexpression of Hgt1 alone can partially rescue cells devoid of GSH in a redox-dependent manner. To future elucidate this observation, we will express subcellular targeted redox sensors developed in our lab that specifically equilibrates with GSH:GSSG redox changes.

**McLaurin, Kristen**

**Mentor(s) -- Dr. Charles Mactutus, Dr. Rosemarie Booze, Dr. Amanda Fairchild, Dr. Hailong Li**  
**Unraveling Individual Differences in the HIV-1 Transgenic Rat: Therapeutic Efficacy of Methylphenidate**

Despite the heterogeneity of HIV-1 associated neurocognitive disorders (HAND), assignment of categorical diagnoses based on the level of impairment (e.g., Frascati criteria) obfuscates the well-acknowledged variability observed within the population of HIV-1+ individuals. The present study sought to elucidate the natural heterogeneity in adult HIV-1 transgenic (Tg) rats using three interrelated aims. First, heterogeneity of the HIV-1 transgene was examined using a pretest-posttest design assessing the therapeutic efficacy of oral self-administration (OSA) of methylphenidate (MPH;  $2.4 \pm 0.2$  mg/kg), targeting neurotransmitter alterations in HIV-1, on temporal processing. Approximately 42% of HIV-1 Tg animals displayed an improvement in temporal processing following OSA of MPH. Second, repeated OSA of MPH (22-27 days) altered dendritic spine morphology in layer II-III pyramidal neurons in the medial prefrontal cortex. HIV-1 Tg animals exhibited a population shift towards longer spines with decreased head diameter on lower order branches; a shift associated with temporal processing impairment. Third, in HIV-1 Tg animals, dendritic spine backbone length ( $\mu$ m) was associated with temporal processing impairment; a brain/behavior relationship not observed in control animals. Assessing the therapeutic efficacy of MPH revealed heterogeneity in the neural mechanisms underlying neurocognitive impairments, providing a key target for individualized therapeutic and diagnostic approaches for HAND.

**Mehrabi, Amir**

**Mentor(s) -- Dr. Khin Myat**

**Disparities in Medical Imaging Procedure Volume Amongst Cancer Patients Attributable to the Presence of Performance Regulated Payment Systems**

Medical imaging techniques are among the preliminary approaches used in the screening and diagnosis of cancer cases. They allow for a noninvasive way for clinicians to assess the patient for potential abnormalities. Major imaging procedures for cancer patients include magnetic resonance imaging (MRI), radiography (X-ray), and computed tomography (CT) scanning, in addition to other alternative techniques. In accordance with the literature, it has not been sufficiently established whether variations in the provision of these procedures exist based on the influence of performance enhanced systems, and incentivized physician payment models. To determine how performance and quality metric enhanced physician compensation schemes influence the provision of MRI scans among cancer afflicted patients, aggregated NAMCS data from 2011 to 2015 containing 236,117 patients ( $n=236,117$ ) was used, with a descriptive statistics and frequency analysis, alongside a logistic regression approach. Within the sample, 17,835 subjects had cancer, with 408 (2.3%) experiencing MRI, 933 (5.2%) experiencing X-ray imaging, 992 (5.6%) experiencing CT scanning, and 228 (1.3%) experiencing an alternative medical imaging procedure. Correspondingly, 6,169 (34.6%) physicians within the cancer afflicted patient subgroup were regulated by a performance measure or quality metric enhanced compensation scheme. The statistically significant odds ratio (OR) values in descending order for different medical imaging procedures performed for patients afflicted by cancer were X-rays (OR=12.7), computed tomography scan (OR=17.6), and alternative medical imaging (OR=5.2). For

performance-based physician compensation schemes, the odds of a cancer patient being provided an MRI scan was 5.92 times greater as compared to a physician not regulated by performance standards, with 95% CI [4.6,7.6]. The frequency of medical imaging procedures among cancer afflicted subjects was diverse and varied with respect to each imaging technique. Significant heterogeneity existed, with differences between MRI rates, and CT scanning and X-ray imaging being the most prominent. The likelihood of a cancer patient being exposed to MRI was greater when performance metrics were implemented, indicating that physician payment systems that involve performance measure criteria may be promoting greater medical imaging procedure rates for cancer patients, particularly in relation to MRI frequency. Future policies and research should focus on examining factors impacting this issue.

**Miranda, Kathryn**

**Mentor(s) -- Dr. Mitzi Nagarkatti, Dr. Prakash Nagarkatti**

**receptor 1 blockade attenuates metabolic inflammation and gut microbial dysbiosis during high-fat diet-induced obesity.**

The endocannabinoid (eCB) system regulates a variety of physiological processes including inflammation and metabolism. Obesity is characterized by overactivation of the eCB system, chronic low-grade inflammation, metabolic dysfunction, and gut microbial dysbiosis. Blockade of cannabinoid receptor 1 (CB1) ameliorates obesity, however CB1-mediated immune-microbial interactions have not been extensively explored. In the current study, antagonists and genetic ablation of CB1 were used in a mouse model of diet-induced obesity to determine the role of CB1 in modulating inflammation, metabolism, and the gut microbiome. As expected, CB1<sup>-/-</sup> mice were resistant to high-fat diet (HFD)-induced weight gain and metabolic inflammation was significantly less in CB1<sup>-/-</sup> mice when compared to wild-type (WT) controls. Lamina propria lymphocytes in CB1<sup>-/-</sup> did not display a Th1 induction after HFD feeding whereas WT mice fed HFD had elevated CD4<sup>+</sup>Tbet<sup>+</sup> cells compared to WT mice fed low-fat diet. Decreased colonic inflammation indicated CB1-dependent alterations in the gut microbiome may contribute to a decreased obese phenotype. Similarly, WT obese mice treated with the CB1 antagonist AM251 experienced weight loss, decreased inflammation and improvement in metabolic parameters. Interrogation of the gut microbiome by 16S metagenomics revealed CB1-dependent alterations in abundance of bacteria belonging to the Clostridiales order. In addition, functional predictions by PICRUSt analysis revealed decreased abundance of operational taxonomic units belonging to bacterial metabolism and membrane transport pathways. Together these data suggest CB1 regulates metabolism by shaping the immune response and gut microbial community.

**Mohammed, Amira**

**Mentor(s) -- Prof. Mitzi Nagarkatti**

**Role of miR-34a in Amelioration of SEB-induced Lung Injury Treated with Tetrahydrocannabinol (THC)**

Staphylococcal enterotoxin B (SEB) is a highly potent CDC select agent that can trigger acute lung injury. SEB induces immune dysregulation leading to robust T cell proliferation and differentiation, as well as massive cytokine and chemokine release. Δ9-Tetrahydrocannabinol (THC) is a psychoactive ingredient found in Cannabis sativa. Shifting the society point view about THC, from criminal issue to medical issue came from that THC can minimize patient pain which gives THC the ethical and legal implication. In the current study, we investigated the effects of treatment with THC of SEB-induced acute lung injury. To this end, acute lung injury was induced by a dual dose of SEB in C3H/HeJ mice, which were treated with vehicle or THC. THC-treatment led to survival of all the SEB-administered mice, while all vehicle-treated mice were succumbed. THC treatment decreased the CD3<sup>+</sup>, CD4<sup>+</sup>, CD8<sup>+</sup> and NKT population and increased the number of MDSCs in the lungs. THC also induced a significant decrease in the pro-inflammatory cytokines, IFN-γ and TNF-α in the BALF and in the levels of chemokines, CCL5 and MCP-1 in the sera and BALF as well. In order to determine the epigenetic

mechanisms underlying the THC-induced beneficial effects, we performed high-throughput microRNA microarrays with lung-infiltrated mononuclear cells from vehicle and THC-treated mice. Pathway analysis demonstrated that THC treatment led to immune suppression through several mechanisms including downregulation of Let7a-5p that may be responsible for increased expression of IL-10, and downregulation of miR34-5p leading to increased FoxP3. Furthermore, Validation of the expression of miR-34a by RT-PCR with lung mononuclear cells confirmed our high throughput analysis and in silico findings. Together, THC plays a major role through epigenetic mechanisms to modulate immunological pathways that suppress SEB-induced acute lung injury.

**Monreal, Timothy**

**Mentor(s) -- Dr. Lucy Ingram**

**Como estas, y'all? Latinx Teachers in South Carolina**

Spurred by a cheaper cost of living, globalization, and stable work in meat processing, poultry, construction, and light industry the United States Southeast (SE) has emerged as the center of the "New Latino Diaspora." A larger Latinx population naturally means changes in school demographics. Although there is an growing field of scholarship about Latinx education in the SE, there is a dearth of research about Latinx K-12 teachers in this geographic area.

This pilot research project is designed to explore the experiences of K-12 Latinx teachers in South Carolina.

In particular, the research aims to collect and analyze thick descriptions of K-12 Latinx teachers in South Carolina. Preliminary data from qualitative interviews of four K-12 Latinx teachers in South Carolina reveals emerging themes regarding the problems, challenges, and opportunities regarding being a

Latinx teacher in South Carolina.

**Myat, Khin**

**Mentor(s) -- Ms. Candace Cooper**

**My Cultural Ambassador Experience at USC: A Triple Win**

I have volunteered as "cultural ambassador" in USC's Thinking Globally (TG) program, representing my home country - Myanmar (Burma). Cultural ambassadors reached to students at elementary school, middle school, high school and university. First, I was intimidated to provide talk and presentation in public. It was challenging for an international student with language barriers like me. However, I wanted to embrace this challenge because I see this as a chance to improve: my public speaking and presentation skills, my research on Myanmar to share with international community. As an ambassador, I learned to study and retell without biases and good evidences. My experience was a win-win situation.

One "win" is that I understand more about my country, and I am now confident to present in public with improved English speaking and presentation skills. Another "win" is that my audience will realize how fortunate they are, compared to the vulnerable populations in Myanmar. I sincerely shared about my country's vulnerabilities to inform my audience. We do not actually realize our resources and strength unless we encounter hardship and struggles. Students in Myanmar cannot have free school lunch and bus, and their class-room communication is more on one-way communication rather than student-centered education; I hope this information will help the students value what they have and be more contributive to their society. The additional third "win" is that I encourage the students to work for Myanmar because there are needs and gaps in health, education, rule of laws, peace building, etc. They will gain great experiences working there whereas Myanmar will benefit their international expertise. With this volunteering, I was selected to participate in a panel discussion - "Balancing modernization and preserving tradition." This is my first experience of participating in a panel discussion; I was a bit nervous before, yet I gained self-esteem after participating. Each and every experience with TG program is epic. It gives me skills for my present works (both academic and

community), and it also cultivates philanthropic spirit for my future endeavors. I am now planning to volunteer and contribute to the needy communities in Columbia.

### **Myat, Khin**

**Mentor(s) -- Mr. Amir Mehrabi, Dr. Shyamkumar Sriram**

#### **Factors Influencing Substance Use Education and Counseling**

Substance use disorders impose a substantial burden to the U.S healthcare system, according to the CDC. Substance use education and counselling is pragmatic in alleviating the burden since primary care and preventive services are significant in reducing high healthcare cost and improving health outcomes. Using NAMCS 2015 data, this study identifies factors associated with providing and receiving “substance use education and counselling” at the ambulatory care practice settings. The unit of observation in NAMCS is “patients’ visits to office-based physicians.” Since the analysis focuses on provision of health education, the subsample of adults is selected. Bivariate analyses are conducted to identify significant associations between substance use education and the following factors. 92% of current substance users (n=24,200) do not receive substance use education and counselling during their health visits. “Private solo or group” is more likely to provide education and counselling than other types of office settings; primary care and medical care specialties are more likely to provide than surgical specialties. White and Hispanic populations are more likely to receive substance use education and counselling services than other races, and chronic patients are more likely to receive than acute cases. Comparing the four regions of the U.S, primary care practices in the West are more likely to provide education and counselling services than those in the Northeast, Midwest and South. The majority of current substance users reside in the West and Midwest, and the rest in the Northeast and South. The majority of current substance users are at age groups of 45-59 and 60-70. Logistic regression models are estimated to identify possible factors that affect provision of substance use education and counselling; time spent with physician (OR=1.02), type of office setting (OR=3.93), type of specialty (OR=0.78), major reason for visit (OR=0.92), the U.S regions (OR=1.06), and age groups (OR=0.71) are found to be determining factors in this study.

### **Nahar, Iffat**

**Mentor(s) -- Dr. Suzanne McDermott**

#### **Association between pregnancies and neonatal outcomes among the women with physical disabilities in the State of South Carolina**

Motherhood is a very precious journey in women’s lives. Women with physical disabilities are not different from that. According to the Disability Status report: SC 2008, approximately 12.5% woman of ages 21-64 are living with disabling conditions. Although it is likely that childbearing among women with disabilities is increasing, no empirical data have been published neonate outcomes for these pregnancies in South Carolina. The objective of this study is to document the trend in pregnancy among the women with physical disabilities and evaluate the neonatal outcomes of these pregnancies. Data obtained from hospital admission and discharge records in State of South Carolina from 2007-20015, were analyzed and linked to the respective SC birth certificate. In the data, women with disabilities were identified by using ICD-9-CM codes in hospital admission and discharge records and report neonate outcomes from birth certificates. Compared with nondisabled women, about 10.2% of Women with a disability had a low birth weight babies and 11.8% delivered before term, which were 7.9% and 8.4% respectively, among women without disabilities (p-value=<.0001). The study showed disabled mothers did not get their prenatal care from an early pregnancy whereas for most of their care started first from 2nd trimester. These mothers were more prone to have infection, labor complications and birth injury. They underwent the stressful experiences and specific medical issues due to their physical limitations. The pregnancy risk, complications, and adverse outcomes can be minimized by utilizing the health care benefits and prenatal care from the beginning of their conception. These findings open the idea of strategies and plans which would propose to soothe the way of motherhood

of those women with physical disability.

**Neamah, Wurood**

**Mentor(s) -- Prof. Mitzi Nagarkati**

**2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) induces immune tolerance by altering the gut microbiome**

The compound 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) belongs to the polychlorinated dibenzodioxins (PCDDs) and is known to act as an immunosuppressant for humoral and cell-mediated responses. In the current study, we investigated TCDD-mediated mechanisms related to immunosuppression. Gut microbiota serves an important role in immune function and development of disease, and it has been shown that changes in host microbiota is not only a marker of disease, but also actively contributes to disease pathogenesis. We, therefore, investigated how 3 days of TCDD exposure in mice could alter the gut microbiome compared to control groups. We performed 16S rRNA sequencing on bacterial DNA isolated from fecal samples from the experimental groups. We found separate clustering of the bacterial composition in TCDD versus the vehicle treated groups based on principal coordinate analysis. Interestingly, we found that TCDD-treated mice showed significant decrease in *Sutterella*, a bacterium belonging to Proteobacteria phylum, Betaproteobacteria class, Burkholderiales order and Alcaligenaceae family. Moreover, *Sutterella* is present normally in gut flora and elevated in some inflammatory disorders. Furthermore, We found that fecal transplantation (FMT) from TCDD-treated mice to germ free (GF) mice induce MDSCs and T-reg percentage as well as reduce the gut microbial dysbiosis. Collectively, our data suggest that TCDD induces immune tolerance by inducing dysbiosis in gut microbiome.

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**Nimrichter, Sarah**

**Mentor(s) -- Mrs. Victoria Vincent, Dr. Ashley Jones, Dr. Jehannine Austin**

**Patient Interest in and Comfort With Discussing a Personal and/or Family History of Mental Illness During Prenatal Genetic Counseling**

**Purpose:** This study aimed to explore patient interest in and comfort with discussing a personal and/or family history of mental illness with a genetic counselor during a prenatal genetic counseling session.

**Methods:** Participants included average risk pregnant women who met with a genetic counselor for prenatal genetic counseling at Palmetto Health USC Medical Group Department of OB/GYN. Following their appointment, they were given a copy of the invitation to participate, questionnaire, and mental health resource page by the genetic counselor who performed their genetic counseling.

**Preliminary Results:** 40 participants completed questionnaires. 21 out of 40 (52.50%) participants indicated they were very interested and 7 out of 40 participants (17.50%) indicated they were somewhat interested in discussing mental illness with a genetic counselor. Of the participants who were directly asked by the genetic counselor about a personal and/or family history of mental illness, 72.41% felt very comfortable and 17.24% felt somewhat comfortable. Of the participants who were not directly asked, 66.67% would have been very comfortable and 22.22% would have been somewhat comfortable being asked about a personal and/or family history of mental illness.

**Preliminary Conclusion:** These results suggest that patients are interested in and comfortable with discussing a personal and/or family history of mental illness with a genetic counselor during prenatal genetic counseling. Prenatal genetic counselors should incorporate asking about mental illness while taking the family history and be prepared to discuss information regarding the genetic components of mental illness.

**Noland, Chris**

**Mentor(s) -- Dr. Kevin Hull**

## **Podcasts and News: A Marriage That Could Work**

Podcasts are a growing medium that incorporates a collection of audio or video files that people can freely subscribe to via the internet. Using Diffusion of Innovations Theory as a guide, this study looks at whether or not podcasts are a viable option for news content and what factors may or may not influence potential users to adopt podcasts as a source for their news. The idea for this study comes in the wake of declining readership for newspapers and viewership for television news. An older generation is faced with new technology and might not be willing to accept podcasts as a source for news content while the younger generation is increasingly reliant on social media and other online content for theirs.

**O'Brien, G. Patrick**

**Mentor(s) -- Dr. Woody Holton**

### **Unknown and Unlamented": Loyalist Women in Exile and Repatriation, 1775-1800**

In late April, 1775, an angry mob of rebellious Americans chased the Robie family from their home in Marblehead, Massachusetts. Fearing continuing violence, the family boarded a transport and sailed north for Halifax, Nova Scotia on May 5th. Of her early impressions of her new home Mrs. Mary Robie Sr. wrote, "So much for Halifax, I wish I had never seen it." Despite her unhappiness, over the next eight years of exile Mary Robie Sr. and her teenage daughters, Mary and Hetty, worked diligently to transform a transient population of refugees into a recognizable loyalist community. When marriage brought the younger Mary back to New England in 1788, she lamented leaving the city of captivity. While she believed marriage would bring her happiness, she also mourned the loss of her friends in Halifax who she described as having "too much hold on my heart."

My research investigates the experiences of refugee women in Halifax, Nova Scotia during the American Revolution and the role they played in organizing and creating the loyalist community. While historians have examined how loyalist men grew increasingly frustrated with a less than generous imperial British government, their wives and daughters worked to unite the diverse refugee population. Through private visiting practices and public service to the broader community, loyalist women transformed a suffering and grieving refugee population into a network of loyalists. These connections survived long after many families migrated to other regions of the empire or, even more surprisingly, back to the United States.

**Omebeyinje, Mayomi**

**Mentor(s) -- Dr. Anindya Chanda**

### **Making aflatoxins to reduce total ROS: a case study in *Aspergillus parasiticus***

The machinery for secondary metabolite synthesis has been preserved in fungi during the course of evolution, which allowed them to survive against adverse environmental conditions. Although several studies have explored the cross-talk between secondary metabolism and response to oxidative stress in filamentous fungi, an aspect of secondary metabolism that remains unclear in fungal physiology is its relationship with the cellular management of reactive oxygen species [ROS]. Here we conduct a comparative study of the total ROS production in the wild-type strain (SU-1) of the plant pathogen and aflatoxin producer, *Aspergillus parasiticus*, and its mutant strain, AFS10, in which the aflatoxin biosynthesis pathway is blocked by disruption of its pathway regulator, aflR. We show that SU-1 demonstrates a significantly faster decrease in total ROS than AFS10 between 24h to 48h, a time window within which aflatoxin synthesis is activated and reaches peak levels in SU-1. The impact of aflatoxin synthesis in alleviation of ROS correlated well with the transcriptional activation of five superoxide dismutases [SOD], a group of enzymes that protect cells from elevated levels of a class of ROS, the superoxide radicals (O<sub>2</sub><sup>-</sup>). Finally we show that aflatoxin uptake in AFS10 can result in significant reduction of total ROS only in 24h cultures, without resulting significant changes in SOD gene expression. Our findings show that activation of aflatoxin biosynthesis in *A. parasiticus* alleviates ROS generation, which in turn, can be both aflR dependent and aflatoxin dependent.

**Oostdyk, Alicia**

**Mentor(s) -- Dr. Melanie Cozad, Dr. Sarah Floyd**

**On the path to total knee arthroplasty: a qualitative analysis of lifestyle factors, clinical management and phases of readiness for knee arthroplasty patients**

On the path to total knee arthroplasty: a qualitative analysis of lifestyle factors, clinical management and phases of readiness for knee arthroplasty patients

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**Purpose Statement:** The choice to undergo total knee arthroplasty (TKA) is the terminal treatment point to alleviate symptoms that cannot be managed in other ways for patients with chronic degenerative knee osteoarthritis. This study elucidates phases of readiness and factors patients identify as important in shaping the decision to undergo TKA.

**Methods:** Semi-structured interviews were conducted with subjects over 18 years of age seeking treatment from a physician for a knee condition between August and December 2017 at the Steadman Hawkins Clinic of the Carolinas. Open coding content analysis was used to identify main themes and emerging patterns from individual chronologic timelines of readiness for TKA.

**Results:** Sixteen subjects with a chronic knee condition (8 females, 8 males) participated. The mean age of subjects was 58.31±10.53. Based on content analysis, timeline events were organized into 6 readiness phases across the patient lifespan. Differences in clinical treatment pathways emerged during the sixth phase. Patients over the age of 60 more quickly progressed to TKA, regardless of individual mental readiness and acceptance. Patients under 50 years were directed to non-operative treatments, coinciding with a period of waiting and symptom management regardless of desire for surgical treatment and mental readiness.

**Summary of Findings:** Subjects expressed individual levels of readiness for TKA, however the treatment options presented varied based on age and lifestyle factors. Patients under age 50 expressed dissatisfaction in treatment choices despite readiness; while patients over 60 were directed to undergo TKA, some were not accepting or mentally ready.

**Ozigbu, Chamberline E.**

**Mentor(s) -- Dr. Bankole A. Olatosi**

**PHYSICIAN'S PRACTICE VARIATION IN BLOOD PRESSURE HOME MONITORING (BPHM) RECOMMENDATIONS: RESULTS FROM NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (NHANES) 2009 – 2014**

**Introduction:**

About 75 million adults in United States are diagnosed with high blood pressure (HBP), with majority of cases uncontrolled. HBP increases the risks of stroke, myocardial infarction, kidney diseases, and costs the US over \$48 billion annually. The U.S. preventive services task force (USPSTF) recommends BPHM outside clinical settings to confirm diagnosis hypertension, but are yet to provide guidance on continued home monitoring after diagnosis have been made to achieve optimal control. This has created gap on how physicians recommend BPHM to their hypertensive patients. The objective of this study is to identify factors that contribute to variation in physician's recommendation of BPHM

in hypertensive patients in the United States.

#### Methods:

Cross-sectional data from NHANES 2009-2014, was pooled for this study. Participants were restricted to adults aged 16 years and above (N=19,522). Hypertension was defined as systolic blood pressure  $\geq 140$  mmHg and/or diastolic blood pressure  $\geq 90$  mmHg. Appropriate weights were applied to account for multistage sampling in NHANES. Multivariate logistic regression models were used to estimate the relevant parameters. All analyses were conducted using SAS (version 9.4) software.

#### Results:

Out of 19,522 respondents, only 2,428 (12%) were recommended by physicians for BPHM. Physician's recommendation was more prevalent among females (54%), White (70%), age >60 years old (50%), married (61%), AA degree (31%), insurance (91%), and individuals above poverty level (38%). After adjusting for other variables, we found that the odds of physician's recommending BPHM was higher in patients with insurance than those without insurance [OR, 1.8 (95% CI: 1.5-2.2)], non-Hispanic black than Hispanic [OR, 1.7 (95% CI: 1.5-2.1)], age group 40-59years [OR, 2.7 (95% CI: 2.2-3.4)], and age above 60years than age group 16-39years [OR, 5.9 (95% CI: 4.9-7.0)].

#### Conclusion:

Our findings suggest amendment of USPSTF guideline regarding BPHM in order to encourage physicians adopt best practices, while reducing variation that exist regarding BPHM. This adjustment will help decrease the morbidity, mortality and costs associated with hypertension and its complications in United States.

#### **Palmer, Erik**

**Mentor(s) -- Dr. Paula Vasquez**

#### **A Stochastic Model for High Performance Computing of Polymer Gel Behavior**

Hydrogels have attracted attention as "smart" materials for their tunable mechanical properties that respond to environmental stimuli such as pH, UV, or temperature; making them ideal for a variety of biomedical and sensor technology applications. Consisting of mostly water, the viscoelastic properties of hydrogels are the product of a network of polymer chains attaching and detaching at various entanglement points. Due to this complexity at the micro-scale, many previous polymer simulations rely on mathematical simplifications of chain dynamics to produce results. In this poster we explore the potential for a Brownian dynamics mean-field model to capture the properties that emerge from a mixture of hydrogels using massively parallel computation on graphics processing units. This approach abstracts away the network positions and uses stochastic differential equations derived from physical properties to capture the breaking and reforming behavior of attached segments, thereby keeping the non-linear micro-scale polymer dynamics intact.

#### **Pandya, Kinjal**

**Mentor(s) -- Dr. Cheryl Armstead**

#### **Exploring Gender and Ethnic Microaggressions on Campus**

Women of color (WOC) continue to be underrepresented in academia and report many challenges to success including gender and ethnic focused microaggressions. Microaggressions can be defined as "brief and commonplace daily verbal, behavioral, or environmental indignities, whether intentional or unintentional, that communicate hostile, derogatory, or negative racial slights and insults toward people of color" (Sue et al., 2007). Although general scales of racial microaggressions exist, there is little research regarding how to measure and assess the role of the unique gender and ethnic microaggressions that faculty WOC face and how these experiences impact their mental health and ultimately their decision to stay or leave their positions. The aim of this study is to explore the nature, frequency,

and content of the specific microaggressions WOC face on campus. Further, the results of this study will be used to create a measure of gender and ethnic based microaggressions in WOC. Fifteen participants for a total of three focus groups will be recruited. Participants will be asked about any gender or ethnic focused discriminatory experiences, both blatant and subtle, that they have experienced on college campuses. Interviews will be transcribed and coded in NVivo software. Questionnaire items will be generated based on the themes/results derived from the qualitative analyses. In this presentation, thematic analyses of qualitative data from the focus groups will be described. Further, potential questionnaire items derived from focus group results will also be presented to provide an assessment tool that can be administered in departments and programs.

**Parada, Anais**

**Mentor(s) -- Dr. Sherina Feliciano-Santos**

**The Puruhá Fashion Entrepreneurs of Ecuador: Creating and Contesting the Boundaries of Indigenous Identities Through Dress**

This dissertation investigates the social, economic, and political impact of emergent Puruhá dress styles in Ecuador as it contributes to larger global discourse on cultural heritage, appropriation, and the boundaries of cultural citizenship, primarily for minority creative producers. Through fieldwork in both Quito and Riobamba, Ecuador, data has been gathered from designers, sellers, and consumers of this unique dress style, which roots itself in a historical past while simultaneously speaking to the future of indigenous identities. Critical discourse analysis will be employed to parse apart the racial, ethnic, gendered, and classed distinctions that arise in talking about dress, and how individuals exhibit agency by using these same styles to complicate and contradict political and social categorizations of belonging. Moreover, dress itself will be analyzed as material culture that can be read as an intertextual discourse between mestizo and indigenous Ecuadorians, as well as between Ecuador and the global community. This research suggests that female entrepreneurs and consumers in particular are negotiating ideals of femininity and indigeneity from within their own indigenous community, as well as national and global societies. As indigenous women worldwide continue to fight for rights to cultural heritage, based in part on the ability to align with a particular community, exploring how identity is crafted on a daily basis through material culture like dress is absolutely necessary to understanding the shifting legal and political boundaries of citizenship.

**Paris, Morgan**

**Mentor(s) -- Dr. Subra Bulusu**

**Identifying the linkage between upstream Agulhas Current and Agulhas Leakage**

The Agulhas Current, a western boundary current, is a limb of the wind driven anti-cyclonic circulation of the south Indian Ocean. Near the tip of Africa, the current retroflects shedding warm saline waters into the Atlantic Ocean. This phenomenon, referred to Agulhas leakage, feeds the upper arm of the Atlantic Meridional Overturning Circulation. Fluctuations in this highly dynamic system impact the strength of overturning sequentially altering climate patterns. This study explores the connection between Agulhas leakage and upstream controls to establish a connection between the Pacific, Indian, and Atlantic Ocean basins. Ultimately, this connection can be used to relate anomalous Agulhas leakage events to an ENSO signal. A combination of sea surface temperature, sea surface salinity, and altimetry data is used to identify features involved in signal transmission including eddies and Rossby waves. The subsurface features are also explored to better understand the magnitude of influence and energy transferred by these systems. Specifically, the Mozambique Channel and East Madagascar Current release eddies that interact with the Agulhas Current. Further upstream, Rossby waves identified at 25°S and 12°S, coupled with tropical wind stress curl, and signal transmission carried by the Indonesian throughflow and the South Equatorial Current are all considered to be apart of the upstream dynamics influencing Agulhas leakage events. Our results suggest that changes to upstream dynamics directly influence Agulhas leakage, and these changes are anomalous in response

to ENSO events.

**Patel, Yogin**

**Mentor(s) -- Dr. Hexin Chen**

**Role of miR-489 in breast cancer**

Human epidermal growth factor receptor 2 (HER2 or ErBb2) is a receptor tyrosine kinase overexpressed in 20-30% of breast cancers and associated with poor prognosis and outcome. Dysregulation of several micro RNAs (miRs) plays a key role in breast cancer progression and metastasis. In this study, we screened and identified miRs dysregulated in HER2-positive breast cancer cells. Molecular study demonstrated that miR-489 was specifically downregulated by the HER2-downstream signaling, especially the MAPK pathway. Restoration or overexpression of miR-489 in HER2-positive breast cancer cells significantly inhibited cell growth in vitro and decreased the tumorigenicity and tumor growth in xenograft mice. Mechanistically, we found that overexpression of miR-489 led to the decreased levels of HER2 and thus attenuated HER2-downstream signaling. To dissect the role of miR-489 in mammary gland development and HER2 induced tumorigenesis, we generated and characterize MMTV-miR-489 mice that overexpressed miR-489 in mammary epithelial cells were developed and these mice exhibited an inhibition of mammary gland development in early ages with a specific impact on highly proliferative cells. Double transgenic MMTV-Her2-miR489 mice were then generated to observe how miR-489 overexpression affects Her2 induced tumorigenesis. miR-489 overexpression delayed Her2 induced tumor initiation significantly. Moreover, miR-489 overexpression inhibited tumor growth and lung metastasis. miR-489 overexpression reduced mammary progenitor cell population significantly in preneoplastic mammary glands of MMTV-Her2 mice which showed a putative transformed population in Her2 induced tumorigenesis. The miR-489 overexpression reduced CD49<sup>hi</sup>CD61<sup>hi</sup> populations in tumors that have stem-like properties, and miR-489 overexpression altered the Her2 signaling pathway in mammary tumors. Also, our in vitro data suggest miR-489 restoration can also induce significant cytotoxicity in basal breast cancer cells. We found miR-489 restoration can inhibit CDK1 and FOXM1 in breast cancer cells. Overall, our data indicates that miR-489 acts as a tumor suppressor miRNA at least partially by targeting HER2 signaling pathway by targeting HER2 and SHP2 and Her2 regulated progenitor population and represents a new prognostic biomarker and potential therapeutic target in breast cancer.

**Perry, Christopher**

**Mentor(s) -- Dr. Troy Herter**

**Eye-hand coordination is modulated by attentional demands**

During tasks involving eye-hand coordination, movements of the eyes and hands often exhibit rigid temporal coupling, suggesting that eye and hand movements share a common motor plan that controls movement characteristics of both the eyes and hands. However, other studies using tasks that involve looking in one direction and reaching in the opposite direction have shown that the eyes and hands can be independently controlled with differing task demands. The objective of the current study was to investigate if humans can flexibly shift between common and independent control of eye and hand movements to meet the attentional demands of tasks. We will recruit twenty healthy, young adults, who will perform two eye-hand coordination tasks with different attentional demands. In the first task, subjects will start with their hand and gaze at a central target, and will reach movement as quickly as possible to a second peripheral target that appears at one of four locations. The spatial focus of attention will be implicitly manipulated by presenting the target more often at one of the peripheral locations. The second task is similar, except that the spatial focus of attention will be explicitly manipulated by presenting a central arrow that correctly cues the peripheral target location on 70% of trials. Our primary outcome measures will include eye and hand reaction times and the temporal delay between initiation of the eye and hand movements (eye-hand latency). In the first task, we predict that implicitly manipulating attention will result in eye and hand reaction times that are shorter to

frequent target locations and longer to infrequent target locations, but will show proportional changes (i.e., constant eye-hand latency consistent with a common controller). In the second task, we expect that explicitly manipulating attention will result in differential changes in eye and hand reaction times to correctly and incorrectly cued locations (i.e., variable eye-hand latencies consistent with independent controllers). Successful completion of this study will show humans are able to flexibly shift between common and independent control of eye and hand movements to optimize task performance.

**Phillip, Lorelei**

**Mentor(s) -- Dr. Julius Fridriksson, Dr. Allison Marsh, Dr. Lucy Ingram**

### **Aphasia Patients and Caregivers Have Their Say**

Approximately one million people in the United States currently live with aphasia, a language disorder commonly acquired after stroke. The language comprehension and production impairments often negatively impact individuals' ability to gain and maintain employment and preserve functional independence in daily life, leading to declines in overall quality of life and well-being as well as additional burden on families and caregivers. At the University of South Carolina, there is a community of individuals with aphasia who regularly engage in recovery groups provided by the Aphasia Laboratory throughout the year. With an increase in enrollment in recent years, there were opportunities for expansion of the program to include more options for social interaction and support for people with aphasia and their families. Researchers began by conducting a needs assessment for people utilizing group therapeutic services at the Aphasia Lab and forming a Governing Board with representatives from each stakeholder group: people living with aphasia, family members or caregivers of people living with aphasia, speech and language therapists affiliated with the Lab, rehabilitation professionals working in the community, and social work faculty. The needs assessment indicated a desire for social and recreational activities as anticipated, therapeutic and mutual support groups, and the development of aphasia-friendly resources in the community. To meet therapeutic and community development needs, researchers developed three social work internship placements. Based on a follow-up survey of potential participants, researchers conducted two pilot groups, one each for patients and caregivers. Group participants were screened for quality of life and depression before and after group meetings with validated measures.

**Pilarzyk, Katy**

**Mentor(s) -- Dr. Michy Kelly**

### **The Role Of PDE11A4 In Isolation-Induced Neuroinflammation**

Phosphodiesterase 11A (PDE11A) is an enzyme that degrades cyclic nucleotides and is the only PDE whose mRNA expression is restricted to the hippocampal formation. Previously, we showed that PDE11A4 regulates social preference and social memory formation. Further, we showed that, in adults, chronic social isolation decreases PDE11A4 signaling specifically within the membrane compartment of the ventral hippocampus (VHIPP) and that this isolation-induced decrease in PDE11A4 is sufficient to alter subsequent social behaviors. Although it appears that PDE11A4 regulates social behaviors and social experience, in turn, regulates PDE11A4, it remains unclear whether 1) social isolation decreases PDE11A4 expression in VHIPP of adolescent mice as it does in adults, 2) if acute social isolation decreases PDE11A4 expression in adult VHIPP as does chronic isolation, and 3) if isolation-induced decreases in PDE11A4 expression may drive isolation-induced increases in neuroinflammation that have previously been reported. We show that adolescent mice show no effect of chronic social isolation on PDE11A4 expression in VHIPP membrane. Chronic social isolation decreases PDE11A4 in adults but not adolescent mice which is reminiscent of the fact that deletion of PDE11A4 affects social preferences of adult but not adolescent mice. In addition to chronic social isolation, acute isolation also decreases PDE11A4 selectively in hippocampal membrane compartments. Unlike chronic social isolation that selectively decreases PDE11A4 expression in the VHIPP, however, acute social isolation decreases PDE11A4 in both the VHIPP and dorsal HIPP membrane

fractions. The effect of social isolation on PDE11A4 expression appears to be specific, because it had no effect on PDE2A nor PDE10A. These isolation-induced decreases in PDE11A4 appear functional as measured by changes in relevant signal transduction cascades. We found that social isolation does increase IL-6 expression in the cytosol of the VHIPP, an effect that is mimicked by PDE11A deletion. Additionally, we found that deletion of PDE11A is sufficient to increase the infiltration and activation of microglia within the VHIPP. Together these data suggest that isolation-induced decreases in PDE11A4 signaling and likely driving increases in neuroinflammation.

**Porter, Ryan**

**Mentor(s) -- Dr. Jennifer Trilk**

**Cardiorespiratory Health, Muscular Strength/Endurance and Fat Free Mass are Improved after 12 Weeks of Exercise Therapy in Cancer Survivors**

**Purpose:** Structured and home-based exercise programs have demonstrated improved functional capacity and quality of life for cancer survivors of targeted diagnoses (e.g. breast, colon); however, no studies to our knowledge have compared the effects of a nurse-supervised program with ACSM/ACS Certified Cancer Exercise Trainers on precise anthropometric and physiological variables across multiple cancer diagnoses. The purpose of this pilot study was to evaluate effects of the Greenville Health System (GHS) Cancer Institute's Oncology Rehabilitation program called "Moving On."

**Methods:** GHS oncologists referred eligible cancer survivors to "Moving On," (12-weeks, 1 hour, 3 days/week of exercise) after having completed initial chemotherapy, or on maintenance chemotherapy and/or current radiation therapy. Baseline and follow-up evaluations included body mass index (BMI), body composition (body fat mass [FM]; fat free mass [FFM]), peak oxygen uptake (VO<sub>2</sub>peak), muscle strength (1-repetition maximum [1-RM]) and muscle endurance (repetitions at 40% 1-RM).

**Results:** Survivors (N=11, 54.5±14.8 years of age; 82% women) who completed the program with ≥80% attendance were evaluated. No change in BMI or FM occurred; however, body FFM as well as truncal FFM increased 3.5% (3.3 lbs, p=0.02) and 3.8% (1.7 lbs, p=0.01), respectively. VO<sub>2</sub>peak increased 20.2% (3.5±0.9 ml/kg/min; p<0.01), upper and lower body 1-RM increased 27.4% (24.8±8.6 lbs, p<0.05) and 19.1% (35.8±11.3 lbs, p<0.05), respectively. Upper and lower body muscular endurance increased 76.8% (+18.1±1.9 repetitions, p<0.001) and 76.3% (+13.7±2.8 repetitions, p=0.001), respectively (absolute data reported as mean±SE).

**Conclusions:** Cancer survivors across diagnosis groups and age ranges experienced anthropometric and physiological benefits of the Moving On program.

**Porter, Jason**

**Mentor(s) -- Mr. Simon Tarr**

**Picturebooks: The bedtime battleground for power and agency**

As children struggle to make sense of the world, it is an intricately interwoven adult culture that often provides the resources for youthful exploration and understanding. Adults envision children in a particular way, where a child's interests are often seen as foolish or something that shouldn't be taken seriously. As a father, I find myself not only embracing the immature foolishness of my son's imagination, but also categorizing the triviality of his rational and childish process. However, children's imaginative play is all about freedom from our projections. Children explore the limits imposed on them in a transformational space where they can translate the complexities of the world around them, controlling the reconfiguration of their outcomes. They are not mimicking the world around them, instead children are producers able to translate, transform, and reconfigure adult culture that surrounds their lives. The sheer amount of imaginative energy children invest in the playthings of their mass culture makes it very much their culture, reliant on their choices. Children reconfigure their personal agency in order to have power in the space adult culture provides.

This ethnological crossroads creates a site of social contradiction explored in picturebooks. Between

the ages 2-6, the preoperational child cannot read and must create meaning as an observer while the adult reads aloud. The reader often focuses more on what is written whereas the observer, freed from the linear text on the page, is able to focus on the nonlinear story being told through pictures they see and the words they hear. The child translates and transforms the verbal-visual narratives ultimately creating agency in reconfiguring the meaning to best suit their understanding. To understand my son's agency, I have written an augmented reality picturebook which employs interdependent storytelling, in which both picture and text are considered concurrently. The words and pictures are in opposition to one another, challenging him to mediate between text and pictures to develop his own understanding of what is being depicted. I use augmented reality to visually describe the imaginative narrative my son has invented between the verbal-visual lines.

**Rahman, Md Anisur**

**Mentor(s) -- Dr. Chuanbing Tang**

**Facial Amphiphilic Antimicrobial Polymers based on Bile Acid Multicyclic Terpenoids**

Bacterial infections and antibiotic resistance, particularly by Gram-negative pathogens, have become a global healthcare crisis that needs to be addressed. Cationic peptides and cationic polymers are widely developed as antibacterial agents. However, many of them suffer higher cytotoxicity against mammalian cells and are ineffective particularly against the multidrug-resistant Gram-negative bacteria. New antimicrobial agents with enhanced activity and lower cytotoxicity are urgently needed to prevent the inception of a post-antibiotic era. We have developed multiple cationic charge-containing facial amphiphilic polymers based on derivatives (cholic, deoxycholic and lithocholic acid) of a multicyclic terpenoid, a bile acid. These derivatives bear one, two and three quaternary ammoniums as head groups. Our results indicated that cholic acid polymers containing three cationic head groups showed significantly better antimicrobial activity against several bacterial species, especially, Gram-negative bacteria than deoxycholic acid with two cationic head groups and lithocholic acid with a single cationic head group. The cytotoxicity study on mammalian cells exhibited a similar trend. This is due to the presence of facially oriented hydrophilic cationic head groups and hydrophobicity of the multicyclic fused rings, which could provide better interactions with bacterial cells.

**Romagnolo, Shannon**

**Mentor(s) -- Dr. Dodie Limberg**

**Impact of a Social Justice-Focused School Counselor Education Curriculum on Trainees' Social Justice Attitudes and Beliefs, Self-Efficacy, and Perceived Knowledge**

Social justice advocacy is a critical part of school counselors' ethical and professional responsibilities; however, preparing school counselor trainees for this work is often complicated given lack of shared meaning regarding what constitutes a social justice-oriented practice. In this session, the presenter will address this issue by discussing the development and implementation of a curriculum designed to prepare graduate students and practicing school counselors to engage in specific social justice practices. Additionally, the presenter will discuss the outcomes of a quasi-experimental study in which she examined changes in graduate school counseling students' social justice attitudes and beliefs, self-efficacy, and knowledge of social justice practices pre- and post-curriculum compared to students who received instruction as usual.

**Ruiz-Ramie, Jonathan**

**Mentor(s) -- Dr. Mark Sarzynski**

**Cardiovascular Health is Associated with Incidence of Elevated C-Reactive Protein over 18 Years of Follow-up: The Coronary Artery Risk Development in Young Adults Study**

Introduction: In 2010, the American Heart Association established a composite of metrics aimed at defining cardiovascular health (CVH). Seven positive health factors (blood cholesterol, blood pressure, and fasting plasma glucose) and behaviors (diet quality, physical activity, smoking, and body mass

index) are emphasized, each being scored into ideal, intermediate, or poor categories. While multiple studies have explored the association between the individual components of CVH and markers of inflammation and atherogenesis, none have examined total CVH score as a predictor of elevated C-reactive protein (CRP) levels.

**Purpose:** To assess the hypothesis that CVH score is predictive of future elevated CRP levels.

**Methods:** Black and White men and women (N=1096) from the Coronary Artery Risk Development in young Adults (CARDIA) study were examined at 4 different examinations across 18 years. At each examination, CRP and the components of CVH were measured. A 14-point CVH score was determined by summing points for each CVH metric at ideal (2 points), intermediate (1 point), and poor (0 points) levels. Three categories of CVH score were created: low (0-7), moderate (8-11), and high (12-14). Multivariable Cox proportional hazards regression models were used to test the association of both categorical and continuous CVH score with incidence of elevated CRP (>3.0 mg/L) over up to 18 years of follow-up. All models were adjusted for sex and race, and the following time-varying covariates: age, and current level of education.

**Results:** Baseline CVH was associated with lower risk (hazard ratio (HR): 0.83) of elevated CRP per 1point increment in CVH. When compared to the high CVH group at baseline, both low (HR: 2.80) and moderate (HR: 1.63) CVH groups had elevated risk of elevated CRP. Time-varying CVH was associated with a lower risk (HR: 0.88) of elevated CRP per increment in CVH score. In models that entered CVH category as a time-varying covariate, both low (HR: 2.84) and moderate (HR: 2.09) CVH categories were associated with over twice the risk of elevated CRP compared to the optimal CVH group.

**Conclusions:** Lower CVH is associated with elevated risk of elevated CRP during the transition from young adulthood to middle age.

**Ruxton, Stephen**

**Mentor(s) -- Dr. Doug Thompson**

**Political Elites and the Construction of Representation: Do political elites create their own constituencies?**

Traditional assumptions concerning representation have recently been called in to question by normative political theorists and by empirical and experimental political science research. In place of the traditional picture of already-formed constituencies seeking representation, political representation has become a process in which constituencies are created and framed around existing and emergent social identities and issues. Furthermore, the job of creating and framing is typically undertaken by political elites, the very people who are seeking to represent said constituencies in an institutional setting. The purpose of this paper is to provide causal evidence of the constituency-creating process undertaken by political elites. This paper presents the results of an original survey, with the use of an experimental instrument, measuring the receptiveness of the public to the constituency-creating efforts undertaken by political elites. Ultimately, the results of the survey provide evidence to the constituency-creating process, questioning the normative foundations of representation and democracy. If public expectations are shaped by implausible assumptions about political representation, then disappointment, anger, and resentment toward representative institutions are likely; and it may be necessary both to foster more realistic expectations in public opinion and also to reform representative institutions to better reflect empirical evidence concerning how representation works.

**Saha, Sudipta**

**Mentor(s) -- Dr. Tanvir Farouk**

**Evaporation boosted cooling under laminar flow condition**

This study describes a numerical investigation of the effect of evaporative cooling on forced convective heat transfer in a combined heat and mass transfer system. In recent years, as an attempt to emulate the perspiration process of mammals, on-demand sweating boosted cooling has drawn ma-

major interest where convective heat transfer is augmented/aided by evaporative heat and mass transfer. This dual mode (convection and evaporation) cooling method can drastically enhance the heat transfer coefficient where conventional convective cooling has already reached its maximum value and dry cooling is a desired objective. A multi-dimensional mathematical model has been developed to conduct simulations over a range of operating parameters to obtain insight into the 'hybrid' system where evaporation and convection both contribute to the heat transfer process. The system being modeled consists of a thin liquid water film that undergoes evaporation as a result of being exposed to a prescribed heat flux and laminar convective flow condition. Predictions from the simulations indicate that under convective-evaporative conditions the overall heat transfer coefficient increases significantly approaching a factor of five higher, in comparison to the purely forced convection scenario. For a fixed heat flux, an increase in Reynolds number was found to increase the heat transfer coefficient and vice versa for film thickness. A critical Reynolds number is identified beyond which no significant increase in the heat transfer coefficient is observed. The aim of the work is to identify the role of the key parameters that has a dominant influence on the heat transfer process. This hybrid system has direct implementation in many practical applications. For instance, thermal power plants hit a roadblock to achieve high heat transfer coefficients in air/fin-side with the dry cooling strategy. Sweating-boosted cooling holds the promise to overcome the trade-offs between dry and wet cooling methods with affordable cost. This work proposes and develops a comprehensive model that has a strong coupling among momentum, heat and mass transfer for a multiphase convective environment configuration that is capable of simulating heat transfer effect as a result of both phase change and convection.

**Sanchez, Natalie**

**Mentor(s) -- Dr. Daniel Speiser, Dr. Carol Boggs**

**The Visual Ecology of the *Speyeria mormonia***

The visual ecology of butterflies may be affected by variations in their rearing environments, including shifts in temperature and changes in food availability. Morphological traits including eye size and sexually dimorphic wing patterns and colors can be affected. This is significant because both traits are necessary for successful mate selection. The dorsal forewings and hindwings of male and female *S. mormonia* are similar in color, but the ventral sides of their forewings are dimorphic: females have an orange patch that is absent in males. The eyes of *S. mormonia* are also sexually dimorphic: males have larger absolute and relative eye surface areas than females. To investigate how temperature variation may impact butterfly visual ecology, we collected *Speyeria mormonia* from different sites across an elevational gradient and studied the natural variation in eye size and wing color. *S. mormonia* butterflies were collected from five different elevations, spanning approximately 2,000 ft., within the Rocky Mountain Biological Laboratory in Colorado. Image-analysis software and reflectance spectroscopy were used to measure the wing color of individuals from each collection site. We investigated whether there is an interaction between elevation and wing color or eye surface area. *S. mormonia* butterflies collected at higher elevations generally have wings that reflect longer wavelengths of light than those collected at lower elevations. Winglength, a proxy for body size, was greater in butterflies collected at lower elevations (i.e. 9,000 ft. and 9,400 ft.) than in those of higher elevations (i.e. 10,000 to 11,000 ft). We also found that *S. mormonia* collected from an elevation of 11,000 ft. had the smallest average relative eye surface area while those collected from 9,400 ft. had the largest. We suspect that the morphological differences present across elevations may impact mating interactions. Ongoing studies will continue to elucidate our knowledge about the effect of environmental variability on the visual ecology of this butterfly species.

**Sarkar, Sutapa**

**Mentor(s) -- Dr. Saurabh Chatterjee, Mrs. Diana Klmono, Dr. Muayad Albadrani, Mr. Firas Alhasson, Dr. Ratanesh Seth**

## **Gut Feeling Manifestations of Environmental Non-Alcoholic Fatty Liver Disease**

Nonalcoholic fatty liver disease (NAFLD) is a growing health concern among all ages. Center for Disease Control lists NAFLD as a silent disease where the window for preventive approaches are limited. We and others have shown previously that environmental factors can potentiate the progression of NAFLD, however the mechanisms of MC-LR induced potentiation of NAFLD-related pathology remains unclear. Using both in vivo and in vitro experiments we show that MC-LR exposure in NAFLD mice cause intestinal gut leaching and increase of tight junction protein Claudin-2. The increase in Claudin-2 was equivocally observed in the distal intestines but was correlated well with significantly increased oxidative tyrosyl radicals. Studies also showed a distinct pattern of NADPH oxidase-2 (NOX2) activation in the cells of the crypts that was significantly identified to be Paneth Cells following dual immunofluorescence labelling with EphB2. Paneth cells showed significant granulation and disruption of cellular morphology following MC-LR exposure in NAFLD mice when compared to either MC-LR alone or MCD mice that showed liver symptoms of NAFLD. Increased NOX-2 activation in Paneth Cells associated well with inflammasome activation as shown by NLRP3/ASCII and NLRP3/Casp-1 colocalizations in these cells. Activation of inflammasome were verified with significantly high IL-1 $\beta$  levels in Paneth cells and cells in the intestinal crypts suggesting a NOX-2 mediated innate immune activation following MC-LR exposure in the NAFLD intestine. This associative result was further confirmed using p47-phox knockout mice where the inflammasome activation, subsequent release of IL-1 $\beta$  and changes in cellular morphology were significantly prevented. Thus, in conclusion, MC-LR exposure in NAFLD could significantly alter intestinal pathology especially by modulating Paneth cell redox status and can advance our understanding of the co-existence of NAFLD-linked inflammatory bowel disease phenotypes in the clinic.

**Schank, Stephanie**

**Mentor(s) -- Dr. Daniel Fogerty**

### **Speech Modulation Masking in Young Adults**

Introduction: Speech recognition in noisy environments is determined, in part, by amplitude modulation properties of the competing signal. The present study assessed how speech recognition is determined by the interaction between the temporal properties of speech and noise.

Methods: Adults with normal vision and hearing were recruited between the ages of 18-30 years old. Participants completed a speech recognition task where they listened to and repeated sentences in noise. The speech and the background noise were processed to contain speech amplitude modulations at either slower (0-8Hz) or faster (8-16Hz) rates. Furthermore, the noise amplitude modulation was compressed or expanded to vary the depth (i.e, degree) of modulation. In a second task, the speech signal was further degraded to remove spectral cues, but preserve amplitude modulation cues.

Results: Preliminary data suggest that performance improves when the amplitude modulation depth of the noise is increased. Furthermore, there is some indication that speech recognition may improve when the temporal amplitude modulation rates present in the speech and noise are non-overlapping.

Conclusions: These results suggest that modulation of a competing signal interferes the least when modulations occur at different rates. Furthermore, greater depth to the amplitude modulation of the noise provides a better signal for the listener to recognize speech.

**Schenkelberg, Michaela**

**Mentor(s) -- Dr. Russell Pate**

### **Development of an Observational Instrument to Assess Physical Activity of Preschoolers with Developmental Disabilities**

Children with developmental disabilities (DD) are at greater risk for becoming overweight and obese compared to typically developing peers. Participation in regular physical activity (PA) is a modifiable behavior that is consistently associated with weight status and other health outcomes. Little is known about PA behaviors of children with DD, and even less is known about these behaviors in those of preschool age (3 – 5 years). Some children with DD experience sensory impairments and may not tolerate PA monitoring devices. Alternatively, direct observation systems can be used to explore PA behaviors as well as the features of the social and physical environment that may influence PA. Unfortunately, existing observation systems fall short of being able to adequately describe certain types of PA and social interactions that are characteristic of preschoolers with DD. The purpose of this study was to: 1) identify physical and social contextual circumstances that may be unique to children with DD in inclusive and segregated classrooms, and 2) develop a reliable observational instrument to measure PA of preschoolers with DD that can be used in these settings.

**Schramm, Andrew**

**Mentor(s) -- Dr. Suzanne Swan**

**Internalized homonegativity and alcohol use as predictors of intimate partner violence perpetration among sexual minority men**

Prior research has found that sexual minorities (i.e., individuals who identify as lesbian, gay, bisexual, and/or who are attracted to or have had sexual experiences with members of the same sex) are at heightened risk for intimate partner violence (IPV) as compared to heterosexuals. Although understanding risk factors that place sexual minorities at risk is a crucial step in the prevention of IPV in this population, little is known about this. Some have proposed that internalized homonegativity, a component of minority stress in which sexual minorities internalize negative societal messages about them, may place individuals at heightened risk for IPV perpetration. Internalized homonegativity is also associated with greater alcohol use and abuse, which is a known IPV risk factor. However, inferences about the association between these risk factors and IPV perpetration are hindered by the methodological limitations of existing research in this area. Using data collected from a web-based sample of cisgender sexual minority men, the purpose of this study is to assess internalized homonegativity, alcohol use, and the synergistic effect of the two, as risk factors for IPV perpetration. This study is an important step in examining why sexual minorities are at heightened risk for IPV.

**Schuck, Percy**

**Mentor(s) -- Dr. Jason Stewart**

**Uncovering the Role of CST in Sister Chromatid Cohesion**

The heterotrimeric single-stranded DNA binding protein complex CST (CTC1-STN1-TEN1) is found in eukaryotic organisms ranging from budding yeast to humans. CST has recently been shown to play a role in eukaryotic DNA replication restart by aiding in the firing of dormant replication origins and facilitating replication through GC rich genomic regions. During DNA replication, sister chromatid cohesion (SCC) is established to keep replicated DNA strands close together until their segregation in the metaphase-anaphase transition in mitosis. Interestingly, in CST deficient cells, there is a marked increase in SCC loss. However, the timing and cause of this loss is unknown. The focus of these studies is to pinpoint the timing of SCC loss and unravel the connection between CST and SCC. This will be done through live cell imaging, fluorescence in situ hybridization and, interference of cohesion related components. These studies will cast light on the role of CST in SCC, which may help to explain how aneuploidy arises in the development of cancer.

**Schwartz, Victoria**

**Mentor(s) -- Dr. Carol Boggs**

**Distribution of Invasive Chinese Tallow (*Triadica sebifera*) on Bulls Island Following Management Treatments and Natural Disturbance Events**

At roughly 5,000 acres in size along the coast of South Carolina, Bulls Island is Cape Romain National Wildlife Refuge's largest island. The island is comprised of habitats ranging from maritime forest and beaches to salt marshes and brackish wetlands. Live oak trees (*Quercus virginiana*) and loblolly pines (*Pinus taeda*) have historically dominated the island. Natural disturbance events such as hurricanes have affected island dynamics in recent decades. Additionally, management practices including controlled burns have been carried out to mimic the ecosystem effects of historic fire occurrence. The exotic tree Chinese Tallow (*Triadica sebifera*), an ornamental species quickly spreading across the Southeastern United States, has now reached invasive levels becoming the most prevalent tree species on the island. Extremely salt, water, and light tolerant, Chinese Tallow is currently threatening the unique habitat mosaics of the island. With each new disturbance event, Tallow is quickly able to invade vulnerable habitats, with water sources serving as easy vectors for seed dispersal, creating thick tree stands and smothering native vegetation. Between 2006 and 2012, substantial portions of the island underwent herbicide treatments of Chinese Tallow, guided by distribution data collected during vegetation surveys conducted in 1991 and 1998. Since these treatment events, no new data have been collected to determine the success of treatments or current distribution of Tallow for each island habitat with varying proximities to water. Research conducted on Bulls Island will ask what the current distribution of Tallow is and how Tallow distribution varies across the island among past herbicide treatment sections as well as non-treated sections. To answer these questions, data on Tallow density and size was collected during the summer of 2017 in circular plots along transect lines in each treatment section of the island as well as non-treated sections.

**Schwartz, Brett**

**Mentor(s) -- Dr. Cole Chapman**

**Prescriber-level variation among the intensity of opioid prescriptions in relation to postoperative patient-level prescription intensity among new opioid users**

Background: Although research has inquired into the wide-area variation of both the chronic and postoperative use and exploitation of opioids, little is known about the multiplicity of risk and benefits from varying intensities of opioid prescriptions. The purpose of this study was to examine and identify prescriber and area-level variation in the intensity of opioid prescriptions among Medicare beneficiaries in 2010.

Methods: Using Medicare claims and summary files from 2010-2012, a cohort was created consisting of beneficiaries with a shoulder diagnosis in 2011. Opioids were identified by NDC codes on Part-D claims and prescribers associated were linked by the prescriber-identifier on the claim. Intensity of prescription was measured as daily-average morphine equivalent (ME) dosage. Patient-level intensity was measured as the average daily ME of all fills within 7 days post-surgery. Traditional and multi-level regression models were used to estimate relationships between historical provider-level prescribing intensity and the intensity of postoperative opioid fills controlling for patient demographics and comorbidity, among patients undergoing a newly diagnosed rotator-cuff tear in 2011, with no opioid use within 180-days prior to surgery.

Results: A total of 16,342 patients meeting the inclusion criterion were identified with rotator-cuff repair with no 180-days prior to surgery opioid use, of which 8,989 of these patients filled an opioid prescription within 7 days after surgery. Average daily-supply was 5.8 pills and average daily ME was 50.7. Historical intensity measures at a prescriber and area-level were significant predictors of post-surgical opioid intensity ( $p < 0.05$ ), but not of the probability of an opioid fill.

Applicability: Establishes associations between higher intensity patient fills and provider prescribing characteristics which are associated with higher risk of overdose and death.

**Sevoyan, Maria**

**Mentor(s) -- Dr. Marco Geraci, Dr. Nansi Boghossian**

**Examining the “Birthweight Paradox”: Differences in Maternal and Newborn Characteristics Among Smoking and Non-smoking Mothers of Low Birth Weight Infants**

Several studies from different countries have shown a counterintuitive relationship between mortality in low birthweight (LBW) infants and maternal smoking during pregnancy: mortality among LBW infants born to non-smoking mothers is higher than mortality among those born to smoking mothers. However, little is known about differences in maternal and newborn characteristics in the exposed and unexposed groups. We analyzed data from two cohorts: 18,081 infant-mother dyads from the UK Millennium Cohort Study and 3,281,944 dyads from the US National Vital Statistics System. Maternal and newborn characteristics were compared between smoking and non-smoking mothers using Chi-square test. Prevalence of LBW among smokers was twice as much as the prevalence in non-smokers for both countries (UK: 10.0% vs. 5.3%; US: 11.0% vs. 5.7%). Overall, as compared to non-smokers, mothers who smoked during pregnancy were more likely to be young, white, unmarried, less educated, unemployed, and to have had pregnancy complications. These factors are known to be associated with higher LBW risk. However, other important unfavorable factors were more prevalent among non-smokers, namely non-smokers were more likely to have: pre-pregnancy diabetes (UK: 4.1% vs. 1.5%; US: 1.3% vs. 1.2%), pre-pregnancy hypertension (US: 3.8% vs. 3.0%), eclampsia (US: 1.1% vs. 0.7%), and gestational diabetes (US: 5.5% vs. 4.1%). Some unfavorable newborn conditions were more prevalent among infants of non-smokers as compared to smokers including preterm birth (UK: 61.2% vs. 52.7%; US: 64.3% vs. 54.1%) and congenital heart disease (US: 0.33% vs. 0.21%). It has been hypothesized that higher prevalence of unfavorable maternal and neonatal factors that are also associated with lower birthweight might explain higher infant mortality among LBW infants born to non-smokers. Future steps following our analysis include quantifying the contribution of each factor to LBW and subsequent mortality among smokers vs. non-smokers.

**Sexton, Jim**

**Mentor(s) -- Prof. David Barbeau**

**U-Pb detrital zircon geochronology of the Carolina Terrane in central South Carolina**

The Carolina Terrane (CT) is considered to be an exotic island-arc system that accreted to Laurentia during the middle to late Paleozoic. In central South Carolina (SC), the CT is the easternmost exposed crustal block in the southern Appalachian Orogen and is peri-Gondwanan in origin. Laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS) was used to determine ages for more than 849 detrital zircons found in the CT of central SC. These zircons were extracted from the low-grade metasedimentary rocks of the Emory, Richtex and Asbill Pond formations. U-Pb detrital zircon age distributions do not contain the characteristic 1.0-1.3 Ga peaks associated with the Grenville Orogeny, which is consistent with other better characterized parts of the Carolina Terrane and demonstrative of its exotic origin. Age distributions are dominated by ages that fall between ca. 530-650 Ma, suggestive of a similar provenance, and these ages are consistent with age distributions found within the Albemarle Group and Hyco Arc in North Carolina. However, two samples have distinct age populations at ca. 520 Ma, younger than observed in the northern extent of the Carolina Terrane. These results change minimum depositional age constraints for the CT of central SC, which must be at least 12 Ma younger than observed elsewhere in the Albemarle group.

**Shakal, Emily**

**Mentor(s) -- Dr. Adam Pazda**

**When “Right Makes Might”: Moral Superiority and its Effects on Decision-making for Others**

Although the study of morality was originally thought of as a philosophical endeavor, developmental psychologists approached morality from a psychological perspective, setting forth theories concerning the formation of morality throughout the lifespan. Their foundational work established a domain for

morality within psychology. Present psychological literature examines the complex realms of moral identity and moral reasoning, recently including a concept referred to as moral mandates. Despite the developments in the psychology of morality, the concept of moral superiority remains largely unexamined. The present study aims to manipulate moral superiority in an experimental group to demonstrate its effects on decision-making for others as compared to a control group, particularly in the realm of policy and procedural justice.

**Shanahan, Meghan**

**Mentor(s) -- Prof. Alicia Wilson**

**Assessing the Impact of Coastal Development and Marsh Width on Groundwater Quality**

In the United States, coastal counties account for approximately 10% of land area (excluding Alaska), yet contain 39% of the population. The number of coastal residents is projected to rise by an additional 10 million people by 2020. In tidal creeks located along the South Carolina coast, prior studies have confirmed that the ultimate stressor on the ecosystem is human population density in the watershed and associated increases in the amount of impervious cover. Understanding the impact of development on groundwater quality is critical to maintaining appropriate best management practices. Along the creekbank, groundwater discharge can be influenced by a variety of factors over different temporal scales including seasonal precipitation and evapotranspiration, tidal fluctuations, and storm events. Twice-daily tides flood and drain the marshes, with groundwater-surface water mixing occurring in the sub-marsh aquifer.

We sampled groundwater in the upland and creekbanks of tidal creeks located in undeveloped and developed watersheds. Samples were analyzed for salinity, carbon, nitrogen and phosphorus concentrations. We hypothesize that groundwater in developed watersheds will have higher concentrations of nutrients, and that marsh width will positively correlate with salinity and nutrient concentrations. Results from this project will provide an assessment in the southeastern US of groundwater composition originating in the upland, as well as provide an evaluation of the influence of marsh width and salinity on groundwater quality.

**Shaw, Jr., George**

**Mentor(s) -- Dr. Amir Karami**

**Characterizing Diabetes, Diet, Exercise, and Obesity Comments on Twitter (4.5 Million Tweets)**

Social media provides a platform for users to express their opinions and share information. Understanding public health opinions on social media, such as Twitter, offers a unique approach to characterizing common health issues such as diabetes, diet, exercise, and obesity (DDEO); however, collecting and analyzing a large scale conversational public health data set is a challenging research task. The goal of this research is to analyze the characteristics of the general public's opinions in regard to diabetes, diet, exercise and obesity (DDEO) as expressed on Twitter. A multi-component semantic and linguistic framework was developed to collect Twitter data, discover topics of interest about DDEO, and analyze the topics. From the extracted 4.5 million tweets, 8% of tweets discussed diabetes, 23.7% diet, 16.6% exercise, and 51.7% obesity. The strongest correlation among the topics was determined between exercise and obesity ( $p < .0002$ ). The frequent subtopics discussed along with "Diabetes", excluding the DDEO terms themselves, were blood pressure, heart attack, yoga, and Alzheimer. With 2.67 billion social media users in 2016, publicly available data such as Twitter posts can be utilized to support clinical providers, public health experts, and social scientists to gain additional insight into common public opinions regarding diabetes, diet, exercise, and obesity.

**Shih, Yi-Wen**

**Mentor(s) -- Dr. Ibrahim Demir**

**The probability of having diabetes with self-reported health status and health care access**

**Objective:** Diabetes mellitus affects many people, and it is the seventh leading cause of death in the United States. Type 2 diabetes, which is more related to health behaviors, represents the majority of diabetes cases (90% to 95%). Several studies have revealed the association between age, gender, race, smoking, education, and diabetes. However, giving self-reported health statuses and having one or more health care providers when people need health care may also affect the potential of developing diabetes. The purpose of this study is to assess the probability of having diabetes with self-aware health status and regular health care providers.

**Methods:** Data obtained from the 2015 Behavioral Risk Factor Surveillance System (BRFSS) survey of people with diabetes serves as the dependent variable, and age, gender, race, smoking, education, self-aware health status and health care access were the independent variables. Data were analyzed by SAS (version 9.4; SAS Institute, Cary, NC). The statistical significant level was set as 0.05. Binary logistic regression was used to predict the possibility of having diabetes, with the stated independent variables.

**Results:** There were 440,658 observations in the dataset. Of that number, 60,864 were diabetes subjects (13.81%). Those who are age 65 or older are more likely to have diabetes; it is more likely that those who have access to one or more health care providers have diabetes, relative to those who do not have access to any regular health care provider. People who reported themselves as good or better health status were less likely to develop diabetes compared to those who reported as fine or poor, holding other variables in the model as constant.

**Conclusions:** The most likely group to develop diabetes was black males, 65 or older, who self-reported as fine or poor, were former smokers, were without high school degrees, and had health care access.

**Shuvo, Tanzir Ahmed**

**Mentor(s) -- Dr. Mohammad Rifat Haider**

**Alzheimer's Attributable Costs in the United States: A Secondary Analysis of Medical Expenditure Panel Survey 2011-2015**

**Background:** Alzheimer's disease is the 6th leading cause of death in the United States and the 5th leading cause of death among people older than 65 years of age. This is associated with a rapid rise in the Alzheimer's associated expenditure in recent years. This study aims to calculate the health care cost attributable to Alzheimer's disease using Medical Expenditure Panel Survey, 2011-2015. **Methods:** Alzheimer's patients were identified through ICD 9 code. Propensity score matching technique was used to match control group based on the variables age, sex, race, region, family income, marital status. Generalized linear model with log link and gamma family was fitted for each year data. Differences between the estimated average cost of Alzheimer's disease and the non-Alzheimer's group was calculated to determine cost attributable to Alzheimer's disease. Costs for all year were converted to 2015 dollars to see the trend over years. The total cost attributable to Alzheimer's disease incurred by the nation was calculated using the national prevalence. **Results:** The lowest Alzheimer's attributable cost was reported in 2011; 11185\$ for a single patient. The highest cost was reported in 2013; 23290\$ in 2015 dollars. The lowest national expenditure attributable to Alzheimer's disease was in 2011 (60 Billion Dollar) and highest expenditure was in 2015 (121.2 billion). **Conclusions:** Alzheimer's disease is a potent cost driver of the US healthcare system. This is high time to formulate and implement policies directed towards cost containing strategies to manage Alzheimer's disease without reducing the quality of care.

**Siddiqi, Khairul**

**Mentor(s) -- Dr. Mohammad Rifat Haider, Dr. M Mahmud Khan**

**Mother's Previous Birth Experience, Health Status and Behavior during Pregnancy, and Having Low Birth Weight Babies: Evidence from South Carolina PRAMS Survey, 2004-2013**

**BACKGROUND**

Previous studies on South Carolina have examined the effects of maternal stress and smoking on low birth weight from the neighborhood context and produced mixed results. This study intends to investigate the effects of maternal behavior, previous birth experience, and pregnancy-related conditions on having low birth weight (LBW) babies.

#### **METHODS**

South Carolina Pregnancy Risk Assessment and Monitoring System (PRAMS) 2004-2013 data have been analyzed. The data set presents weighted total of 550,657 live births. Weighted multivariable regression analyses have been performed using STATA 14.2 to determine the predictors of LBW.

#### **RESULTS**

An estimated 49,457 (8.98%) babies were born with LBW (<2500 gram); while 9,167 (1.67%) babies were born with very low birth weight (<1500 gram). In multivariable analysis, African American mothers were more likely (OR 1.78, 95% CI 1.43-2.20), where chances of having LBW child decreased 2% with each pound of mother's weight gain. Mothers who reported hypertension (OR 2.31, 95% CI 1.62-3.31); previous experience of poor pregnancy (OR 1.46, 95% CI 1.09-1.96) and of premature birth (OR 2.86, 95% CI 2.26-3.62); and, had Medicaid (OR 1.61, 95% CI 1.28-2.02) had higher odds of having LBW babies. Mothers who participated in WIC program were less likely (OR 0.78, 95% CI 0.62-0.96), and mothers who had adequate prenatal visits had lower odds (OR 0.44, 95% CI 0.33-0.58) of experiencing LBW than those with inadequate prenatal visits. Mothers who smoked during pregnancy were at higher risk (OR 1.47, 95% CI 1.10-1.96), and interestingly, those who drank alcohol were at lower risk of having LBW (OR 0.44, 95% CI 0.28-0.71).

#### **CONCLUSIONS**

Results indicate that government programs directed to lower-income mothers such as WIC do have a beneficial effect on better birth outcomes. It also signifies that poor mothers should be enrolled in this program and they should be encouraged to use maternal healthcare.

### **Simmons, Virginia**

**Mentor(s) -- Dr. Myriam Torres**

#### **Hogar Carlos Maria Ulloa Data Management Analysis**

Data was collected in a nursing home during the USC Global Health Study Abroad Program in Costa Rica during the years 2015-2017. Building on the work that had been done, a deeper investigation of two different health conditions was taken. The purpose of this research is to explore the nutritional status and cognitive condition of the residents of the nursing home, Hogar Carlos Maria Ulloa in San José, Costa Rica. Data cleaning, creation of a codebook for the database, and input of the cognitive conditions and nutrition statuses data into the database were among the first steps taken in this research project. A literature review of the nutrition status for the elderly in Latin American populations compared to the United States populations was conducted as well as a literature review for the cognitive conditions of the elderly in Latin American and United States populations. Preliminary statistics and analyses were conducted on the prevalent conditions within the nursing home and compared to the literature reviews. The results of this research, along with the complete database, will be available to the nursing home, enabling the nursing home to have a more complete picture of the conditions of the residents within the facility as compared to the wider population.

### **Somera, Brandy**

**Mentor(s) -- Dr. Jim Fadel**

#### **Age-related changes in basal forebrain afferent activation in response to food paired stimuli**

The basal forebrain cholinergic system (BFCS) provides the largest source of cholinergic neurons implicated in cognitive functions including attention, learning, and arousal. Evidence suggests basal forebrain cholinergic neurons are particularly vulnerable to dysfunction and degeneration in aged humans and, more dramatically, in diseases such as Alzheimers. Cholinergic dysfunction impairs attentional processing of salient stimuli. The basal forebrain afferent projections regulating the attentional

and cognitive behaviors impaired by aging are not yet fully understood. We investigate basal forebrain afferent activation during salient conditioned stimuli to reveal afferent projections directly affected by age, and therefore, elucidate potential circuits affected by age related loss of activation of basal forebrain cholinergic neurons. Both aged (26-28 months) and young (2-3 months) rats were administered 200 nl cholera toxin B (CTb), a retrograde tracer, in the ventral pallidum and substantia innominata region of the basal forebrain, and placed on an 80% food restricted diet. The following 7 days prior to perfusion with paraformaldehyde, rats were either trained using a dark/food paired conditioned stimulus, known to activate basal forebrain cholinergic output, or not trained. On day 15, aged and young trained rats were either given a dark/food paired stimulus or only given a dark cue absent of the stimulus. Two hr later, animals were sacrificed and their brains processed for immunohistochemical detection of the neuronal activity marker, cFos and CTb. Aged rats showed impaired activation of basal forebrain afferents located in the medial prefrontal cortex, cingulate cortex, lateral hypothalamus, and ventral tegmental area when presented a dark/food stimulus compared to controls. Age-related loss of activation of basal forebrain afferents may result in attentional dysfunction and impaired cognitive and behavioral responses to homeostatic cues.

**Soni, Mithil**

**Mentor(s) -- Dr. Hexin Chen**

**Estrogen induced miR-489 acts as a negative feedback to confine uncontrolled estrogen signaling and cell proliferation in breast cancer.**

Approximately 75% of diagnosed breast cancer tumors are Estrogen receptor positive tumors and are associated with better prognosis due to response to hormonal therapies. However, around 40% of patients relapse after hormonal therapies. Identification of novel molecular targets is necessary to combat such resistant tumors. In the current study, using microarray, qRT-PCR, western blot, luciferase reporter assay and immunofluorescence, we found that miR-489 is an estrogen regulated miRNA that negatively regulates estrogen signaling. Depletion of miR-489 using Anti-miR-489 siRNA or CRISPR-Cas9 significantly increased proliferation, colony formation ability and stem like cell population. Interestingly, depletion of miR-489 enhanced nuclear localization of estrogen receptor which also indicates enhanced estrogen signaling. Several miRNA microarray studies have demonstrated loss of miR-489 in tamoxifen resistant breast cancer cells. Goal of this study is to decipher underlying molecular mechanism of miR-489 in estrogen signaling pathway and to demonstrate whether miR-489 can modulate therapeutic response to tamoxifen in tamoxifen resistant breast cancers.

**Sparks, Joshua**

**Mentor(s) -- Dr. Xuewen Wang**

**Effects of Aerobic Exercise Training on Glucose Metabolism in Sedentary, Overweight or Obese Adults**

The prevalence of overweight and obese adults continues to increase, and it is one of the largest public health concerns not only in the US, but worldwide. Individuals who are overweight or obese are at high risk for developing diabetes, and sedentary lifestyle further enhances the risk of diabetes development. However, increasing physical activity has been shown to decrease the risk of the development of diabetes independent of weight status. Measurement of free-living glucose concentrations utilizing continuous glucose monitoring (CGM) has recently emerged as a monitoring tool for individuals with diabetes but has not previously been utilized to establish how glucose concentrations alter due to aerobic exercise training in sedentary, overweight or obese adults at risk for the development of diabetes. Utilizing the University of South Carolina SPARC grant, I am testing the hypothesis that currently sedentary, overweight or obese adults participating in aerobic exercise training will positively impact free-living glucose concentrations measured by CGM technology. This study is among the first to utilize CGM-assessed glucose as the primary outcome following an aerobic exercise training intervention and will add to the current knowledge of how aerobic exercise training impacts the reg-

ulation of free-living glucose metabolism in those at risk for the development of diabetes. Moreover, this study will begin to lay the groundwork for future research to determine the efficacy of using CGM technology to develop interventional treatments aimed at decreasing the risk of the development of diabetes in overweight or obese adults. It is with great sentiment that I thank the University of South Carolina and the SPARC grant provided through the Graduate Research Grant Program for allowing me the opportunity to pursue a research endeavor that is of great interest to me and will aid in building my early career and future status as a researcher.

**Spead, Olivia**

**Mentor(s) -- Dr. Fabienne E. Poulain**

### **Specific Roles of Glypican3 in Axon Sorting and Topographic Map Formation in the Developing Visual System**

Brain connectivity and function depend on the precise formation of neuronal connections during development. In the central nervous system, most axonal projections are organized into topographic maps according to the spatial organization of the neurons they originate from or the type of stimulus they respond to. Interestingly, axons are often organized and sorted en route to their destination. A salient example is the visual system, where retinal axons are topographically sorted along the dorso-ventral axis along the optic tract before reaching the optic tectum (in fish) or superior colliculus (in mammals). While optic tract sorting may contribute to the topographic fidelity of retinotectal connections, little is known about how it is established. Our previous studies have shown that heparan sulfate (HS), a type of sugar chains carried by core proteins known as heparan sulfate proteoglycans (HSPGs), regulates retinal axon sorting non-cell-autonomously by promoting the degeneration of mis-sorted dorsal axons. Here, we sought to determine whether a specific core protein might regulate that process. Among the ten glypicans expressed in zebrafish, we identified Glypican-3 (Gpc3) as the only core protein specifically expressed in the ventral retina throughout development. Using CRISPR/Cas9 genome editing, we generated two *gpc3* mutant alleles encoding a truncated, non-functional protein. We are currently analyzing retinal axon sorting and retinotopy in *gpc3* mutants using topographic injections of lipophilic fluorescent dyes in the dorsal and ventral parts of the retina. Our preliminary experiments indicate that dorsal retinal axons are missorted along the optic tract in *gpc3* mutants, suggesting a novel function for this core protein in nervous system development.

**Spencer, Christopher**

**Mentor(s) -- Mrs. Janice Edwards**

### **Spiritual Care in Cancer Genetic Counseling: Patient Perceptions of Methods**

Spirituality is an all-inclusive concept that applies to more than just religious beliefs. The integration of spirituality into healthcare is called spiritual care, and it has been a notable topic of study and debate in the medical field. Studies have shown that some patient populations show better treatment outcomes with the provision of spiritual care. Spiritual assessment tools are often used to detect distress related to a patient's spirituality, and spiritual care specialists help patients work through this distress. Cancer patients in particular have shown increased coping with their disease with proper spiritual care. Despite this, no previous study has targeted spiritual care in cancer genetic counseling. Genetic counselors in the cancer setting assess the chance for a patient to have a hereditary cancer syndrome, which may increase their lifetime risk for cancer. Common referral reasons for cancer genetic counseling include a strong family history of cancer and cancer diagnosed at a young age. Genetic counselors also help patients to process psychosocial issues related to their experiences with cancer and their potentially increased cancer risk. Some genetic counselors believe that a limited spiritual assessment tool may be beneficial to helping their patients more comprehensively, but there is little consensus on what this tool may entail. This study explores patient perception of various methods a cancer genetic counselor may potentially use to integrate spirituality into patient sessions. 55 patients who were offered genetic testing through Palmetto Health USC Medical Group Genetic Counseling

completed a questionnaire regarding this topic. This questionnaire investigated their perception of various strategies to address spirituality in genetic counseling, each based on existing spiritual assessment tools. Participants also provided demographic information and answered open-ended questions to give more depth and context about their feelings. The presentation will indicate which methods were found to be the most agreeable to participants, and highlight any trends in the open-ended questions and demographic variables.

**Sriram, Shyamkumar**

**Mentor(s) -- Prof. Mahmud Khan**

### **Burden of Asthma in USA: Evidence from National Survey of Children's Health**

**Background:** According to the CDC, about 1 in 12 people have asthma, and the numbers are increasing every year. Asthma costs the US about \$56 billion in medical costs, lost school and work days, and early deaths. More children than adults had an asthma attack. It is vital to understand the determinants of asthma in children to take remedial actions and policy measures to reduce complications. **Methods:** The National Survey of Children's Health (NSCH) data for 2012 is used for our study. NSCH was conducted using telephone methodology led by the National Center for Health Statistics. National weights were used to estimate relevant parameters. Logistic regression was used to analyze the data in STATA version 14.1. **Results:** Smoking inside the home increases the likelihood of asthma by 1.53 times (OR1.53: CI 1.19-1.98). Likelihood of asthma dropped by 8% (OR0.92:CI 0.90-0.94) with increase in age by a year. Children without health insurance coverage were 1.94 times (OR1.94:1.61-2.32) more likely to have asthma. Each additional physician office visit in past 12 months increased likelihood asthma by 2.2 times (OR2.22: CI 2.04-2.41). Children who are stopped breast feeding earlier than 6 months are 1.5 times more likely to develop asthma (OR1.52: CI 1.23-1.78). Children who are born prematurely at least 3 weeks before the due date are 1.47 times (OR1.47: CI 1.23-1.78) more likely to have asthma. **Conclusions:** Indoor cigarette smoking is an important cause of asthma. Barriers to physician care utilization significantly increased likelihood of having asthma. Health education measures should be targeted at providing exclusive breastfeeding for children, prevention of indoor smoking and increasing access to health insurance coverage. Further studies are needed to explore the relationship between premature birth and development of asthma.

**Starrett, Angela**

**Mentor(s) -- Dr. Matthew Irvin**

### **INTEGRATING SELF-DETERMINATION AND EXPECTANCY-VALUE THEORIES IN EXAMINING THE ACHIEVEMENT OF FIRST-GENERATION COLLEGE STUDENTS: A LATENT PROFILE ANALYSIS EXAMINING RELATIONS BETWEEN PERCEIVED CHOICE, SCHOOL VALUING, AND PERCEIVED COMPETENCE AND ACADEM**

First-generation students, who represent more than 40% of entering college freshmen, have lower academic achievement and struggle to persist compared to their continuing-generation peers. Although previous studies have repeatedly shown a deficit model for first-generation students, there is still a lack of clear understanding about the heterogeneity that exists among these college students. While some do struggle to persist, others show marked resilience. Thus, drawing on Self-Determination Theory and Expectancy-Value Theory, this short-term longitudinal study examined whether perceived competence, perceived choice, and positive school value could moderate the risk of being a first-generation college student. A latent profile analysis on the motivational constructs revealed a three-class solution with one high competence class and two low competence and value classes. In one low competence and value class, odds are twice as likely that a student will be first-generation. When considering if the latent profiles moderate the risk of being first-generation, no significant relationship with generation status was found when controlling for high school GPA, race/ethnicity, and socioeconomic hardship. While exploring the relationship of race on academic achievement, the high competence motivational profile significantly moderates the risk. Thus, this dissertation study specifically illustrates

the resilience that can protect college students at risk of low academic achievement. The significance, limitations, and implications of this study for future research and practice on how at-risk college students can beat the odds on academic achievement are discussed.

**Steiner, Alex**

**Mentor(s) -- Dr. Rosemarie Booze, Dr. Charles Mactutus, Mr. Michael Cranston**

**Can wheel running mitigate temporal processing deficits in the HIV-1 Tg Rat?**

Exercise is an incredibly important behavior that promotes physical well-being as well as mental health in humans. These benefits include control of weight, reduced diabetic risk, improved cardiovascular health, as well as lower reports of anxiety and depression. Voluntary wheel running using laboratory rodents is a preclinical translational paradigm designed to resemble exercise in humans. While voluntary wheel running cannot be defined concretely as exercise, it is a solid measure of physical activity. Previous literature using rodents has shown that voluntary wheel running is mediated by the medial prefrontal cortex and the nucleus accumbens, and may promote general neurogenesis in the brain. Visual and auditory prepulse inhibition (PPI) has been used to assess temporal processing deficits in the HIV-1 Tg rat. It was hypothesized physical activity, defined as voluntary wheel running, would promote neurogenesis in the brain and possibly diminish temporal processing deficits tested using the visual prepulse inhibition paradigm. Male and female control and HIV-1Tg rats were placed in either sedentary conditions with locked wheels or running conditions with unlocked wheels for 67 minutes for a minimum of 74 consecutive days after habituation. After meeting criteria, animals were then placed immediately from the wheel room to the PPI chamber. Results indicated that there is a temporal processing deficit in the HIV-1 Tg rat that was not seen in the controls,  $F(1,72) = 72.301$ ,  $p < .001$ . However, the difference in temporal processing was not influenced by access to wheel running  $F(1,72) = 1.065$ ,  $p = .306$ , indicating that physical activity is not an effective tool to deter HIV associated temporal processing deficits and possibly other HIV associated neurocognitive disorders.

**Steward, Rachel**

**Mentor(s) -- Dr. Carol Boggs**

**Persistent maladaptation of a butterfly to an invasive evolutionary trap**

*Pieris macdunnoughii* is stuck in an evolutionary trap. Female butterflies of this species lay eggs on the invasive Eurasian mustard *Thlaspi arvense*, a plant that is lethal to developing larvae. In the 40 years since this interaction was first described, and at least 130 years since its introduction to the Colorado Rockies, females continue to lay eggs on *T. arvense*. The *P. macdunnoughii* / *T. arvense* evolutionary trap provides a case study with which to test the mechanisms leading to persistent maladaptation to human-induced environmental change. The context for rapid evolution exists: there is a significant fitness cost associated with laying eggs on *T. arvense*, host plant preference varies considerably within the population, and choice between *T. arvense* and the native host appears to be heritable when tested on whole plants. For my dissertation, I have studied the basis of poor larval performance, including larval feeding patterns and genomic signatures of host plant use, and variation in oviposition preference, among individuals and across a landscape, to understand constraints on rapid adaptation to this lethal plant.

**Sultan, Muthanna**

**Mentor(s) -- Prof. Mitzi Nagarkatti, Prof. Prakash Nagarkatti**

**Endocannabinoids attenuate Staphylococcal enterotoxin B (SEB)-mediated acute lung injury through regulation of micro-RNA that target the induction of Myeloid Derived Suppressor Cells and T regulatory cells.**

Acute Lung Injury (ALI) is still a significant cause for morbidity and mortality in the human population with a high incidence of over 200,000 cases/year in USA. In this study, we used a single dose of Staphylococcal enterotoxin B (SEB) (50 $\mu$ g) intra-nasally to induce ALI. The inhalation of SEB, a

category B agent as defined by CDC, leads to robust activation of T cells and a cytokine storm that causes significant damage to the lungs. In the current study, we induced SEB-mediated acute lung injury (ALI) in C57BL/6 mice and investigated if treatment with an endocannabinoid (AEA) would attenuate ALI. Our data demonstrated that a dose of (40mg/kg) of AEA significantly improved the lung function tests in mice with SEB-induced ALI when compared to vehicle controls, as determined by plethysmography. Analysis of mononuclear cells from the lungs of SEB+AEA mice showed significant increase in Myeloid-derived Suppressor Cells (MDSCs) that were CD11b+Gr1+ and anti-inflammatory. Our results also demonstrated induction of T regulatory cells that were CD4+FOXP3+. Microarray analysis of miRNA in lung-infiltrating cells in SEB+AEA group revealed that miR-23a-3p and miR34a-5p were downregulated when compared to controls. These miRNA targeted ARG1, TGF- $\beta$ 2 and FOXP3 as shown by transfection of splenocytes activated by SEB with mock, mimic or inhibitor of both miR 23a-3p and miR 34a-5p separately, which resulted in specific alterations in the target genes. The expression of all miRNAs and target genes involved were validated by RT-PCR. Together our data demonstrated that endocannabinoids can attenuate ALI and inflammation mediated by SEB through modulation in the expression of miRNA which induce immunosuppressive MDSCs and Tregs. (Supported by NIH grants P01AT003961, R01AT006888, R01AI129788, R01AI123947, R01MH094755, P20GM103641 to PN and MN).

**Tahiyat, Malik**

**Mentor(s) -- Dr. Tanvir Farouk**

**DC driven low pressure glow discharge in high water vapor content: A characterization study**

In recent days, plasma discharge in the liquid medium has been a topic of immense interest. Theoretical efforts have been pursued to get insight on physicochemical processes being influenced due to trace water vapor either present as residual or provided at a known concentration. However, studies on discharge at high vapor content is limited. In this study discharge characteristics of plasma in high water concentration (>90%) is investigated experimentally for a maximum pressure range of 15 Torr to maximize vapor loading without condensation. Voltage-current characteristics was obtained over 0-14 mA of current for each operating pressure; concurrently, the current density was determined to ensure normal glow regime of operation. A value for normal cathode potential drop for water vapor was experimentally determined and proposed. Spatially resolved optical emission spectroscopy was also conducted to determine OH, O, H<sub>2</sub> and H distribution in the inter-electrode separation. The normalized intensities of OH and O emission lines are found to be more prominent in the positive column, whereas the emission lines of H are most intense in cathode glow region. The electric field distribution along the discharge gap was also measured. We envision that data obtained from this characterization study will also provide valuable data for validation of plasma kinetic schemes associated with water vapor.

**Talib, Evan**

**Mentor(s) -- Prof. Caryn Outten**

**Investigation Cross Communication between the High and Low Iron Sensors in Yeast**

Iron is essential to most life on earth. Because of its unique ability to serve as both an electron donor and acceptor, iron is utilized as a co-factor for many biological processes, including electron transfer chain, oxygen binding, and vitamin synthesis. However, the ability of iron to participate in redox reactions renders it toxic at high levels by reacting with peroxide through Fenton chemistry to generate damaging reactive oxygen species (ROS). As such, dysregulation of iron metabolism leads to numerous human diseases such as anemia and hemochromatosis to name a few.<sup>1</sup>The use of *Saccharomyces cerevisiae* as a model has proved advantageous in illuminating many pathways relevant to human disease. In yeast, there are two transcription factors that are responsive to high and low iron conditions, respectively, Yap5 and Aft1/2.<sup>2,3</sup> While significant progress has been made recently in understanding iron homeostasis in yeast, key pieces of these pathways remain unknown. Current

studies have suggested that a link between the high and low iron sensors may exist and that the two may interact in a novel form. Our most recent data shows that in budding yeast the high- and low iron regulation pathways function independent of each other.

**Thomas, Asia**

**Mentor(s) -- Dr. Stacy-Ann January**

**Evaluating the Criterion Validity and Classification Accuracy of Universal Screening Measures in Reading**

Educators often use universal screening in the context of Response to Intervention frameworks to identify students at risk for not meeting proficiency levels on standardized state assessments. In third-grade, passing the state assessment is often used as a determinant for grade promotion in schools across the nation. Given the high-stakes of meeting state proficiency standards and the long-term consequences associated with early reading risk, the use of accurate screening systems is critical for early remediation. Extensive empirical evidence supports the use of curriculum-based measures of reading that are brief and of low cost to schools. Research is still emerging, however, on more comprehensive and costly reading screeners like the Measures of Academic Progress (MAP), a computer-adaptive assessment, and the Strategic Teaching Evaluation of Progress (STEP), a developmental reading assessment. The current study evaluated the criterion-related validity of MAP and STEP by investigating concurrent and predictive associations with a state assessment. Additionally, the utility of each screening measure to distinguish between students at risk for reading failure was evaluated, to determine their classification accuracy. Participants were two cohorts (Cohort 1 N = 209; Cohort 2 N = 115) of children enrolled in a public charter school system located within the southeast region of the United States. MAP and STEP were administered in spring of second grade and fall and spring of third grade, whereas the state assessment was administered in spring of third grade. Results suggested that MAP and STEP were significant predictors of student performance on the standardized state assessment with strong associations. Hierarchical regression analyses indicated that STEP scores significantly improved the prediction of scores on the state assessment, above and beyond MAP scores alone. Furthermore, findings support the utility of MAP and STEP in distinguishing between students at-risk for failing the state assessment. Altogether, preliminary findings from this study support the use of both of MAP and STEP to predict student reading performance on a high-stakes assessment.

**Trott, Corinne**

**Mentor(s) -- Prof. Subrahmanyam Bulusu**

**Variability of the Somali Current and eddies during the southwest monsoon regimes**

The meso-scale eddies and currents in the Arabian Sea are analyzed using different satellite observations, Simple Oceanic Data Assimilation (SODA) reanalysis, and Ocean Reanalysis System 4 (ORAS4) from 1993 to 2016 to investigate the impacts of Southwest (SW) Monsoon strength on Somali Current (SC) mesoscale circulations such as the Great Whirl (GW), the Socotra Eddy (SE), the Southern Gyre (SG), and smaller eddies. Increased Ekman pumping during stronger SW monsoons strengthens coastal upwelling along the Somali coast. The Arabian Sea basin-wide anticyclonic circulation and presence of the GW form mesoscale circulation patterns favorable to advection of upwelled waters eastward into the central Arabian Sea. In September, after the SW monsoon winds reach peak strength in July and August, a higher number of discrete anticyclonic eddies with higher (>20 cm) sea surface height anomalies develop in strong and normal intensity SW monsoon seasons than weaker SW monsoon seasons.

**Turley, Brendan**

**Mentor(s) -- Dr. Ryan Rykaczewski**

**To have no fear for storm nor gale: Wind events as potential sources for larval fish mortality**

The early life history of fishes is vital to population growth and vulnerable to changes in the physical environment. The surface layer of the ocean is actively mixed by winds and serves as an important larval habitat for many commercially or ecologically important fish species. Reuben Lasker's "stable ocean" hypothesis describes a mechanism by which wind events can be beneficial for larval fish survival when mixing occurs and nutrients are entrained into the euphotic zone stimulating phytoplankton growth; however, strong winds can induce turbulent mixing and disrupt plankton patches that are necessary for successful foraging by larval fish. Here, I utilize multi-decadal time series of wind and oceanographic data within the southern California Current Ecosystem to examine relationships among sequential wind events, mixed-layer dynamics, and chlorophyll concentrations. Ichthyoplankton data of anchovy and sardine, consisting of eggs and larval abundances and collected concurrently with hydrographic data, were used to estimate larval mortality and compared to chlorophyll concentrations during turbulent and calm periods. Large changes to larval mortality due to physical forcing can significantly influence the subsequent year-class strength and change overall population trajectories with implications for commercial fishery harvest and ecosystem function.

**Uddin, Majbah**

**Mentor(s) -- Dr. Nathan Huynh**

### **Factors Influencing Injury Severity of Crashes Involving HAZMAT Trucks**

This study investigates factors affecting injury severity of crashes involving HAZMAT large trucks. It uses the crash data in the state of California from the Highway Safety Information System, from 2005 to 2011. The explanatory factors include the occupant, crash, vehicle, roadway, environmental, and temporal characteristics. Both fixed- and random-parameters ordered probit models of injury severity (where possible outcomes are major, minor, and no injury) were estimated; the random-parameters model captures possible unobserved effects related to factors not present in the data. The model results indicate that the occupants being male, truck drivers, crashes occurring in rural locations, under dark-unlighted, under dark-lighted conditions, and on weekdays were associated with increased probability of major injuries. Conversely, the older occupants (age 60 and over), truck making a turn, rear-end collision, collision with an object, crashes occurring on a non-interstate highway, higher speed limit highway ( $\geq 65$  mph), and flat terrain were associated with decreased probability of major injuries. This study has identified factors that explain injury severities of crashes involving HAZMAT, and as such, it could be used by policy makers and transportation agencies to improve HAZMAT transport, and thus, the overall highway safety.

**Wakefield, Liz**

**Mentor(s) -- Dr. Carlina de la Cova**

### **Initial testing of a sampling method for measuring variations in concentrations of iron and copper isotopes in human bone**

Sex determination of human skeletal remains is an important topic of research in the field of biological anthropology. Traditional metric and non-metric methods of sex determination using information from the human skeleton are problematic because the accuracy of these methods relies on visual observation and physical measurement of specific skeletal elements by a human researcher. Despite reliance on discipline standards for (metric) morphological observation, and statistical formulae developed for non-metric analysis and sex determination of human remains, error associated with inter and intra-observer bias still poses significant problems for biological anthropologists. This study will assess the accuracy, validity, and application of a new method that uses variations in the compositions, concentrations, and ratios of iron and copper isotopes in bone to determine sex. The primary benefit of using this new method is that it is not subjected to the same types of bias introduced by human observers, and does not require analysis of specific skeletal elements. The goal of this study is to replicate the results of an earlier study (Jaouen et al. 2012) using the same methods, and to expand upon the previous study by including sub-adults in the research sample.

**Walker, Katherine**

**Mentor(s) -- Dr. Krystal Werfel**

### **Brown's Grammatical Morpheme Coding in Language Samples**

Collecting and coding language samples is an informal way to assess a child's language skills. Language samples provide information that standardized assessments do not always test or detect. Brown's grammatical morphemes system is what has been used in the ELLA lab at the University of South Carolina. This coding system focuses on analyzing 14 different morphemes that should be used and mastered in a child's speech, by age 4.

Once a language sample has been transcribed, one can code the sample for the 14 morphemes targeted in the Brown's grammatical morpheme system. The coder looks for bound morphemes such as regular plurals, possessive inflections, regular past tense "'ed'", third person singular, present progressive "'ing'", and negative contractions. If an utterance is missing a bound morpheme, the coder is allowed to place an asterisk mark and add the needed bound morpheme. The asterisk mark indicates that the child omitted the desired bound morpheme.

Free morphemes are also coded which includes: irregular plurals, irregular past tense, third person irregulars, auxiliary do, contractible copula verbs, contractible auxiliary verbs, uncontactable copula verbs, and uncontactable auxiliary verbs. If a child's utterance within the collected language sample omits words or a needed part of speech, then it will be coded as an error. An utterance can also be coded as an error if it is not a adult-like utterance, if the child answers or responds inappropriately, or if the targeted utterance is unclear or unknown. Once there is a error code in place, a gloss line is entered under the utterance where the person coding is able to write out the most appropriate, adult-like utterance.

**Warden, Deborah**

**Mentor(s) -- Dr. Ronda Hughes**

### **Turnover and Intent to Leave Among Nurse Leaders: A Literature Review**

Background: Nurse Leader turnover and intent to leave is considered a priority by nurse leaders themselves. In a 2008 study of nurse executives and a 2014 study of nurse managers, the average age for nurse executives is 52 years vs 47.4 for managers is 47.4. Of nurse executives, 66.6% had been in their positions for less than five years, and 25.2% had been in their executive positions less than 2 years. In addition 12.5% of the nurse executives surveyed had been subjected to involuntary job loss.

Purpose: The purpose of this manuscript is to provide an overview of the literature regarding turnover among nurses in formal positions of leadership.

Design: The design of this study is that of a scoping review which provides an overview of the extent of the literature regarding a particular topic. Screening of the articles yielded 18 that met the criteria for the study.

Findings: Nurses who suffered and involuntary job loss experienced shame, humiliation, loss of relationships, and social isolation as part of this traumatic experience. Reasons attributed to voluntary turnover include conflict with senior leadership members, lack of structural empowerment, opportunities for advancement, ethical conflict, and lack of supportive relationships. At the nurse manager level, other reasons include the lack of time available to spend with staff members and a larger span of control. As the scope and span of control increases, nurse manager job satisfaction decreases. Fewer nurses consider administrative specialty practice as a career opportunity. This makes succession planning and leader development both more critical and more difficult.

Conclusion: The value of this literature review is its exposure of rife with opportunities for future study. Researchers should identify factors that result in involuntary and voluntary turnover, explore the reasons attributed by nurse leaders to involuntary and voluntary turnover. By understanding these factors, it may be possible to consider ways to mitigate the loss of experienced nurse leaders

and to cultivate the next generation.

**Washington, Clorissa**

**Mentor(s) -- Dr. F. Wayne Outten**

**Nickel Exposure Reduces Siderophore Production in Escherichia coli**

Escherichia coli is a well-studied bacterium that can be found in many niches, such as industrial wastewater, where the concentration of nickel can rise to low millimolar levels (Ansari and Malik, 2010). Recent studies show that nickel exposure can repress pyochelin or induce pyoverdine siderophore production in Pseudomonas aeruginosa (Braud et al., 2010). Understanding the molecular crosstalk between siderophore production, metal homeostasis, and metal toxicity in microorganisms is critical for designing bioremediation strategies for metal-contaminated sites (Dixit et al., 2015). Here we show that high nickel exposure prolongs lag phase duration as a result of low intracellular iron levels in Escherichia coli (E. coli). Although E. coli cells respond to low intracellular iron during nickel stress by maintaining high expression of iron uptake systems such as fepA, the demand for iron is not met due to a lack of siderophores in the extracellular medium during nickel stress. Taken together, these results indicate that nickel inhibits iron accumulation in E. coli by reducing the presence of enterobactin in the extracellular medium.

**Weatherred, Jane**

**Mentor(s) -- Dr. Robert McKeever**

**Results Regarding the Development of Two Scales That Measure Attitudes and Beliefs About Child Sexual Abuse**

Abstract

The results of two focus groups and an exploratory factor analysis for the development of two psychometric measurements: 1) The Attribution of Blame for Child Sexual Abuse and 2) Belief in Stereotypes About Child Sexual Abuse will be presented in a poster format at Discover USC.

This research project was awarded SPARC funding from 2017-2018.

Keywords: scale development, child sexual abuse, blame, stereotypes

**Weber, Christine**

**Mentor(s) -- Dr. Douglas Wedell**

**Evaluative Conditioning of Preferences: An Eye Movement Perspective**

In evaluative conditioning, the affective response toward a neutral stimulus is altered by pairing it with a positive or negative stimulus. We investigated how evaluative conditioning operates on consumer preferences by pairing products with valenced music in an eye tracker, using many test trials in order to evaluate effects at the individual level. Conditioning resulted in predicted effects for 12 participants, effects in the opposite direction for 7 participants, and no significant effects for 18 participants. Eye movement measures showed that participants tended to look longer and more frequently at products they preferred. More time was also spent looking at attributes of negatively paired products. Multivariate pattern analyses conducted on eye movements during conditioning showed that valence could be decoded from looking behavior. These results indicate stable individual differences in the effects of evaluative conditioning, and that preferences are reflected by eye movements.

**Weber, Jillian**

**Mentor(s) -- Dr. Leon Jackson**

**Bodies in Play: Female Athleticism in the Nineteenth Century**

My dissertation explores historical and fictional representations of 19th-century female athletes previously overlooked. When critics mention athletic women in fiction they represent them as anomalies,

gender-bending females found in that single text when, in fact, the female athlete has a long and significant genealogy dating from the 1840s. I argue that the active female body reflected and shaped cultural and political conversations about gender norms, race, and class mobility from the 1840s to the 1920s. In the 19th century, women's value was limited to reproductive ability and female athletes were often considered spectacle, deviant, or masculine; however, writings on female athleticism illustrate how women embodied multiple alternative forms of femininity through athletics. My dissertation recuperates a counternarrative to the dominant account of the dainty, passive woman and shows athletic women using sport to perform their own active identities. The SPARC grant allowed me to visit several archives in New York to better understand how women's athletic bodies were written about, and the degree to which female athleticism was connected to performance and theater. Examining 19th century sources at the NYPL provided me with new ways to think about bodily performance and its productive possibilities for reframing female athleticism as positive and agentive, rather than simply abnormal.

**Weber, Samantha**

**Mentor(s) -- Prof. Toni Torres McGehee**

**Identifying Mental Health Risks through Screening among Collegiate Ethnic/Minority Athletes**

Student athletes are at risk for a higher prevalence of mental health disorders. There is limited research on ethnic minority mental health, specifically within the athletic population. In addition to limited mental health resources and screenings for mental health disorders, these populations are at a higher risk for depression, anxiety, and potentially body image dissatisfaction.

**Purpose:** To examine the prevalence of mental health disorders (i.e. Depression, Anxiety, Eating Disorders, Body Image Dissatisfaction) among collegiate ethnic minority student-athletes at four local Historically Black College/Universities (HBCU). A secondary purpose will be to look at the current mental health resources available to the student-athletes.

**Methods:** A cross sectional study design was used. Collegiate male and female athletes (n~200) were recruited from local HBCUs, NCAA Division I Institutions to participate in an online survey. Participants were asked to complete demographic information (e.g., age, academic status, gender, sport, etc), Beck Depression Inventory, Beck Anxiety Inventory, Eating Attitudes Test and standard figural stimuli. Independent variables are gender, sport type, and academic status. Dependent variables are risk for depression, anxiety, eating disorders, and body image dissatisfaction. Cross tabulations and chi square analyses examined the relationship and distribution between independent and dependent variables.

**Results:** Results will be presented at discovery day. Data is currently being collected.

**Conclusions:** TBD

**Wende, Marilyn**

**Mentor(s) -- Dr. Christine Blake**

**Yoga for Everyone: A qualitative study of a community yoga class for people with disability**

**Background:** Yoga involves physical poses, breath work, concentration, meditation, ethical tenets, spirituality and self-knowledge. Previous research has demonstrated the impact of yoga among people living with disability, on various functional outcomes, but limited research has examined the value of the experience from the perspective of participants.

**Objectives:** The goal of the study was to understand the benefits of yoga for those with chronic disabilities that regularly attend the weekly class: Yoga for Everyone. Specific aims included understand-

ing facilitators and barriers, examining perceptions, and understanding experience and meaning derived from participation.

**Methods:** This phenomenological qualitative research used criterion and variation sampling to solicit class participants with varying disability, resulting in a final sample of six participants. Semi-structured interviews (approximately 45-60 minutes) and the World Health Organization Disability Assessment (WHODAS) were completed. Researchers gathered information about the class through direct observation using a standard observation template. Interviews were transcribed verbatim from recordings. NVIVO qualitative analysis software was used for analysis. Emergent thematic coding of all interviews was done by two researchers who met regularly to clarify meaning and interpretation. Results were further verified through peer review and member checking of findings.

**Results:** Barriers to participation include unpredictable physical symptoms, and accessibility barriers such as weather, parking and building access. Facilitators include access to transportation, and positive experiences. Experience themes included the importance of volunteers, differences between yoga and physical therapy, individual level outcomes and community building outcomes. Overall, participants stressed the benefit of facilitated movement during class and the sense of connection and belonging in the class. Those with physical impairments benefit from the practice, in terms of flexibility, relaxation and strength, but also in terms of building instrumental and emotional connections with other participants. Separate from their medical experiences, the class is continuous and not dependent on physician approval or insurance benefits.

**Conclusion:** The study provided a participant perspective on the value of a community yoga class for positive physical, mental and emotional impact as well as social and community building benefits. These insights can inform future community programs for people living with disability.”

**White, Ashley**

**Mentor(s) -- Dr. Emily Mann**

**Foreign objects in college bodies: college women’s feelings about long acting reversible contraceptives**

**Background:** Long acting reversible contraceptives (LARC), namely the intrauterine device (IUD) and the implant, are highly effective (99.5%) forms of contraception that many healthcare providers and public health advocates now consider the “first line option” for people who wish to prevent unintended pregnancy. Despite the growing popularity of LARC, little is known about how college women think about these devices. This study explored college women’s feelings and experiences in order to better understand factors driving decision making around whether or not to use LARC.

**Methods:** Four focus group interviews (n=46) were conducted with female undergraduate students, ages 18-24, enrolled at the University of South Carolina in April 2017. Participants were recruited at the Columbia campus for a 120-minute focus group session. LARC use was not an eligibility requirement for participation in the study. Two female facilitators lead each focus group using a semi-structured guide. Sessions were recorded, transcribed, and analyzed using a modified approach to grounded theory. Participants’ LARC knowledge, attitudes, and experiences were revealed with analysis focusing on acceptability and use.

**Findings:** Focus groups elicited a range of views about LARC acceptability and use, expressing both strong positive and negative affective responses. The idea of having a device inside their body was discussed and some found that “freaky.” Participants compared their attitudes about LARC, focusing on differences of method insertion and placement in the body. Preference for the IUD versus the implant was generally based on the ability to feel the device; some participants wanted the reassur-

ance of feeling the implant in their arm, while others found it disturbing and preferred the IUD. Among LARC users, the primary reason for use was the method's effectiveness. LARC users talked about the methods as their "bodyguard" because they provide a high level of protection against unwanted pregnancy.

Interpretation: This study suggests that college women have widely varying perceptions about LARC, viewing them differently based on method insertion and placement. Conversations about what is and is not acceptable to place in one's body seem to be of greater consideration than method effectiveness among non-LARC users.

**Williamson, Sarah**

**Mentor(s) -- Dr. Jessica Klusek,**

**Differential Cognitive Function in Women with FMR1 Premutation**

Background: The FMR1 premutation is a gene carried by mothers of children with fragile X syndrome that affects 1 in 151 women in the United States. The premutation is caused by an expansion of the CGG sequence on the FMR1 gene. Eight to fifteen percent of women with the premutation develop FXTAS (Fragile X-Associated Tremor Ataxia Syndrome), a neurodegenerative, late-onset movement disorder associated with tremor ataxia, and executive cognitive dysfunction (Brega et al., 2008). Verbal fluency tasks can provide insight into areas of memory and executive function, and may provide a sensitive indicator of subtle executive deficits that may precede the later development of FXTAS in women with the FMR1 premutation.

Aim: To 1) determine whether mothers with the FMR1 premutation perform worse on verbal fluency tasks than controls and 2) examine association between FMR1 gene dysfunction (i.e. CGG repeat) and verbal fluency performance.

Methods: Participants were 30 female carriers of the FMR1 premutation and 26 without the premutation. Participants ranged in age from 26-65 years. The groups did not differ significantly on age ( $p=0.189$ ). Participants completed a verbal fluency task where they were given one minute to name as many words beginning with the letters "F," "A," and "S." Responses were transcribed and coded for the total number of words and number of switches (changes in phonological pattern). Fewer switches is related to frontal lobe dysfunction (Troyer & Moscovitch, 2006). Education level is associated with performance on verbal fluency tasks, and was controlled for all analyses.

Results: No significant group differences were found on total number of words produced ( $p=.078$ ) or the number of switches ( $p=.153$ ). However, higher CGG repeats were significantly associated with increased switches ( $R^2=.49$ ,  $p=.049$ ). The longer the CGG repeat, the fewer number of switches.

Discussion: Preliminary data analysis indicates that a decreased number of switches is indicative of frontal lobe dysfunction, possibly associated with FXTAS. This finding coincides with findings from Shelton's (2014) study, which found that CGG repeat length was inversely related to antisaccade errors. However, difficulty with switching was associated with variation on the CGG repeat size. Final data to be reported.

**Winn, Elizabeth**

**Mentor(s) -- Dr. Daniel Fogerty**

**The effect of musical abilities on implicit and explicit memory**

Musical training promotes cognitive and perceptual skills that prior research has connected with an advantage on auditory memory tasks. The present study seeks to assess the role of memory for speech and music in noisy conditions. Furthermore, it examined the relationship of memory on these

tasks with musical and cognitive abilities. Young normal-hearing listeners (n=21) were presented with a speech repetition task containing sentences in noisy conditions and were assessed for keywords repeated correctly. A music repetition task consisting of 20 six-note melodies were presented in noisy conditions and repetitions were assessed based on the pitch difference from the presented notes. Musical ability was determined using the Adult Measure of Music Audiation (AMMA), a pitch matching task, and a music experience survey. Cognitive measures for participants included measures of vocabulary, matrix reasoning, and word recall. Results showed that music memory abilities were associated with matrix reasoning, as well as, pitch matching, AMMA total score, the number of current music activities, and years of musical experience. Significant correlations existed between the music measures, suggesting that musicianship may be defined using multiple methods. No significant correlations were found between music repetition and speech repetition memory scores. These findings suggest that listeners who are better at memory for music are not necessarily better with memory for speech, at least as assessed by these tasks.

**Winstead, James**

**Mentor(s) -- Dr. Jim Burch, Dr. Jay Ginsberg**

### **Shiftwork and Heart Rate Variability Coherence among Nurses**

**Abstract:** This study used an ambient heart rate monitoring protocol among health care workers to test the hypothesis that heart rate variability (HRV), sleep disturbances, fatigue, or cognitive performance differed among non-rotating night nurses relative to those on permanent day shifts. Continuous ambulatory HRV monitoring was performed among non-rotating night nurses (n=11), and a comparison group of permanent day nurses (n=7), over a 36-hour period coinciding with the last two 12-hour shifts of each participant's work week. Symptoms and psychomotor vigilance were assessed at the end of the ambient HRV monitoring period, and no differences between shifts were observed. This study was the first to quantify patterns of the HRV Coherence Ratio, an indicator of cardio-respiratory phase coupling that occurs naturally during deep sleep, in a non-experimental (work/home) setting, and to compare hourly HRV Coherence Ratios with a standard HRV measure of vagal tone. Day nurses had a clear circadian pattern of HRV Coherence coinciding with their sleep period, whereas night nurses had no increase in hourly mean HRV Coherence Ratios during their sleep period. The results suggest a pattern of autonomic dysregulation among night workers during their sleep period relative to those on day shifts. HRV Coherence may serve as a novel indicator of HRV dysregulation among shiftworkers.

**Wolfe, Ashton**

**Mentor(s) -- Mrs. Jessica Fairey, MS, CGC, Mrs. Crystal Hill-Chapman, PhD, LP, NCSP, ABPP, Dr. Caroline DiBattisto**

### **The Impact of Communication in Sexual Development in Adolescents with Autism Spectrum Disorder**

Transitioning into a sexually mature adult is a challenging time for both an adolescent with autism spectrum disorder (ASD) and their family. More specifically, sexual development begets challenges due to the demands it places on the social and communication skills needed to explore developmental changes that are occurring physically, emotionally and hormonally. It is during adolescence when individuals form relationships and learn about puberty and sexual development primarily through peer-to-peer interactions. A diagnosis of ASD is partially established by quantifying impediments in social and communication skills through observation. As this is the chief feature of ASD, it is safe to assume that social and communication difficulties can create obstacles in the sexual development of affected individuals. Our research surveyed parents of adolescents, ages 10-18, with a diagnosis of ASD, and interviewed a portion of these parents in order to determine how the severity of their child's social communication skills correlate with his or her sexual development. Preliminary results (n = 39) reveal adolescents with poorer social communication skills had a higher association with displaying

inappropriate sexualized behaviors ( $r = -0.32$ ,  $p = 0.06$ ). Additionally, stronger social communication skills were associated with adolescent's understanding of appropriate sexual behavior in romantic relationships ( $r = -0.407$ ,  $p = 0.012$ ). Furthermore, 64% of the sample indicated that their child had been provided with some form of sexual education. Provision of sexual education was inversely associated with displayed atypical sexual behaviors ( $r = -0.05$ ,  $p < 0.01$ ). While these results are not representative of the entirety of our data analysis, they are strongly suggestive of the direct impact social communication has on sexual development in adolescents with ASD.

**Woodward, Alfonso**

**Mentor(s) -- Dr. Candice Morgan**

### **The Positive Impact of Re-entry Programs for Youth Returning to the Community After Leaving the Juvenile Justice System**

This study served as an evaluation of the benefit and need of re-entry programs in the greater Columbia, SC area for youth returning to the community following time spent in the juvenile justice system. The need for this project was determined upon review of current research highlighting the importance of youth accessing needed resources upon release. Additionally, studies have shown re-entry programs can contribute to the reduction of recidivism. Current research focused on this topic and involvement with the Richland County Public Defender's Office Re-entry Program served as the foundation to promote future research to further prove the benefit and need of re-entry programs.

**Yasmeen, Farzana**

**Mentor(s) -- Dr. Michael Sutton**

### **Sensitivity of in-plane strain measurement to calibration parameter for out-of-plane specimen rotations**

In practice, out-of-plane motions usually are not avoidable during experiments. Since 2D-DIC measurements are vulnerable to parasitic deformations due to out-of-plane specimen motions, three-dimensional digital image correlation (StereoDIC or 3D-DIC) oftentimes is employed. The StereoDIC method is known to be capable of accurate deformation measurements for specimens subjected to general three-dimensional motions, including out-of-plane rotations and displacements. As a result, there has been limited study of the deformation measurements obtained when using StereoDIC to measure the displacement and strain fields for a specimen subjected only to out-of-plane rotation. To assess the accuracy of strain measurements obtained using stereovision systems and StereoDIC when a specimen undergoes appreciable out of plane rotation, rigid body out-of-plane rotation experiments are performed in the range using a two-camera stereovision system. Results indicate that (a) for what would normally be considered "small angle" calibration processes, the measured normal strain in the foreshortened specimen direction due to specimen rotation increases in a non-linear manner with rotation angle, with measurement errors exceeding and (b) for what would normally be considered "large angle" calibration processes, the magnitude of the errors in the strain are reduced to . To theoretically assess the effect of calibration parameters on the measurements, two separate analyses are performed. First, theoretical strains due to out-of-plane rigid body rotation are determined using a pinhole camera model to project a series of three-dimensional object points into the image plane using large angle calibration parameters and then re-project the corresponding sensor plane coordinates back into the plane using small angle calibration parameters. Secondly, the entire imaging process is also simulated in order to remove experimental error sources and to further validate the theory. Results from both approaches confirmed the same strain error trends as the experimental strain measurements, providing confidence that the source of the errors is the calibration process. Finally, variance-based sensitivity analyses show that inaccuracy in the calibrated stereo angle parameter is the most significant factor affecting the accuracy of the measured strain.

**Yaussy, Samantha**

**Mentor(s) -- Dr. Sharon DeWitte**

**Patterns of Craniofacial Fluctuating Asymmetry in Industrial-era England**

Historical evidence from 19th-century England suggests that industrialization's impacts on health were primarily negative and were especially intense among marginalized workers, such as women. However, when historical evidence is biased towards a particular age or sex group (e.g., adult males), skeletal evidence can elucidate previously inaccessible aspects of patterns of health and frailty in the past. This study examines the relationship between age, sex, and craniofacial fluctuating asymmetry (FA) in skeletal samples from industrial-era England. FA—subtle deviations from symmetry in an organism's bilateral features—serves as a proxy measurement of the stability (or lack thereof) of the development of an organism's phenotype. Thus, pronounced FA suggests that an individual was particularly prone to environmental disturbances during development or was less able to buffer against them. A measure of individual FA (Mahalanobis distance) was generated using geometric morphometric analyses of 3-dimensional landmark data collected from 172 individuals. ANOVA was used to evaluate the impact of biological sex (male vs. female) and adult age (18+) on FA scores. The results indicate that sex is significantly associated with individual FA scores ( $p = 0.019$ ), but age ( $p = 0.885$ ) is not. Likewise, the interaction between sex and age is not significantly associated with FA score ( $p = 0.762$ ). Comparisons of the means for males and females indicated that males had significantly higher FA scores than females. Therefore, this study supports findings from previous studies that have suggested that females are generally less susceptible to disease and infection compared to males, and that males are more susceptible to the sorts of environmental stressors that generate discernable differences in craniofacial asymmetry.

**Zhang, Jingsheng**

**Mentor(s) -- Dr. Krista Van Fleit**

**Re-reading the Intellectual Turn in 1980s' Chinese Poetry Field: A Study of Unofficial Poetry Journals after 1985**

This presentation will focus on my research in the summer of 2017 at Leiden University Library in the Netherlands. I will show the self-printed and unofficial poetry journals by three avant-garde literary groups that I found in the special collection of the library. I will demonstrate how the horizontal reading of these journals enabled me to see the original tasks and appeals of the avant-garde poets in the second half of the 1980s before their poems were canonized. Their common anxiety in looking for a new subjectivity mirrors the great transition of Chinese society in the late 1980s from socialist revolution to commercial economy. The study of these primary materials contributed to one of my dissertation chapters. I presented a part of the research outcome in AAS regional conference in January.

**Zheng, Jiali**

**Mentor(s) -- Dr. Christine DiStefano**

**Factors Influencing College Students' Motivation on Computer Programming Courses: a perspective of expectancy-value theory**

Many fields have become increasingly dependent on information technology. Interdisciplinary programs such as information management require students to take computer programming courses to graduate. An increasing number of college students decide to switch majors in order to take less programming courses, or to take more programming courses. A number of reasons could account for their choices. The aim of the current study is to examine potential factors that influence students' attitude toward programming courses, as well as the strength and directions of the relationships between the factors. Data was collected in a university in China. 300 students from 3 interdisciplinary majors which require taking different numbers of programming courses to graduate completed a survey. The survey items were developed to reflect the components in the Expectancy-Value-Cost model of motivation, which is one of the most influential models seeking to explain academic choice and effort. Among the three components of the model, expectancies for success, task values, and costs, there

are many subcomponents which may influence students' academic choice, such as students' ability belief in the courses, intrinsic value of the courses, the utility of the courses (extrinsic value), influence from peers, previous learning experience, teaching methods, gender stereotypes, ect. Data was analyzed with confirmatory factor analysis technique to identify the relationship between the factors. Students' gender, grade level and major were added to the model as covariates. The results indicate that expectancy for success and value (both intrinsic and extrinsic) were significant positive predictors of students' motivation and academic choice, which is largely consistent with previous findings that expectancies for success and task values are the two key constructs that directly influence academic choice and motivation. Grade level is a significant negative predictor of students' choice. The higher their grade level, the less inclined they were to take programming courses. This is perhaps because the courses get more difficult as they go which lowered their expectancy for success. Past experiences, teachers and teaching methods, influence from peers, perceived cost of time and effort to learn the courses, gender and major are not significant predictors of students' choice.

**Zubizarreta, Maria**

**Mentor(s) -- Dr. Lucy Ingram**

**Dissemination of Water Quality Interactions and Human Health in the Shem Creek Watershed, Charleston, South Carolina**

Shem Creek, a tidal creek located in Mt. Pleasant near Charleston, South Carolina has a history of fecal indicator bacteria levels that exceed the Environmental Protection Agency's recreational water standards. Local residents and tourists use Shem Creek for recreational purposes. With recent coastal population and development trends, proper management and the sustainability of beach and estuary environments is a rising public health concern. The purpose of this project is to disseminate water quality information with a focus on bacterial pollution and human health impacts to the Charleston community and those living in the Shem Creek watershed. In addition, this project aims to understand from community members their perspectives, concerns, and what they see as viable solutions to keeping Shem Creek a pristine environment. Water quality issues with a focus on bacterial pollution in the Shem Creek watershed was disseminated using a series of outreach events and educational platforms in the Charleston community including an informational table set up at a community market and a presentation at the South Carolina Aquarium. Surveys were also given to community members in order to get their perspective about the water quality in Shem Creek. Results indicate that there is a concern within the Charleston community about water quality issues. The main concerns among community members consisted of protecting the fishability of the water and making sure the water was safe for recreational use, including swimming. In addition, evidence was given that previous efforts to educate or reach out to the Shem Creek community about water quality issues have been inadequate. Further action should be taken to address the neighborhood's concerns. Getting community members involved in research being conducted and allowing the researchers to hear residents' perspectives will help to inform and develop future scientific work.

# **Postdoctoral Scholars**

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# **presentations**

**Albetel, Angela-Nadia**

**Supervisor(s) -- Prof. Caryn Outten**

**Insights into the Molecular Mechanism of Fe Homeostasis in Yeast *S. cerevisiae***

Baker's yeast *S. cerevisiae* has been used extensively as a model for understanding cellular processes such as the iron sensing and regulation in eukaryotic cells. Under cellular iron deficiency, two paralogous iron-responsive transcription factors, Aft1 and Aft2, have been shown to activate the transcription of iron uptake and transport genes via an Fe-dependent signaling pathway. The CGFS monothiol glutaredoxins Grx3 and Grx4, the BolA-like protein Fra2, and the aminopeptidase P-like protein Fra1 have been identified as critical players which function together in the iron regulation pathway to control the nucleocytoplasmic shuttling of Aft1/2. Under iron replete conditions, this pathway induces dimerization of Aft1 (and presumably Aft2), favoring their localization to the cytosol and subsequent deactivation of the iron regulon. However, there are significant gaps in our understanding of iron regulation mechanisms at the cellular and molecular level. We are addressing these gaps by teasing out the molecular details of iron sensing and regulation in the budding yeast *S. cerevisiae* and defining the roles of each component in the iron signaling pathway. Using complementary biophysical and molecular genetic methods, we have demonstrated that Fra2 forms [2Fe-2S]<sup>2+</sup>-bridged heterodimers with Grx3 or Grx4, and that Aft2 senses cellular iron levels via direct [2Fe-2S]-cluster binding, which promotes Aft2 dimerization and deactivation of the regulated genes. Furthermore, we have shown that Aft2 acquires its [2Fe-2S] cluster through intact [2Fe-2S] cluster transfer from the Grx3-Fra2 homodimer. We are currently probing the structural details of the [2Fe-2S] Grx3-Fra2 complex, as well as their *in vivo* interaction with Aft1/2 to gain a better understanding of how interactions between Aft1/Aft2, Grx3/4, Fra1, and Fra2 influence their *in vivo* functions. Since several key proteins in this pathway are conserved in humans and essential for viability, exploiting the yeast system to define their functional and physical interactions will provide a fundamental understanding of their roles in human iron metabolism.

**Alghetaa, Hasan**

**Supervisor(s) -- Prof. Mitzi Nagarkatti**

**Resveratrol inhibits metabolism of SEB-activated T lymphocytes by epigenetic dysregulation**

Staphylococcal enterotoxin B (SEB) is a Center of Disease Control designated select agent of bioterrorism. It is also a superantigen activating V $\beta$ 8 specific T cells, inducing massive T cell proliferation & cytokine production as well as changes in the metabolic status of naïve T cells from normal quiescent state to metabolic energetic, glycolytic cells. Resveratrol, RES, a phytoalexin produced by various plants, mainly grapes & berries has a well-known role as anti-oxidant & anti-inflammatory agent. In addition, it has been shown to be an inhibitor of cancer cell metabolism through suppression of pyruvate kinase. In our previous studies, we found that RES has an ameliorative effect in mice with SEB-induced acute lung injury which led to the survival of the mice while vehicle-treated mice succumbed. In the current study, we examined the effects of resveratrol treatment on cell metabolism of the SEB-activated T cells, specifically following activation of isolated splenocytes with SEB along with treatment with vehicle or RES. Seahorse Realtime metabolic analyzer was used to study the metabolic changes of RES- & Vehicle-treated cells. The data generated showed that RES-treated T cells reverted toward quiescent phase, underwent cell cycle arrest when compared with vehicle-treated cells which were more energetic as demonstrated by increase in the glycolytic activity represented by extracellular acidification rate, which started to increase after 3 hours of SEB exposure. Moreover, RES treatment shifted the cell metabolism of SEB-activated T cells from glycolysis to totally mitochondrial phosphorylation which was due to probably upregulation of upto 3-fold change of microRNA-100 that targets a key enzyme, pyruvate kinase & prevents transformation of phosphoenol pyruvate into pyruvate, the main precursor of Acetyl CoA before entering the mitochondria for oxidation to ATP molecules. Using RT-PCR, we found that PKM gene was significantly suppressed, while expression of TOB, a T cell anti-proliferative gene & DEPTOR, an mTOR suppressor were statistically elevated in

RES-treated cells. mTOR quantity was found in lower amount in RES-treated cells when compared to vehicle-treated cells. Together, RES treatment has significant impact on SEB-activated T cells through effects on the metabolic pathways.

**Bam, Marpe**

**Supervisor(s) -- Prof. Mitzi Nagarkatti**

**Dysregulated WNT signaling in PTSD patients correlates with altered epigenetic marks and elevated inflammation.**

It is now known that PTSD patients exhibit chronic systemic inflammation characterized by upregulated expression of pro-inflammatory cytokines such as IFN $\gamma$  and IL12. However, the mechanism of regulation of these genes and the cells producing these cytokines is inadequately understood. In this context, WNT/ $\beta$ -catenin signaling pathway is critical for the proliferation, differentiation, polarization and survival of mature T cells. We have reported that T cells (Th1 and Th17) are increased in number in the PBMCs of PTSD patients which also correlated with the increased expression of IFN $\gamma$ . However, it is not yet reported which regulatory pathway is involved in the increased T cells in PTSD patients. In this report, we provide compelling evidence that WNT/ $\beta$ -catenin signaling pathway could be dysregulated and responsible for the increased T cells and thereby elevated production of pro-inflammatory cytokines. Our RNAseq results clearly indicate that WNT10A and WNT10B expression is significantly higher in PTSD patients. We further show that there are altered epigenetic marks (histone H3 K4 trimethylation) and miRNA expression profiles in PTSD compared to healthy controls. Our data suggest that presence of higher H3K4me3 mark in PTSD could be the reason for higher WNT10A expression. On the other hand, we observed several downregulated miRNAs in PTSD patients which are predicted to target WNT10B implying that the higher expression of WNT10B could be the result of altered miRNA expression in PTSD. All the above mentioned data, in addition to the expression of WNT/ $\beta$ -catenin signaling pathway associated genes in PTSD samples, strongly suggest that indeed there is dysregulation of the WNT/ $\beta$ -catenin signaling pathway in PTSD which might be the reason for the elevated inflammation. The study provides further evidence that inflammation in PTSD is epigenetically regulated and this pathway could be useful for PTSD diagnosis and combating the inflammation. (This work was supported in part by National Institutes of Health grants P01AT003961, R01AT006888, R01AI123947, R01AI129788, R01MH094755, and P20GM103641).

**Busbee, Philip**

**Supervisor(s) -- Dr. Mitzi Nagarkatti**

**Indole-3-carbinol ameliorates murine colitis symptoms by regulating the release of colonic anti-microbial peptides which prevents disease-associated microbial dysbiosis**

Colitis is a debilitating disease characterized by acute or chronic inflammation within the gastrointestinal tract, often in the colon. Currently ineffective treatments using immunosuppressive drugs that can have adverse side-effects lead to surgical intervention options, thus highlighting the need for alternative therapies. In our previous work, we showed that indole-3-carbinol (I3C), a naturally-occurring plant product found in a number of cruciferous vegetables, was able to ameliorate symptoms in murine models of colitis. In particular, I3C reduced the accumulation of potential pathogenic gram-negative bacteria while increasing anti-inflammatory gram-positive butyrate-producing species, which lead to a shift in a pro-inflammatory T cell response (Th17) to an anti-inflammatory one (Treg). In the current study, we further defined the mechanisms by which I3C and butyrate production, via treating with sodium butyrate (NaB), were able to prevent colitis-associated microbial dysbiosis. I3C or NaB treatment were able to effectively maintain the protective mucus layer of the gut by increasing Muc2 levels, thus preventing the translocation of bacteria into or near the colonic epithelial surface. In addition, both I3C and NaB lead to an increase in peroxisome proliferator-activated receptor gamma (PPAR- $\gamma$ ) expression in the colon, which is known to reduce the inflammatory response in colitis. Lastly, treatment with I3C or NaB increased the expression of colonic anti-microbial peptides (e.g.

mCRAMP, mBD1-3, BPI) and enzymes (Lyz1, Lyz2, sPLA2). Collectively, these data suggest that I3C, through increases in butyrate, is able to ameliorate colitis by preventing pathogenic gut microbial dysbiosis via altering intestinal regulatory mechanisms to include mucus production, PPAR- $\gamma$  activation, and release of anti-microbial peptides/enzymes. The studies were supported in part by NIH grants P01AT003961, R01AT006888, R01AI123947, R01AI129788, R01MH094755, and P20GM103641.

**Chakrabarti, Mrinmay**

**Supervisor(s) -- Dr. Mohamad Azhar**

**Aortopathy in a mouse model of Marfan Syndrome is exacerbated by heterozygous deletion of individual Transforming Growth Factor- $\beta$  ligands**

It is thought that MFS-associated aortopathy is caused by 'paradoxically' increased TGF $\beta$  signaling. Our hypothesis is that a partial genetic reduction of physiologic individual isoforms of TGF $\beta$  exacerbates MFS-associated aortopathy in mice. We generated young and old Marfan syndrome (Fbn1C1039G/+) mice with and without superimposed haploinsufficiency of Tgfb1, Tgfb2, and Tgfb3. We measured aortic dimensions by echocardiography. Subsequently, mouse aortas were analyzed by histological and morphological approaches. Western blot analysis was used to determine changes in canonical and non-canonical TGF $\beta$  signaling pathway components in aortic tissues. The data indicated that aortic dilation was exacerbated in Fbn1C1039G/+ mice by superimposed heterozygous deletion of Tgfb1, Tgfb2, and Tgfb3. Our data support a detrimental effect of specifically reducing individual isoforms of TGF $\beta$  during on MFS-associated aortopathy. There is no medical treatment for aortic aneurysm in MFS. Thus, our data provide novel information which will benefit in developing safer approaches for targeting TGF $\beta$  signaling to prevent and/or treat aortic aneurysm in MFS and MFS-related aneurysmal disorders.

**Chitralla, Kumaraswamy Naidu**

**Supervisor(s) -- Prof. Mitzi Nagarkatti**

**Impact of deleterious single nucleotide polymorphisms in Catechol O-Methyltransferase conferring risk to Post-traumatic stress disorder**

One of the prevalent neurological disorders includes Post-traumatic stress disorder (PTSD) which is drawing attention over the past few decades. It occurs as a consequence of a life-threatening event such as physical or sexual assault, combat, car accident or natural disaster. Some of the risk factors for PTSD include environmental and genetic factors. Among the genetic risk factors, polymorphisms in the catechol-O-methyltransferase (COMT) gene have been associated with risk for PTSD. In the present study, we aim to analyze the impact of deleterious single nucleotide polymorphisms (SNPs) in COMT conferring risk to PTSD using computational based screening and molecular dynamic simulations. The data on the COMT gene associated with PTSD were collected from Online Mendelian Inheritance in Man (OMIM) database and PubMed search. The SNP datasets were downloaded from the dbSNP database. The amino acid sequence of the COMT protein was retrieved from the Uniprot database and its three-dimensional structure was downloaded from protein databank. To study the structural and dynamic effects of COMT wild type and mutant forms we have performed molecular dynamics simulations (MDS) at a time scale of 300 ns. Results from computational screening using the computational tools SIFT and Polyphen-2 showed that the SNP, rs4680 (V158M) in COMT is deleterious with a phenotype in PTSD. Results from MDS showed some major fluctuations in the structural features such as root mean square deviation (RMSD), radius of gyration (Rg), root mean square fluctuation (RMSF) and secondary structural elements including  $\alpha$ -helices, sheets and turns between wild-type and mutant forms of COMT protein. In conclusion, our study provides new insights into the deleterious effects of the V158M mutation on the COMT structure.

**Choi, Seul Ki**

**Supervisor(s) -- Dr. Daniela Friedman**

## **Health information seeking behaviors among caregivers of individuals with Alzheimer's disease and related dementias**

One in nine Americans age 65 and older has Alzheimer's disease (AD) and more than 15 million family members or friends of individuals with AD and related dementias (ARD) provide unpaid caregiving. Caregivers often look for health information for themselves (self-health information seeking) as well as for their care recipients (surrogate-health information seeking). Caregivers may face challenges with accessing and understanding information that they need for caregiving and for their own health. Having adequate health literacy is important for caregivers to manage their own health as well as to perform caregiving tasks. Less is known, however, about health literacy, and self- and surrogate- health information seeking behaviors of caregivers of individuals with ARD.

This study aims at understanding health literacy and health information seeking behaviors among caregivers of individuals with ARD. Caregivers of individuals with ARD were recruited via local caregiver support groups and asked to complete a survey and participate in focus groups. The survey instrument assessed caregivers' self- and surrogate- health information seeking behaviors, sociodemographic characteristics, health literacy, and physical and mental health status, caregiving practice, and characteristics of care recipients. The survey was distributed as a printed form and in an online format. Focus groups are currently being conducted to obtain more in-depth information about caregivers' self- and surrogate- health information seeking behaviors. A semi-structured guide that was developed based on initial survey results and research aims is being used for the focus groups. All interviews are recorded and will be transcribed verbatim. Participants received incentives of \$10 upon completion of the survey and \$25 after participation in the focus group.

Survey data is being analyzed using SAS 9.4 to generate descriptive statistics and examine similarities and differences between self- and surrogate- health information seeking behaviors. Potential factors affecting health information seeking behaviors will be examined using linear and logistic regressions as appropriate. The qualitative constant comparative method will be used for the focus group analysis. The results of this study will provide a deeper understanding of self- and surrogate- health information seeking behaviors among caregivers of individuals with ARD.

**DeMello, Madison**

**Supervisor(s) -- Dr. Bernardine Pinto**

## **Longitudinal Determinants of Sedentary Behavior among Colorectal Survivors**

### **Background**

Colorectal survivors spend approximately 9 hours/day in sedentary behavior (SED). While there is extensive research into the health detriments of SED, less is known about the determinants of SED, specifically among cancer patients. In this longitudinal study, we examined determinants of SED among colorectal survivors who participated in a 12-month physical activity randomized controlled trial.

### **Methods**

Colorectal survivors (Stage 0-3, <5 years since diagnosis) were randomized. SED was objectively measured using the CSA monitor at baseline and 3, 6 and 12 month follow-ups. Additionally, fitness, mood, body fat and cognitive and behavioral processes of change for physical activity were assessed at baseline and follow-ups. Using Latent Class Analysis (LCA), we identified 4 distinct subgroups of the sample with respect to SED over one-year. Classes were compared using Analysis of Variance with respect to baseline data including demographics, fitness and psychosocial constructs. Using generalized linear models, class was used as a predictor of change in psychosocial outcomes controlling for group assignment.

### **Results**

46 colorectal survivors (57 years old, 57% female) were randomized. Data supported a 4 class mod-

el: 22% had high/sustained min/week of SED over 12 months (Class 1), 24% had low/sustained SED (Class 2), 33% had increasing SED over time (Class 3) and 22% had high SED through 6 months followed by a marked decreased through 12 months (Class 4). Overall, females were less likely to be in Class 1; mood was significantly lower at baseline in Class 2; and baseline cognitive processes were highest and fitness and body fat were significantly worse at baseline for Class 3. Finally, class was a significant predictor of changes in fitness, mood and moderate-to-vigorous physical activity ( $p$ 's<.05) over 12 months.

## Conclusions

Characteristics such as gender, fitness, body fat and psychosocial constructs may be useful variables to help guide researchers and practitioners in their efforts reduce SED among survivors.

## Gao, Peng

**Supervisor(s) -- Dr. Greg Carbone**

### **Basins-Level Heavy Rainfall and Flood Analyses**

Flooding induced by extreme rainfall events causes tremendous loss of life and property, and infrastructure failure. Accurate representation of precipitation, which has high variation in space and time, is critical to hydrologic model simulations and flood analyses. In this study, we examined responses of differently-sized United States Geological Survey (USGS) hydrologic units to heavy precipitation using three different data sets. The first one is rainfall observation at individual meteorological stations. The second blends the advantages of meteorological station data with high temporal resolution, with the spatial coverage of Parameter-elevation Relationships on Independent Slopes Model (PRISM) data. The third uses National Centers for Environmental Prediction (NCEP) National Multi-sensor Hourly Precipitation Analysis Stage IV Data. We examined how urban watersheds affected by an October 2015 flooding event in South Carolina respond to the two different representations of heavy rainfall, using the Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS) developed by the US Army Corps of Engineers. We found that although the latter two methods that consider spatial representation of rainfall yields similar performance, they improved simulated streamflow as compared to that using rainfall observed at individual meteorological stations. Our study helps identify uncertainties associated with precipitation inputs for flood analyses and informs floodplain management and planning.

## Gibbs, Bobby

**Supervisor(s) -- Dr. Daniel Fogerty**

### **Entrainment of Different Speech Rhythms as a Predictor of Speech-in-Noise Recognition**

The ability to attend to a target talker in noise likely involves tracking changes in speech amplitude over time. Due to the complexity of the speech signal, characterizing the temporal modulations that are salient for perception of speech in noise remains a challenge. The temporal modulations present in a talker's speech can be analyzed according to different frequency band rates which correspond to different speech rhythms. In this study young listeners with normal hearing were instructed to synchronize their speech production with a pre-recorded male talker speaking nursery rhymes and longer sentences from a passage. Different measures of the subject's alignment, or entrainment, to the target speech were obtained based on correlations between temporal modulations at different frequency bands. This analysis provides an opportunity to observe how speech entrainment may be similar across different band rates as well as to identify rates that specify unique aspects of entrainment. This analysis also provides an opportunity to explore whether any of these entrainment measures are aligned with recognition of speech in noise. These different acoustic entrainment measures will be compared to a more standard entrainment measure that only assessed vowel peak alignment. Results from this study will demonstrate how people entrain to specific speech rhythms and how entrainment to specific rhythms is related to speech recognition in noise.

**Goff, Eric**

**Supervisor(s) -- Dr. Matt Irvin**

**The Role of Informal Youth STEM Program Participation in Undergraduate Student STEM Interest**

Informal science learning opportunities provide young people an environment to interact with STEM content that is different than the traditional school setting. While informal science learning programs can vary in both the experiences that they offer as well as the training that they require, involvement in these programs can promote STEM interest and engagement amongst participants. Positive outcomes such as this are paramount in the promotion of undergraduate students in the STEM pipeline and eventually in the STEM workforce.

This study aims to examine how involvement in informal science learning opportunities may play a role in their future interest, engagement and motivation regarding the STEM disciplines. We surveyed undergraduate students enrolled in introductory biology courses at a major public university in the Southeast. Measures were designed to gather data on students' interest, perceived importance, academic aspiration and perceived competence in regard to STEM concepts. We analyzed the outcomes of these surveys and investigated differences across student's who had previously participated in informal science learning programs. In addition, we analyzed differences based on student gender and ethnicity. Students who reported prior informal science program participation show significantly higher educational aspirations, perceive themselves are more competent in regard to STEM concepts and have higher perceived interest and importance in STEM disciplines compared to those who had not participated in informal programs. In addition, females reported significantly higher educational aspirations than their male counterparts. Alternately, males showed a slightly higher perceived competence in STEM concepts than females. Results of this study demonstrate the possible roll of informal science program participation in the choice of undergraduate students to pursue STEM disciplines as a field of study. Future studies will focus on the promotion of informal science programming amongst young people in the hopes of increasing the interest and engagement in the STEM disciplines.

**Kingston, Alexandra**

**Supervisor(s) -- Dr. Daniel Speiser**

**Co-evolution of complex traits associated with a key innovation: Weaponry, armor, and vision in the snapping shrimp, *Alpheus heterochaelis***

Snapping shrimp are a group of decapod crustaceans where the evolution of a key innovation, the snapping claw, is accompanied by the co-evolution of sophisticated armor. This armor, called an orbital hood, covers the head and eyes of snapping shrimp to protect them from the explosive collapse of cavitation bubbles produced by their snapping claw. The morphology of the orbital hood has led to the long-standing hypothesis that snapping shrimp are blind, even though these animals have well-developed eyes. To address how these complex traits may have co-evolved, we are examining the associations between the force produced by the snapping claw and the protective properties of the orbital hood, determining if the orbital hood transmits enough light to support vision, and testing whether the visual system is functional. We have found that the big claw snapping shrimp, *Alpheus heterochaelis*, has a forceful snapping claw and an extensive orbital hood that completely covers its well-developed eyes. We have discovered that the orbital hood of *A. heterochaelis* transmits 80-90% of incident light across the visible spectrum (400-700nm). Using electroretinography, we have discovered that *A. heterochaelis* is physiologically capable of detecting light stimuli. We conclude that snapping shrimp with sophisticated snapping claws, like *A. heterochaelis*, have full orbital hoods that cover the eyes, without obstructing visual function.

**Kocevski, Vancho**

**Supervisor(s) -- Prof. Theodore Besmann**

## **Computational modeling of prospective molecular frameworks for nuclear waste forms**

Hierarchical waste form materials are a novel approach to nuclear waste sequestration. Their inherent ability to contain various structural motifs within a larger framework or structure make them an interesting candidate to hold various transuranic or fission product elements all within a single entity. Salt-inclusion materials, SIMs, are a class of hierarchical material that consist of a covalent oxide framework containing voids filled by ionic salts potentially of radionuclides of important fission products. The framework allows for structural variability forming uranyl based silicate, germanate, phosphate, or borate networks, as well as europium and gadolinium silicates. To widen the class of materials, ion exchange of existing SIMs can be performed to include targeted isotopic compositions important in nuclear waste. It is therefore of interest to understand the role of the pore sizes created by the salt inclusions and their involvement in ion exchange mechanisms, and moreover, calculate their thermodynamic stability, including formation enthalpies and Gibbs energies. To date there is no published literature on the thermodynamic properties of SIMs. This work investigates the thermodynamic stability using density functional theory (DFT) calculations and estimation/correlation techniques such as volume based thermodynamics (VBT) to determine values for the SIM, including their separate framework and salt constituents. For the VBT calculations, we use structural information from crystallographic data and build a thermodynamic cycle to calculate entropies, enthalpies and Gibbs energies of formation. In addition, ion exchange energies can be predicted, allowing for the determination of relative material stability and the tendency for ion exchange. The results can guide experimental efforts and can be coupled with calorimetric data when available. We aim to provide a library of Gibbs energy values for a set of systems that encompass a multitude of different frameworks and potential salt inclusions to effectively inform the sequestration of radionuclides for waste management.

**Li, Ning**

**Supervisor(s) -- Prof. Michael Sutton**

### **Processing SAR Images for Measuring Ground Displacements**

The Differential Interferometric Synthetic Aperture Radar (dInSAR) technology has been applied worldwide to detect Earth's surface deformations/changes, but has not been used extensively in the State of South Carolina. In an effort to assess the potential for using dInSAR to provide quantitative data, a modified version of a modern radar image processing software was recently functionalized by the investigator and is now available in a USC. Preliminary evaluation of publicly available SAR images showed that there were unexpected differences in measurements that should nominally be the same. As a result of these preliminary studies, the investigators have identified several issues that must be investigated and potentially improved to obtain the required accuracy and reduced variability. The issues include (a) the coarseness of the initial feature matching used to properly align SAR images, and (b) variability in the measurements obtained when using SAR images of the same region obtained using different satellite paths.

Subsidence/uplift data have been obtained by the investigators using SNAP software to analyze pairs of Sentinel-1A satellite's SAR images for (a) urbanized and (b) forested areas that did not experience significant geologic events. The results from these studies provide a baseline for the expected level of variability in the dInSAR measurements.

**Moore, Emily**

**Supervisor(s) -- Dr. Theodore Besmann**

### **Multi-Scale Computational Modeling of Phase Relations in Uranium Silicide-Based Fuels and Alternative Cladding**

The phase equilibria of advanced technology nuclear fuel candidates and interactions with alternate options to zirconium-based cladding is being explored. Uranium silicide ( $U_3Si_2$ ) and silicide nitride ( $U_3Si_2-UN$ ) composite fuels are the most promising contenders for the future, whereas ferritic alloys

such as FeCrAl and SiC/SiC composite materials are under investigation for the cladding. The uranium density of the silicide and U-Si-N composite is advantageous in overcoming the neutron penalty imposed by the FeCrAlY material. This work focuses on thermochemical modeling and experiment to explore current limitations within the literature concerning the U-Si-N and U-Si-FeCrAlY phase space. Experimental techniques to investigate the U<sub>3</sub>Si<sub>5</sub>-USi<sub>2</sub> region include arc-melting and characterization by SEM-EDS and XRD, which is also extended to ternary nitride compositions. A multiscale modeling approach is used to explore the U-Si phase space including DFT, evolutionary algorithms and cluster expansion to identify stable structure types. Density functional theory is also utilized for formation energies of the U-Si-N ternary as well as the U-Fe-Si phase space to include FeCrAlY cladding compositions. These first principal calculations support thermodynamic CALPHAD assessments these ternary systems, with the cumulative results serving as input for higher order fuel performance evaluation.

→ This research is being performed using funding received from the DOE Office of Nuclear Energy's Nuclear Energy University Programs

**Saylor, Rachel**

**Supervisor(s) -- Dr. Parastoo Hashemi**

### **Investigation of Serotonin Transporter Dynamics in Response to SSRI Administration**

The treatment most often prescribed for depression, selective serotonin reuptake inhibitors (SSRIs), are thought to act by blocking serotonin reuptake via inhibition of serotonin transporters (SERTs). Many fundamental questions remain on the precise mechanism of action, dose regimen, and time course surrounding this treatment, leading to variable efficacy in the clinic. Through in vivo fast-scan cyclic voltammetry after acute SSRI administration, we determine that evoked serotonin release and reuptake responds in a dose-dependent, but not linear, manner. Unexpectedly, a faster reuptake of serotonin at select time points and SSRI doses was observed, leading to the hypothesis that the surface expression of SERT must increase dynamically in response to SSRI administration. To investigate this theory, confocal laser-scanning microscopy of both active and resting stem-cell derived serotonergic neurons was employed to investigate the SERT surface density and its function in vitro. These in vitro results demonstrate a difference in the density and function of SERT after an acute exposure to an SSRI, with active neurons exhibiting increased density and functionality at 5 minutes, relative to resting neurons. Taken together this in vivo and in vitro data show that the function and surface expression of SERT after acute SSRI administration is complex and dynamic. In the future, this information can be employed to improve understanding of SSRI efficacy, aiding the development of better therapeutics for depression.

**Shi, Dexin**

**Supervisor(s) -- Dr. Alberto Maydeu-Olivares**

### **Fitting Ordinal Factor Analysis Models with Missing Data: A Comparison between Pairwise Deletion and Multiple Imputation**

This study compares two missing data procedures, pairwise deletion (PD; the default setting in Mplus) and multiple imputation (MI) in the context of ordinal factor analysis models. We examine which procedure, PD or MI, tends to show parameter estimates and model fit indices closer to those from analysis of the hypothetical complete data. The performance of PD and MI are compared under a wide range of conditions, including sample size, percent of missingness, and degree of model misfit. Results indicate that both PD and MI yield parameter estimates similar to those from analysis of complete data under conditions where the data are missing completely at random (MCAR). When the data are missing at random (MAR), the PD parameter estimates could be severely different from those obtained from the complete data analysis; given the percentage of missingness is low (< 50%), the MI procedure could yield parameter estimates that are similar to the results using complete data. However, when applying the MI procedure, the fit indices (i.e.,  $\chi^2$ , CFI, TLI, RMSEA, and WRMR)

tend to yield estimates that suggested a worse fit than the counterparts which would have been obtained using complete data. Implications and recommendations for applied researchers are also provided.

**Shidal, Chris**

**Supervisor(s) -- Dr. Mitzi Nagarkatti**

**MicroRNA-92 expression in CD133+ melanoma stem cells regulates immunosuppression in the tumor microenvironment through integrin-dependent TGF- $\beta$  activation**

The existence of cancer stem cells (CSC) accounts for the high degree of chemoresistance and heterogeneity characterizing refractory melanomas. Yet, the degree to which CSCs modulate immune cells in the tumor microenvironment has yet to be revealed. The present study aims to establish a novel role for miR-92 and its associated gene networks in immunomodulation. We employed syngeneic mouse models utilizing B16-F10 melanoma cells to observe primary tumor and metastatic growth. CSCs were isolated from the parental line based on expression of the putative CSC marker, CD133. CD133+ cells were functionally distinct from CD133- cells with CD133+ cells showing increased proliferation in vitro and enhanced tumorigenesis when administered subcutaneously. Our data indicated that compared to CD133- cells, CD133+ CSCs had a greater capacity to recruit immunosuppressive cell types during tumor formation. Using microarray technology in order to expose disparities in microRNA expression between CSC and non-CSC compartments, we identified several miRs that were significantly downregulated in CD133+ cells including miR-92. We hypothesized that lower levels of miR-92 in CSCs led to higher expression of integrin subunits as predicted by gene alignment software and confirmed using qRT-PCR. Flow cytometry analysis of dissociated tumors demonstrated that tumors initiated by CD133+ cells displayed significantly higher levels of TGF- $\beta$  compared to CD133- cells. Additionally, qRT-PCR for TGF- $\beta$  associated genes confirmed a significant increase in expression in CD133+ cells. These data suggest that CSCs efficiently induce intratumoral immunosuppression which is potentially regulated by a miR-92 driven axis involving integrin activation of TGF- $\beta$ .

**Sweeney, Allison**

**Supervisor(s) -- Dr. Dawn Wilson**

**A Qualitative Study to Examine How Differences in Motivation Can Inform the Development of Tailored Physical Activity Intervention Programs**

Despite the significant health benefits, the majority of adults fail to meet national physical activity (PA) guidelines, with underserved groups (low income and racial/ethnic minority groups) having the highest rates of physical inactivity. Previous efforts to engage underserved groups in PA initiation have been, for the most part, unsuccessful. This may be because most interventions have predominantly adopted a "one-size-fits-all" approach, with few studies examining why certain individuals are more responsive to an intervention than others. Numerous studies have shown that while some people feel compelled to engage in PA by autonomous reasons (i.e. viewing PA as self-determined, enjoyable, important), others feel compelled by controlled reasons (e.g., viewing PA as instrumental for attaining rewards). Despite extensive research showing substantial differences in people's motivation for PA engagement, differences in autonomous vs. controlled motivation have been overlooked as critical individual difference that can be embedded within intervention strategies to maximize engagement. The present research aimed to 1) examine how differences in motivation relate to differences in physical activity needs and interests among inactive African American adults and 2) to get input about how to best design PA programs that are tailored towards differences in motivation. Qualitative data were obtained from inactive African American women through three focus groups (N=20, Mage = 43.7, Median Income = \$25,000-\$39,999). Participants completed a survey measuring their motivation for initiating PA and completed a group discussion about what would help them to be more physically active in the future. Sessions were audiotaped, transcribed, and coded by independent pairs of raters. QSR NVi-

vo8 was used to analyze data, and themes were categorized separately for individuals categorized as autonomous vs. controlled. We identified themes around universal PA barriers/facilitators, including access, time, convenience, and family involvement, as well as themes that were specific to individuals categorized as autonomous or controlled. When discussing facilitators, the autonomous group focused on themes of excitement and competition, whereas the controlled group focused on themes of tangible support and incentives. Developing intervention programs that are tailored toward differences in motivation may be a useful approach for increasing PA engagement among underserved African Americans.

**Verreet, Tine**

**Supervisor(s) -- Dr. Fabienne Poulain**

**Role of mitochondrial fusion in retinal axon outgrowth and maintenance in vivo**

Neurons are particularly dependent on mitochondria for ATP supply and calcium buffering in regions distant from the cell body, such as the axonal growth cone or synapses. Proper regulation of mitochondrial dynamics, including transport, fission, and fusion, is therefore of vital importance for neuronal development and function. Mitochondrial dynamics were identified as targets of a variety of neurodevelopmental and neurodegenerative diseases. One of those, Charcot-Marie-Tooth type 2A (CMT2A), is characterized by the degeneration of long motor and sensory axons, including the optic nerve. CMT2A is caused by mutations in Mitofusin-2 (Mfn2), which fuses mitochondria by forming homodimers or heterodimers with Mfn1. Mfn1 has however never been associated to CMT2A. That is why, to date, it remains unclear whether dysfunctional mitochondrial fusion underlies CMT2A. In this study, we aim to determine the roles of mitochondrial fusion in growing axons, both under normal conditions and in the context of CMT2A. For this purpose, we use the zebrafish visual system that allows genetic and live imaging approaches to visualize mitochondria directly in retinal axons in vivo.

We first analyzed the behavior of mitochondria in the growth cone of retinal axons elongating along the optic tract. Mitochondria accumulated in the central domain but were also occasionally observed along filopodia extending from the growth cone periphery. We are currently analyzing whether these dynamics correlate with and/or predict growth cone behavior. We also detected a higher rate of anterograde versus retrograde mitochondrial transport in the axon shaft proximal to the growth cone, suggesting that mitochondrial fusion may occur in the growth cone and regulate its behavior. To test this hypothesis, we are now photoconverting Dendra2 targeted to mitochondria to visualize fusion events in real time, and are testing the effects of expressing a dominant negative form of Mfn1 that inhibits mitochondrial fusion. Finally, we will compare how mitochondrial dynamics are affected by the expression of a dominant negative form of Mfn2 or of Mfn2 harboring mutations found in CMT2A patients. Altogether, these studies will bring new insight into the role of mitochondrial fusion in axon development and maintenance.



# **Medical Scholars**

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# **presentations**

**Alimohamed, Saif**

**Mentor(s) -- Dr. Prahlad Ram, Dr. Elena Seviour**

**MET downregulation by miR-206 potentially implicated in reversing cisplatin-induced chemo-resistance in ovarian cancer**

Adaptive resistance to chemotherapy represents 90% of unsuccessful treatment of advanced cancer patients. Several microRNAs have been shown to have differential expression values in chemo-resistant tumors and have been implicated as the cause of chemo-resistance in tumor samples. In this study, we used microRNA expression, gene expression, and RPPA data from TCGA patients to identify differentially expressed miRNA in TCGA ovarian cancer patients who were resistant to cisplatin treatment versus patients who were sensitive to cisplatin treatment.

First, we stratified the two sets of patients into cisplatin resistant and cisplatin sensitive patients. Cisplatin resistant patients survived surgery and lived for less than 6 months post-surgery, while cisplatin sensitive patients survived surgery and lived for greater than 2 years post-surgery. After categorizing these two sets of patients, the expression distributions of each of the miRNA were compared in the chemo-resistant and chemo-sensitive groups, which revealed that miR-206 is up-regulated in chemo-resistant patients. The functional gene and protein targets of miR-206 were then identified which were PAX3, MET, KRAS, EGFR, ESR1, IRS1, IGF1, TSC2, HDAC4, and HMGB3. Ultimately, our network analysis showed that PAX3 is a known gene regulator of MET which interacts with EGFR and KRAS. Then, functional enrichment analysis showed that MET is involved in oncogenesis. MET was identified as a key component of this signal transduction pathway and Western Blot was used to validate that miR-206 reduced expression of MET. Cell proliferation assays in the H460 lung cancer cell line showed that miR-206 coupled with cisplatin may decrease cell proliferation.

Overall, the implication of this research is that by miR-206 downregulating the downstream effector target MET, there could be potential reversal of chemoresistance to cisplatin in these ovarian cancer patients. Future experiments would involve reverse protein engineering MET to confirm this hypothesis. Moreover, future directions include determining the effect of miR-206 on migration and metastasis, while also exploring if miR-206 is implicated in other network signatures that play a role as chemosensitive targets.

**Anderson, Alexander**

**Mentor(s) -- Dr. Kristopher Phillips**

**The Effectiveness of Exercise and Soft Tissue Mobilization to the Sternocleidomastoid in a Patient with Cervicogenic Headaches: A Case Report**

**Background and Purpose**

The diagnosis of cervicogenic headache is a relatively new concept. As evidence on the topic has become more available, patients are more frequently utilizing physical therapy services to treat the condition. Common physical therapy treatments utilized in the treatment of cervicogenic headache include exercise, cervical joint mobilizations, and trigger point therapy. The purpose of this case report is to detail the effects that deep neck flexor strengthening, soft tissue mobilization to the sternocleidomastoid, and therapeutic exercise may have on the management of symptoms associated with cervicogenic headache.

**Case Description.**

A 70-year old male presented with right sided neck pain with concurrent headaches along the parietal region of the head. The patient's symptoms were strictly present along the right side and did not switch sides. Neck pain and headaches were associated with head and neck movements, specifically movements that involved lateral flexion or rotation to either the left or right sides. The patient underwent physical therapy treatment that consisted of neck flexor strengthening, cervical flexibility exercises, postural education, and manual therapy.

**Outcomes**

The patient attended 11 sessions of physical therapy treatment. At discharge, the patient's Neck Disability Score decreased from 18% to 6%. The patient also exhibited a significant improvement in subjective pain. In addition to improvements in disability and pain, the patient also demonstrated significant improvements in cervical active range of motion and neck flexor strength, as well as a decrease in headache frequency.

#### Discussion

Improvements in headache frequency, neck pain, cervical range of motion and subjective disability suggest that a multi-modal treatment approach involving exercise and manual therapy may be effective in patients with cervicogenic headache.

### **Baker, Daniel**

**Mentor(s) -- Dr. William Richardson, Dr. Lewis Hardison**

### **Severe Diphenhydramine Overdose Resulting in Compartment Syndrome**

#### Introduction:

Severe diphenhydramine (DPH) overdose is well-described to cause cardiovascular and neurologic toxicity including anticholinergic poisoning, sodium-channel blockade-induced QRS prolongation, myocardial depression, CNS depression, and seizures. Large overdoses appear similar to tricyclic antidepressant poisoning. However, there are limited case reports describing toxicity to include severe rhabdomyolysis and compartment syndrome. We report a case of massive DPH overdose resulting in compartment syndrome requiring extremity amputation.

#### Case Description:

A 29-year old male presented to an emergency department by EMS for reported altered mental status followed by seizure activity after collapsing at a public bus stop. Paramedics reported emesis containing blue tablets. The patient's initial presentation revealed a young African American male with dilated pupils, intermittent seizures with several tongue lacerations, altered mental status, and a wide complex tachycardia. Initial treatment included intravenous fluids, lorazepam, airway management with mechanical ventilation, and activated charcoal. The patient received multiple boluses of sodium bicarbonate followed by a continuous infusion secondary to a widened QRS of 202 ms on electrocardiogram. He was admitted to the medical ICU and rapidly developed rhabdomyolysis and acute renal failure requiring hemodialysis. Bilateral upper extremity edema worsened over the first 24 hours of hospitalization resulting in compartment syndrome requiring bilateral upper extremity fasciotomies. Due to the severity of muscle necrosis despite fasciotomy, a right upper extremity amputation was performed on hospital day #4 with a peak creatine phosphokinase (CPK) the following day of 1,169,200 U/L. The patient was ultimately discharged to home on hospital day #44 but continued to require hemodialysis for renal failure. A serum diphenhydramine level initially obtained in the ED was 9800 ng/ml confirming DPH exposure and toxicity.

#### Discussion:

Diphenhydramine overdose is common and well described. However, the development of severe rhabdomyolysis and compartment syndrome requiring fasciotomy and limb amputation is rare. This case presents the complicated course of a patient with classic clinical findings of cardiovascular and neurologic toxicity from DPH poisoning along with the rare complication of associated compartment syndrome.

### **Barbier, Gregory**

**Mentor(s) -- Dr. Stanley Hassinger, Dr. Micheal Wade**

### **The Case of the Disappearing Teddy Bear: Gastric Bezoar as an Atypical Cause of Vomiting in a Pediatric Patient**

Vomiting is a frequent cause of ED visits in the pediatric population. In this poster, we present an

unusual cause for nausea and vomiting in a six-year-old. In this case, the patient was seen a total of 3 times in the ED over several days for nausea and vomiting with an otherwise unremarkable physical exam. On his third visit to the ED, having failed conservative outpatient management of his symptoms, an abdominal plain film was obtained and he was found to have a large gastric bezoar. On further questioning mother noted her son's favorite teddy bear had been gradually shrinking in size and fluffiness over the preceding weeks and the supposition was that the patient had been eating the stuffing. The ultimate cause of the patient's symptoms was a gastric bezoar secondary to teddy bear stuffing with concretion in the stomach, which required open laparotomy for removal. A bezoar is a concretion in the gastrointestinal tract that increases in size by continuous accumulation of non-absorbable food or fibers, often in the stomach. Bezoars are an uncommon occurrence as the incidence for patients of all ages is very low. As bezoars enlarge, complications can present including malabsorption, nutritional deficiencies, intussusception, pancreatitis, stomach mucosal ischemia, ulceration, hemorrhage, and even gastric perforation has been described. Presentations for gastric bezoars vary widely, but most commonly present with nausea, vomiting, and abdominal pain. The most common types of bezoars are trichobezoars, phytobezoars, lactobezoars, and medication bezoars. Inorganic fibers causing bezoars are rarely described in the literature, though there are cases of carpet fiber bezoars being described. In this case, surgical laparotomy removed the bezoar and the patient's symptoms resolved. In conclusion, this case highlights a relatively rare pediatric pathophysiologic phenomenon and underscores the value of obtaining a thorough history, as often details that may seem irrelevant end up being important diagnostic clues.

**Barrett, Hayden**

**Mentor(s) -- Dr. Wayne Carver**

### **Effects of Cardiomyocyte (H9C2) Exosomes on Cardiac Fibroblast Activity**

Heart disease is the number one killer in Western nations. The primary culprit is hypertension that induces myocardial remodeling (MR). MR is an adaptive process that allows the heart to sustain oxygen demands of the body. MR can be deleterious and often reduces the efficiency of the heart. Cardiac tissue is primarily composed of resident cardiac cells including myocytes, endothelial cells, fibroblasts and smooth muscle cells. The fibroblasts are responsible for the synthesis and deposition of the extracellular matrix and play an important role in fibrosis and MR. A number of recent studies have indicated that MR likely involves crosstalk between cardiac muscle cells and cardiac fibroblasts. Attempts to elucidate this crosstalk have been targeted for study. A mechanism of cell-to-cell communication that is not extensively understood is the exchange of regulatory molecules by exosomes. The long-term purpose of our research is to understand how chronic abuse of alcohol results in deleterious MR including fibrosis. The purpose of the present study was to evaluate the effects of exosomes from alcohol-treated myocytes on cardiac fibroblast activity. For these studies, H9C2 cells, a cardiomyocyte cell line was treated with ethanol and exosomes collected. Fibroblasts were subsequently treated with myocyte-derived exosomes and bioassays performed to assess fibroblast function. Collagen gel contraction assays, BrdU proliferation assays, and migration assays were used to determine the effects that exosome treatments have on cardiac fibroblast activity. The results from collagen gel assays with fibroblasts showed that exosomes from the ethanol-treated H9C2 cells induced a significantly enhanced contraction of the collagen gel as measured by surface area. Migration assays of fibroblasts treated with exosomes from ethanol-treated H9C2 cells showed a trend towards more rapid migration, but without statistical significance. BrdU proliferation assays did not demonstrate consistent change in fibroblast proliferative activity with exosome treatments. These findings indicated that exosomes derived from ethanol-treated cardiomyocytes may play an important role in the fibrotic response via transfer of regulatory molecules to cardiac fibroblasts. Further research is necessary to study how these affects contribute to MR in an animal model and identify specific molecules involved in this response.

**Bowser, Matthew****Mentor(s) -- Dr. Troy Privette****Improved recognition and management of patients presenting with sepsis in the PHR ED**

Background:

Sepsis is a major cause of mortality worldwide. Early recognition and intervention leads to improved survivability. CMS has implemented an “all or nothing” benchmark for providers treating patients diagnosed with severe sepsis or septic shock. Palmetto Health has implemented a sepsis treatment power plan into our EMR. An analysis of ED provider powerplan utilization was made before and after enrolling the EM residency in a QI project. At the completion, a comparison of usage from FY2016 was compared to usage from FY2017 as well as mortality of power plan vs no power plan.

Methods:

A retrospective chart review of patients presenting to the PHR ED meeting SIRS criteria from 5/1/2016 -8/5/2016 was compared to patients from 10/1/2016 – 1/5/2017 (post power plan development). The initial cohort, 49 patients met SIRS criteria; 75 in the post QI group. The two groups were compared on powerplan usage.

All patients dx with sepsis at PHR for FY16 and FY17 was obtained as well mortality outcomes. Patients with sepsis using the power plan vs not were analyzed for RR and NNTR using mortality as outcome.

Results:

Of 49 patients meeting SIRS criteria, 16 patients (32%) utilized the powerplan. The post QI group, powerplan utilization increased to 53 out of 75 SIRS patients (77.3%). In FY16, 1267 septic patients without powerplan useage(87.2%); 186 septic patients recieved the plan (12.8%). In FY17, 888 septic patients without powerplan (57.6%); 652 with the powerplan (42.3). Thus power plan increased from FY16 to FY17 of 29.54% (P <.001)

Septic patients with powerplan from FY16 and 17 combined was 838; 100 of these patients expired. Without the powerplan for FY16 and FY17, 2155 dx with sepsis and 373 expired. Thus, NNT= 18.6 (CI 12.0-40.4) to prevent mortality and a RR of death from powerplan usage vs no powerplan =0.6894 (CI 0.561-0.847)

Conclusion:

The implementation of a QI project lead to increased usage of sepsis powerplan. Utilization of the powerplan increased for all patients who received sepsis as a diagnosis at PHR between FY2016 and 2017. Mortality of septic patients decreased between powerplan in FY16 and 17 vs no powerplan.

**Brady, Caroline****Mentor(s) -- Dr. Heather Brown****Injury Patterns of Patients Presenting to a Non-Government Hospital in Western Uganda**

Background: Injury is a leading cause of morbidity and mortality globally and disproportionately affects low-income countries. Most injury data from low-income countries come from studies performed in large tertiary care centers in urban settings. The purpose of this study was to describe the patterns and severity of injury in patients presenting to a small hospital in a more rural setting.

Methods: This is a retrospective review of a paper trauma registry implemented at Masindi-Kitara Medical Center (MKMC) in March of 2017. Run by a non-government organization, MKMC is a 40 bed hospital with 24 hour services located in Northwest Uganda. Data was extracted from trauma registry forms which were completed over nine months by clinicians upon initial presentation of all injury patients to MKMC, regardless of age or severity of injury.

Results: A total of 260 patients were entered into the registry. Most patients were male (70.7%) and the average age was 27.5 with a range from 2 months to 85 years. Road traffic accidents (RTAs) accounted for the majority of trauma patients (60.1%). Motorcycle crashes were the most common mechanism of injury accounting for 46.2% of all trauma patients and 76.9% of RTAs. This was followed by car crashes (10.3% of all trauma patients and 17.1% of RTAs) and falls from height (7.5%

of all patients). The majority of patients (59.9%) were treated in the outpatient department and discharged. Forty-eight patients (19.8%) were admitted and eight patients (3.3%) were taken directly to the operating theater after initial stabilization. Analgesics (71.1%) and antibiotics (49.2%) were the most common treatments administered. 6.9 % of patients received intravenous fluids and only three (1.1%) received blood. Forty-one patients (16.9%) required transfer to another facility. The majority of transferred patients were isolated orthopedic injuries (68.3%), followed by head injuries (14.6%), and ENT injuries (7.3%).

Conclusion: RTAs were the leading cause of injury in this setting and motorcycle crashes were the predominant mechanism. Soft tissue injury was the most common diagnosis and most patients were discharged from the outpatient department.

**Brastauskas, Ian**

**Mentor(s) -- Mrs. Carol Ann Dean, Dr. Phillip Prest**

### **Analyzing Sequential Compression Device Compliance in a Large Tertiary Care Trauma Center**

Background: Hospitalized patients, particularly those hospitalized after sustaining traumatic injury are at significant risk of developing venous thromboembolism (VTE). VTE can progress to pulmonary embolism (PE) leading to significant morbidity and mortality in this patient population. The methods for preventing VTE are multifactorial and include pharmacological agents, patient ambulation, and sequential compression devices (SCDs). SCDs work through both a mechanical and fibrinolytic mechanism to prevent VTE, however compliance with their use in intensive care units and on hospital wards is often low.

Methods: Utilizing the electronic medical record at a tertiary care academic trauma center, the charts for all patients admitted to the trauma service ward (excluding the surgical trauma intensive care unit) were reviewed to determine if the patients had SCDs ordered. An audit of all patients on the service was then performed by walking into their room and seeing if SCDs were in use. Data was collected in the following categories: 1.) were SCDs ordered 2.) was the SCD pump in the room 3.) were the SCD sleeves in the room 4.) were the sleeves on the patient 5.) Was the pump turned on.

Results: 7 patients did not have SCDs ordered (n=7) while 17 patients (n=17) did have SCDs ordered. Of the 17 patients with SCD orders in place, 1 patient (5.9% of the patients with orders for SCDs) was found to be in full compliance with SCD use. Full compliance is defined as the SCD pump being in the room and turned on with the SCD sleeves in the room and on the patient. All other patients with SCD orders in place were found to be in various states of non-compliance.

Conclusion: Although it is widely accepted that SCD use can prevent VTE in hospitalized patients, compliance with their use is highly variable. In this analysis only 5.9% of patients with SCDs ordered were found to be in full compliance. Other patients were in various states of non-compliance. The next step will be to conduct an effect diagram to examine potential causes of non-compliance.

**Brown, Krishnan**

**Mentor(s) -- Dr. Julie Justo, Dr. Cortney Dodson**

### **Evaluation of Antibiotic-Associated Medication Errors in Hemodialysis Patients**

Background: There are a variety of approaches to administering antibiotics in hospitalized hemodialysis patients. It was hypothesized a local standard procedure of profiling antibiotics as on call as needed (or PRN) for intermittent hemodialysis (IHD) led to increased medication-related errors. The purpose of this study was to compare the antibiotic-associated medication error rate in patients receiving PRN versus scheduled dosing with IHD.

Methodology: This retrospective, observational cohort study was performed in patients with monomicrobial gram-negative bloodstream infections at a single health system from January 1, 2010 to

December 31, 2017. Inclusion criteria included end-stage renal disease requiring hemodialysis for at least two weeks and initiation of IV antibiotics within 72 hours of index blood culture collection. Patients were divided into groups based on IV antibiotic scheduling: PRN (e.g. on call PRN HD MWF) versus scheduled (e.g. Q24h). The dosing group was defined by the initial regimen of the qualifying antibiotic agent which was maintained for at least 48 hours. Data collection included medication error rate, comorbid conditions, source of bloodstream infection, bloodstream isolate, severity of illness, duration of therapy, ICU length of stay, time to culture clearance, and 14-day mortality. Baseline categorical variables were assessed using a chi-square test or Fisher's exact test and baseline continuous variables were assessed using Student's t test or Mann-Whitney U test, as appropriate. Univariable and multivariable logistic regression was used to evaluate the impact of PRN versus scheduled dosing on the antibiotic-associated medication error rate, after adjusting for potential confounders.

Results: Pending

Conclusion: Pending

**Catala Fuster, Jaime**

**Mentor(s) -- Dr. Sharon Weissman**

### **When Neurontin does not help for headaches**

Background: Racemose neurocysticercosis is a type of extra parenchymal infection cause after ingestion of the cyst (larval stage) of *Taenia solium*. Symptoms can occur early than expected in other types of neurocysticercosis due to location of infection, load of parasitic infection and host immune response. Multilobulated or multiple confluent cyst within the subarachnoid space that may lack a scolex can be observed in the Brain MRI. Decrease response to treatment, multiple regimen medication and increase mortality are just some of the complexity to eradicate this parasitic infection.

Case description: We report a 34yo male patient who recently traveled to Honduras and developed headaches, seizures and hydrocephalus. Diagnosed with racemose neurocysticercosis after excision of an arachnoid mass and ventriculoperitoneal shunt to release intracranial pressure.

Conclusion: Treatment of racemose neurocysticercosis requires a multidisciplinary regimen, surgery, anti-parasitic, anti-inflammatory and anti-epileptic treatment. Symptoms can return after treatment is stop and most of the time prolonged therapy is required

**Chapman, Blake**

**Mentor(s) -- Dr. Kerry Sims**

### **IMPLEMENTING A LAPAROSCOPIC TRAINING CURRICULUM**

Background and Significance: With the increasing demand for gynecological laparoscopic procedures, comes an increasing demand for laparoscopic training in residency. Although animal models have shown to be consistent and valid, there is considerable cost and setup time.<sup>1</sup> An alternative to animal models are bench-top laboratory simulators for both training and assessment of surgical skill.<sup>2</sup> Our residency program had no minimally invasive curriculum. We set out to implement and prospectively evaluate a simulator-based minimally invasive training curriculum at our residency program.

Methods: All residents at the University of South Carolina OB/GYN Program were asked to participate in the minimally invasive curriculum. Only PGY-1 and PGY-2 residents in our OBGYN program were assessed in the laparoscopic tasks. Our curriculum consists of didactic modules from the Council on Resident Education in Obstetrics and Gynecology (CREOG), lectures given by faculty, simulation and demonstration of proficiency during live surgery in the operating room.

Three laparoscopic tasks were used for assessment of PGY-1 and PGY-2 residents. There was an initial assessment at the beginning of the first month of the academic year to provide a baseline score. Residents were required to document at least four hours of practice per month. A senior resident or attending physician supervised and scored each resident on the task. The tasks were then

reassessed the following Spring.

Results: By participating in the Minimally Invasive Curriculum, all residents were able to develop and practice their skills in a safe environment. Task completion time was used as the principle outcome measure in this training curriculum. Improvements in times to completion of the three tasks were appreciated by spending time in the training room.

Conclusion and Discussion: Based on the implementation of a minimally invasive curriculum and observing PGY1 and PGY2 residents using the curriculum, there was a decrease in the time to complete each task. Residents were also introduced and familiarized with instruments prior to the Operating Room. Further studies could consider utilizing a questionnaire for self-assessment as well as having faculty correlate improvement in times of the skills with skills in the operating room.”

**Claire, Jillian**

**Mentor(s) -- Dr. Kerry Sims, Dr. Shannon Poole**

### **Treatment of Suspected Postpartum Endometritis with Postplacental IUD insitu**

Postplacental IUDs are a popular and effective method of contraception in the postpartum period. Treating patients who develop suspected endometritis after placement of an IUD is a concern, as there have been limited cases reported in the literature. Options for treatment include immediate removal of the IUD or antibiotic therapy with the IUD in place. We report two cases in which patients were successfully treated for suspected postpartum endometritis while the IUD remained in place.

**Comer, Michael**

**Mentor(s) -- Dr. Jeff Hall**

### **Hypertension medication adherence survey at rural Nicaraguan outreach clinics**

Hypertension, is one of the most prevalent diseases worldwide and is especially prevalent in the Americas affecting approximately 20-40% of the population. In order to gain insight into how previously diagnosed hypertensive patients in rural Nicaragua acquire and take their medications, we conducted a survey in mobile outreach clinics outside of Sébaco, Nicaragua during a five day period in March of 2017. The survey included seven questions that were modified from similar instruments used in evaluating antiretroviral therapy in PEPFAR-funded projects. We obtained 70 surveys from patients with known diagnoses of hypertension, to identify where patients obtain medications and reasons why they miss doses or stop taking the medicine. This information on barriers and adherence can be used to develop strategies and patient educational strategies to improve therapeutic adherence.

Learning Objectives:

1. Recognize potential challenges of obtaining medications for chronic conditions such as hypertension in Nicaragua
2. List some of the reasons identified for antihypertensive medication non-adherence identified in a rural Low-Moderate Income Country population
3. Review the methodology used in medication adherence studies for HIV and how this can be applied to non-communicable disease therapy.

Knowledge, competency or performance gaps:

The Pan American Health Organization has been implementing strategies for improving care of Non-communicable diseases in several countries in Central and South America. Little information on patient adherence or barriers is available for this region in Nicaragua. This pilot study can help to inform strategies for improving adherence to medication therapy and overall cardiovascular care in this region.

Citations:

1. Alicea-Planas J, Greiner L, Greiner PA. Hypertension and related lifestyle factors among

persons living in rural Nicaragua. *Appl Nurs Res.* 2016 Feb;29:43-6. doi: 10.1016/j.apnr.2015.05.010. PubMed PMID: 26856487.

2. World Health Organization: *Global Status Report on Non-communicable Diseases 2010*. Geneva: World Health Organization; 2011.

3. Nicaragua, Instituto Nacional de Información de Desarrollo (INIDE). *Estimaciones y proyecciones de población nacional, departamental y municipal (revisión 2007)*. Managua: INIDE; 2007.

**Cook, Lauren**

**Mentor(s) -- Dr. Christine Turley**

### **TRANSFORMing Child Health: A Statewide Approach to Engaging New Populations in Research**

**Background:** Rural and underserved populations indicate willingness to participate in clinical trials, however there are structural and cognitive barriers that prevent full participation. Likewise, ethnic and racial representation in research populations is often difficult to achieve. TRANSFORM SC was developed to bridge the gap between investigators and patients, in part, by initiating a registry to recruit potential research participants. **Objectives:** The primary goal of this study was to determine if a statewide registry deployed through a new network of urban and rural providers would engage ethnically and racially diverse populations in research, as well as rural and underserved families. A secondary goal was to determine child health research topics of interest in this population. **Methods:** Participants were recruited from six clinical sites across SC. Participants completed an electronic consent as part of the REDCap web-based Registry survey. **Results:** From June to December 2017, a total of 755 families and 1,175 children enrolled in the registry. Participants represented all four regions of SC, and the majority of enrollees (74.3%) were from the Upstate region. 95.5% of participants resided in a metro area (250,000 to 1 million people), while 4.3% of participants resided in more rural areas (population of less than 250,000 people). A wide variety of ethnicities were enrolled including Non-Hispanic White (42%), Non-Hispanic Black (37%), Hispanic (13%), and multi-racial individuals (4.3%). The most common identified child health interests for parents were ADHD, respiratory infections/pneumonia, school problems and readiness, sleep concerns, and diabetes/obesity. **Conclusion:** The TRANSFORMing Child Health Registry was successful in engaging new populations to research, especially in the Upstate region. While the TRANSFORM SC registry was able to reach a diverse sample of ethnicities, including some underserved populations, it has not yet reached a representative measure of SC rural populations. Therefore, future research will develop local education opportunities to increase knowledge about research and address barriers to participation. This knowledge will be used to generate new recruitment strategies to increase rural population participation in the registry.

**Cryer, Michael**

**Mentor(s) -- Dr. Matthew Cantrell**

### **Born With a Saber in the Chest: Scimitar Syndrome**

**Background:** Scimitar syndrome is a variant partial anomalous pulmonary venous connection (PAPVC) in which part of or the entire right lung drain by right pulmonary veins connecting anomalously to the inferior vena cava (IVC).

**Case:** 34-year-old black female with history of Chiari-I brain malformation, hirsutism, tobacco use presents to the clinic with shortness of breath and chest tightness. Computed tomography (CT) scanning of the chest demonstrates a hypoplastic, bilobar, right lung, as well as, a large anomalous pulmonary vein draining into the intrahepatic IVC.

**Decision-making:** Exercise stress transthoracic echocardiogram demonstrates normal left ventricular function without resting or inducible regional wall motion abnormalities. There is a mildly dilated right atrium without evidence of pulmonary hypertension during rest or exercise. Her symptoms improve spontaneously so she is to have routine follow-up for monitoring of symptoms. She will also need routine echocardiograms to screen for worsening of right atrial enlargement, and/or development of right

ventricular enlargement, and pulmonary hypertension.

Conclusion: Scimitar syndrome is a rare variant of PAPVC commonly associated with ipsilateral pulmonary hypoplasia and pulmonary sequestration. Patients can present in infancy and typically have more severe symptoms related to heart failure and/or respiratory complications. Adults can be diagnosed incidentally or have a wide range of symptoms including fatigue, dyspnea, and recurrent pneumonia. Confirmation of diagnosis is usually with chest CT, chest magnetic resonance imaging, or echocardiography. Surgical correction should be a consideration for symptomatic patients with significant left to right shunting. Transcatheter occlusion can be a consideration in some selected cases.

**Davies, James**

**Mentor(s) -- Dr. James (Ben) Jackson**

**Evaluating Tourniquet Efficacy Comparing Exsanguination Techniques for the Upper Extremity --**

Purpose:

Upper extremity tourniquet use improves intra-operative visibility and identification of anatomy. Despite widespread tourniquet use and differing methods for limb exsanguinations, little research quantifying efficacy exists.

Does the Esmarch remain the gold standard technique when compared to ACE wrap and gravity in a large sample size?

Does efficacy in exsanguination methods differ as a function of patient characteristics, like age, BMI, handedness?

Methods:

Volunteers were excluded if they had risk factors for DVT/PE. Plethysmographic water displacement served as surrogate for blood volume exsanguinated. Control measurements were obtained from both upper extremities without tourniquet inflation. Water displacement was measured with gravity and Esmarch exsanguination techniques. Exsanguination technique and side of testing randomly assigned. Gender, handedness, height, weight, BMI, and age were covariates.

Results:

Exsanguination using Esmarch compared to gravity alone resulted in 51.2% increase in blood removal.

Of the covariates, only age had a significant interaction effect for the Esmarch method. The older the subject, the greater amount of blood displaced by Esmarch. Statistical analysis revealed age accounted for 21.4% of all variance in blood exsanguinated using Esmarch compared to unexsanguinated arm. Although Esmarch was more efficacious exsanguination for all demographics measured, it was most important for subjects over age 40.

Conclusion:

Data reaffirms gravity exsanguination is more efficacious than no tourniquet, and Esmarch is more efficacious than gravity. To our knowledge, this study is the most robust to critically, objectively compare upper extremity exsanguination methods and overall tourniquet use by age, and supports the common practice of Esmarch exsanguination in human extremity surgery.

**Davis, Keri**

**Mentor(s) -- Ms. Kristen Vick**

**The Effectiveness of Long-Term Physical Therapy for Pediatric Patients following Chemotherapy for Acute Lymphoblastic Leukemia**

Keri Davis, DPT

Palmetto Health Orthopedic Rehabilitation Specialist

The Effectiveness of Long-Term Physical Therapy for Pediatric Patients following Chemotherapy for Acute Lymphoblastic Leukemia

## Introduction

Acute Lymphoblastic Leukemia (ALL) is the most common cancer among children with an annual incidence rate of 3.9 per 100,000 children. The five year survival rate approaches 90% for those who are diagnosed before age fourteen. Advancements in treating ALL have come with significant side effects. ALL survivors are at an increased risk for obesity, endocrine and metabolic disorders, muscle weakness, neurosensory impairments, and neurocognitive deficits. Cross sectional studies have suggested that deficits occur in muscle strength following multimodal treatments for ALL which may persist long after the patient is considered in remission. Recent studies have also found that deficits were reported with both static and dynamic balance in children who were at least one year post treatment. The purpose of this case study is to demonstrate the benefits gained from participation in long-term physical therapy for survivors of ALL.

## Case Description

The patient was an 11 year old male who was diagnosed with Acute Lymphoblastic Leukemia. He was referred to physical therapy for generalized weakness and decreased lower extremity flexibility following extensive chemotherapy. His major complaints at his initial evaluation were decreased endurance and muscular fatigue. The patient also had deficits in strength of his lower extremity musculature. Upon balance assessment, the patient demonstrated decreased balance on static and dynamic surfaces. The patient began biweekly physical therapy that consisted of strengthening, balance, and flexibility exercises. Innovated exercises, such as obstacle courses, were instituted in order to encourage the patient when it was observed that conventional strengthening was not motivating to this particular patient. The patient attended eleven and a half months of skilled physical therapy yielding gains in lower extremity strength, improvements in balance, and improved cardiovascular endurance. The patient was subsequently discharged to a home program following improvements with physical therapy.

## Conclusion

When treating pediatric patients who have undergone chemotherapy treatments following a diagnosis of Acute Lymphoblastic Leukemia, innovative, long-term physical therapy is crucial to regain muscular strength, balance, and cardiovascular endurance.

## **DeMarco, Grace**

### **Mentor(s) -- Dr. J. Benjamin Jackson**

#### **Teriparatide Use in Anterior Diaphyseal Tibial Stress Fracture Healing: A Case Report**

Bone stress injuries are one of the most common injuries affecting both athletes and military recruits (6,10). These injuries are associated significant economic and social cost, and often lead to delayed return to sports time (RTST) for high-performance athletes. Anterior diaphyseal tibial stress fractures (DTSF) are high-risk, often difficult to manage, and can require surgical intervention (1). Increasing evidence over the past two decades suggests that Teriparatide, recombinant parathyroid hormone PTH (1-34), may be efficacious in enhancing stress fracture healing as a non-operative treatment for DTSFs (2-5). We present a patient with an anterior DTSF who was treated with teriparatide. With the use of teriparatide, the patient demonstrated a RTST of 2.5 months, lower than the average 7 months reported RTST for anterior DTSFs (7,16). These findings suggest that teriparatide may be beneficial in the acceleration of DTSF healing in high-performance athletes. Additional controlled studies are necessary in order to support these anecdotal findings.

## **Dobbs, Sarah**

### **Mentor(s) -- Dr. Marlene Wilson**

#### **Individual differences in behavioral and autonomic responses during fear extinction**

Post-traumatic stress disorder (PTSD) can develop after experiencing a life-threatening trauma, such as combat, assault, or natural disaster, although not everyone who experiences such an event develops PTSD. This suggests that neurobiological factors may confer resiliency, or risk, to the long-term

negative effects of traumatic stressors. Our laboratory has demonstrated that outbred Long-Evans rats show individual differences in extinction of conditioned freezing behavior, allowing them to serve as a model for characterizing individual differences in autonomic responses associated with traumatic stress. Rats were implanted with DSI transmitters for in vivo telemetry, allowing the continuous monitoring of heart rate (HR) and blood pressure (BP). After monitoring baseline cardiovascular responses for 2 days, rats were conditioned using three tone-shock pairings, and then tested for freezing upon return to the context and in response to twenty cue (tone) presentations for within trial extinction. Rats were divided into low or high extinction groups based on differential freezing during this extinction trial. Extinction recall was assessed 2 days later and blood was collected 30 min after this trial. Rats showing poor extinction (high freezers) showed enhanced cue-induced decreases in HR during extinction learning compared to low freezers, as well as differential changes in HR and BP during other conditioning trials. Blood collected after extinction learning also showed plasma acetylcholinesterase (ACHE) is lower in high freezing (extinction resistant) rats compared to animals showing good extinction, and plasma ACHE levels were correlated with both freezing during extinction trials and the HR deceleration during extinction learning. If plasma levels reflect the synaptic pool of ACHE, reduced ACHE could account for the exaggerated HR deceleration by prolonging ACH actions during cue-induced vagal stimulation. These studies suggest that enhanced vagally-mediated HR deceleration associated with conditioned cue presentations accompanies the behavioral freezing differences during fear extinction, and that autonomic activity may be differentially regulated in these two phenotypes. Additional studies are examining other cardiovascular measures and brain levels of ACHE, but these studies may have implications for the co-morbidities between traumatic stress disorders, autonomic dysfunction, and cardiovascular disease.

**Dorn, Margaret**

**Mentor(s) -- Dr. Norma Frizzell**

### **C/EBP Homologous Protein (CHOP) Stability in the Adipocyte during Diabetes**

The intake of excess nutrients surpasses the energy requirements of the adipocyte and leads to increased mitochondrial stress during diabetes. This is associated with the accumulation of fumarate, which can react with protein thiols to form the chemical modification S-(2-succino)cysteine (2SC), also termed protein succination. Succination is significantly increased in the adipose tissue of diabetic mouse models.

We consistently observe that the transcription factor CCAAT/enhancer-binding protein (C/EBP) homologous protein (CHOP) is elevated in parallel with increased fumarate, oxidative stress and protein succination in the adipocyte during glucotoxicity. This increase is associated with reduced CHOP turnover, rather than new protein synthesis. Therefore, we wanted to investigate if this increase in CHOP stability could be due to alterations in CHOP phosphorylation (pCHOP) levels, as this is required for CHOP turnover.

Adipocytes were matured in normal (5mM) or high (30mM) glucose with or without the addition of tunicamycin (a positive control that induces CHOP through the generation of endoplasmic reticulum stress). Western Immunoblotting was used to detect total levels of pCHOP, CHOP, and actin. This data showed that despite the pronounced increase in CHOP levels in 30 mM glucose, the levels of CHOP phosphorylation were not increased, which suggested that CHOP phosphorylation may indeed be impaired, preventing CHOP turnover.

To further assess the impact of CHOP stability in the adipocyte, we measured the levels of Interleukin-13, which has been recently shown to be negatively regulated by CHOP in adipose tissue (Suzuki et al. 2017). A reduction in IL-13 as a consequence of CHOP stability would favor pro-inflammatory macrophage phenotypes in diabetic adipose tissue. We detected markedly reduced IL-13 levels in adipose tissue from Db/Db diabetic mice versus controls, in association with increased CHOP.

Overall, the data suggests that dysregulated mitochondrial metabolism leads to increased CHOP stability in diabetic adipose tissue. This contributes to alterations in adipocyte cytokine production,

impacting macrophage polarization.

**Drake-Lavelle, Kelan**

**Mentor(s) -- Dr. Will Melton, Dr. Benjamin Jackson, Dr. John Walsh IV, Ms. Kayla Cole**

### **Incidence, Prevalence, and Treatment Trends of Radial Tunnel Syndrome**

#### **INTRODUCTION**

Radial Tunnel Syndrome (RTS) is a controversial diagnosis of exclusion based on clinical exam because EMG and NCV are typically negative, MRI is non-contributory, and there is a wide range of compressive etiologies thought to contribute to its development. The unique and rare characteristics of this condition likely lead to delayed diagnosis and inappropriate treatment as well as a lack of epidemiological studies to this point. The purpose of this study was to determine incidence, prevalence, demographics, and operative treatment trends of RTS in South Carolina.

#### **METHODS**

Health statistics from 1996-2014 were obtained from the South Carolina (SC) State Ambulatory Surgery (SASD), a database of de-identified inpatient and outpatient health statistics. Patients were identified with ICD-9 code 354.3 (radial nerve syndrome) and further analysis was performed for patients who had surgical intervention.

#### **RESULTS**

There were a total of 2174 patients diagnosed with radial nerve syndrome from 1996-2014 in South Carolina. The average annual incidence rate was 1.21 per 100,000. There were 995 surgical episodes of care, 967 of which were radial nerve decompressions. 60.2% of surgical patients were female. 70.2% of surgical patients identified as white. Median age at time of surgery was 45. The most common patient comorbidity was diabetes mellitus (6.2%).

#### **DISCUSSION AND CONCLUSION**

Radial Tunnel Syndrome remains a controversial and rare clinical diagnosis. The mean 1.21 per 100,000 incidence from 1996 to 2004 is significantly lower than those reported for carpal tunnel (376 per 100,000) and cubital tunnel (30 per 100,000). Despite a population with higher than average prevalence of DM and obesity, it is difficult to ascertain any significant relationship these comorbidities and RTS despite their common association with other compressive neuropathies. Given the promising response to surgery, RTS should remain in the differential diagnosis for lateral elbow pain.”

**Duda, Julian**

**Mentor(s) -- Dr. Souvik Sen**

### **Association of Inflammation with Intracranial Atherosclerotic Stenosis**

**Introduction and Hypothesis:** Intracranial Atherosclerotic Stenosis (ICAS) is associated with 8-10% of all strokes in the U.S. Although there is evidence in the Asian population that inflammation plays a role in ICAS, it has not been shown in the U.S. population. We hypothesized that high sensitivity C-reactive protein (hs-CRP), a marker of inflammation, is associated with ICAS.

**Methods:** The Atherosclerosis Risk in Communities (ARIC) study recruited participants from four U.S. communities from 1987-1989. In the ancillary Dental ARIC study, dentate subjects from ARIC undergoing full-mouth examination, had blood samples obtained in Ethylenediaminetetraacetic acid (EDTA) tubes. Inflammatory marker, hs-CRP, was measured by high sensitivity nephelometry assay. Using stratified sampling, participants from Visit 5 underwent high resolution 3T magnetic resonance angiogram. All images were analyzed in a centralized lab and ICAS was graded as no stenosis, <50% stenosis, or >50% stenosis/complete occlusion. In addition, periodontal health was assessed as either present or absent. Crude and adjusted Odds Ratio (OR, adjusted for age, gender, race, BMI,

hypertension, diabetes, LDL, and smoking) were calculated to test the association between periodontal disease, hs-CRP (stratified as <1, 1-3 and >3 mg/l), and ICAS.

Results: A total of 909 subjects (mean age 62.±6, 45% male, 81% white and 19% African-American), underwent assessment of hs-CRP and ICAS. Compared with reference group (hs-CRP <1 mg/l) the modestly elevated hs-CRP (1-3 mg/l) was not significantly associated with >50% ICAS, on univariate (Crude OR 1.3 95% CI: 0.9-2.0, p=0.8) or multivariable analysis (Adjusted OR 1.3, 95% CI: 0.9-2.0, p=0.8). Elevated hs-CRP (>3mg/l) was significantly associated with >50% ICAS (OR 1.6, 95% CI:1.1-2.3, p=0.03). In a multivariable logistic regression analysis adjusted for the covariates, the association remained statistically significant (OR 1.6, 1.1-2.4 p=0.03).

Conclusions: In this US population-based community study, we report a significant and independent association between inflammatory marker hs-CRP and ICAS.

**Engle, Kelly**

**Mentor(s) -- Dr. Mark Humphrey, Dr. Morgan Adams**

**Provider awareness of patients' tobacco use cessation educational needs at a family medicine residency clinic**

Background: With the introduction of the Core Quality Measures Collaborative, patient-centered medical homes have shifted attention to improving these metrics. In 2017, the Tobacco Use: Screening and Cessation Intervention Core Quality Measure was reported as the percentage of patients aged 18 years or older who were screened for tobacco use one or more times within 24 months who received a cessation counseling intervention if identified as a tobacco user. Currently at the Palmetto Health-USC Family Medicine Center, resident and attending providers are responsible for identifying tobacco use, assessing cessation educational needs, and providing the education. The aim of this intervention is to improve tobacco use cessation counseling interventions among patients with an active tobacco use status.

Methods: Baseline information regarding resident physician self-reported preferences and usual practices regarding tobacco use cessation counseling will be collected through an electronic survey prior to the intervention. Additionally, the most preferred tobacco use cessation handout available in the electronic medical record will be determined. Nursing staff will identify the status of tobacco use as a part of routine care and will notify the providers by printing the most preferred tobacco use cessation handout placing the handout with the patient's chart outside the patient's room. The printed handout will prompt counseling by the provider and inclusion of the correlating ICD-10 code for the visit. Patient charts will be reviewed for patients who visit the Palmetto Health-USC Family Medicine Clinic 2 weeks prior and 2 weeks after the intervention. The primary endpoint is percentage of patients with tobacco use indicated in the social history and also had tobacco use cessation counseling indicated in an ICD-10 code for the visit. Resident physicians will be asked to complete a post-intervention survey in order to detect changes in self-reported preferences and usual practices related to smoking cessation

**Enjetti, Alan**

**Mentor(s) -- Dr. David Ford**

**Gatorade Cocktail: Methanol Toxicity in an Adolescent**

Introduction:

Methanol is a colorless liquid found in antifreeze, windshield washer fluid and solvents. Methanol is relatively non-toxic in its "parent" form, causing minimal CNS depression. It is metabolized by alcohol dehydrogenase and aldehyde dehydrogenase. This produces formaldehyde and formate, respectively. Symptoms are often delayed and may go unnoticed. Formate causes anion-gap metabolic acidosis and end-organ damage, by disrupting oxidative phosphorylation, resulting in lactic acidosis. In addi-

tion, formate causes direct injury to the retina and basal ganglia, resulting in blindness, ataxia and seizures. Symptoms are typically seen with methanol levels > 20 mg/dL, visual disturbances at > 50 mg/dL and imminent death at levels > 150 mg/dL. This makes methanol a slow but dangerous poison.

#### Case Report:

A 17-year-old male presented to the pediatric emergency department after ingestion of an unknown blue liquid in a "Cool Blue Gatorade" bottle. The patient admitted that the liquid was actually windshield washer fluid with de-icer. The patient was drowsy and had an altered mental status. There was no evidence of tachycardia, hypotension, visual disturbances, ataxia or seizures. Poison Control informed us that windshield washer fluid with de-icer contains approximately 40% methanol.

Laboratory results showed a sodium of 140, potassium of 4.2, glucose of 99 and a BUN of 10. Serum osmolality was 385. Calculated osmolarity gap was 96. Acetaminophen level, salicylate level, ethanol level and urine drug screen were all unremarkable. ABG showed a pH of 7.31, pCO<sub>2</sub> of 37, pO<sub>2</sub> of 108, bicarbonate of 18.2, and base deficit of 6.9. EKG showed a normal sinus rhythm. Patient was given a 20 cc/kg bolus of normal saline and a bolus of 15 mg/kg of fomepizole. The patient was transferred to the PICU where he received 10 mg/kg of fomepizole every 4 hours. He also received two 4-hour long dialysis treatments and osmolality was trended until osmolar gap was less than 20 and patient was symptom-free. He was transferred to an inpatient psychiatric facility for further evaluation. Methanol level was sent out and one week later, was found to be 252 mg/dL. Ethylene glycol level was 0.

#### **Ergen, Thomas**

#### **Mentor(s) -- Dr. Matthew Pacana, Dr. Adam Money, Mr. Jack Barnes, Dr. Guillaume Dumont Impact of the Severity of Femoroacetabular Impingement Bony Abnormalities on Severity of Chondrolabral Injury**

**INTRODUCTION:** Femoroacetabular impingement (FAI) is a common cause of anterior hip / groin pain that results from abnormal conflict between the acetabulum and femoral head/neck, and often is associated with acetabular labral tears. Radiographic findings and measurements are helpful in diagnosing FAI. The goal of this study was to evaluate the relationship between preoperative radiographic parameters (lateral center edge angle (LCEA), alpha angle, cross over sign) and the size of labral tear noted intra-operatively.

**METHODS:** A retrospective analysis of radiographic and intraoperative findings was performed on patients who underwent primary hip arthroscopy for FAI. LCEA, alpha angle, and cross over sign were obtained from preoperative imaging. Intraoperatively, the size of labral tear on the acetabulum was determined by numbers on a clock face, with 3 o'clock by convention located anteriorly at the psoas "u"□. Spearman's rank correlation rho test was utilized for data analysis.

**RESULTS:** Increased alpha angle was associated with increased labral tear size. A 10 degree increase in the alpha angle was associated with a 0.1552 hour increase in labral tear size. Increased acetabular depth (LCEA) was associated with increased labral tear size. A 10 degree increase in LCEA, correlated with a 0.306 hour increase in labral tear size. The median / mean labral tear size was 3.0 / 3.2 hours in patients with a negative crossover sign versus, versus 3.5 / 3.476 hours in patients with a positive crossover sign.

**DISCUSSION and CONCLUSION:** Our findings suggest that greater bony structural abnormalities of FAI, including acetabular depth and larger cam morphology is associated with larger labral tear size. This may support a growing body of knowledge associated chondrolabral injury with FAI.

**Fayyaz, Humna**

**Mentor(s) -- Dr. Shilpa Srinivasan**

**Is delirium in the acute phase after initial stroke associated with future cognitive impairment or diagnosis of dementia? A review**

Background: In the acute stroke setting, prevalence of delirium has been estimated to be as high as 48% and has been associated with prolonged hospital stays, twelve-month mortality, and overall worse functional outcomes after stroke when compared to patients who did not experience delirium in the post-stroke period. Though several studies have investigated delirium after surgical procedures and trauma, there is limited literature addressing the long-term consequences of post-stroke delirium on neurocognitive function. Objective: To investigate whether delirium in the acute phase after initial stroke is associated with future cognitive impairment, we reviewed prospective and retrospective observational studies, review articles, meta-analyses, and systemic reviews that assessed the outcome of delirium in first time stroke patients. Methods: We conducted a literature search of MEDLINE with full text, CINAHL Plus with full text, Cochrane Library databases, Clinical Key, PubMed, and MedlinePlus. Eligibility criteria for the studies reviewed included first-time stroke patients admitted to an in-patient facility who experienced delirium in the first twelve days after stroke. The primary outcome measurements in these patients was the diagnosis of dementia or cognitive impairment. Results: Six studies were evaluated with 889 patients admitted consecutively for acute in-patient treatment of a stroke, with 323 meeting the criteria for diagnosis of delirium within 12 days after admission. Ojagbemi et al., Melkas et al., and Rijsbergen et al. found significant associations between patients who experienced post-stroke delirium and developed post-stroke dementia by the time of follow-up, compared to those who did not experience post-stroke delirium. The remaining studies examined the incidence of cognitive decline in the post-stroke period in patients who experienced delirium in the acute period after stroke, relying solely on MMSE scores to assess for cognitive impairment. Discussion: Unlike the many known predictors of dementia which cannot be modified, delirium in the acute phase after stroke can be treated and potentially prevented. Though further studies are required to elucidate the association between post-stroke delirium and post-stroke dementia, recognizing a potential risk factor such as delirium may lead to improved attentiveness and education in diagnosis, management, and treatment of delirium in the acute phase after stroke.

**Fowler, Miles**

**Mentor(s) -- Dr. Colin Widener**

**Resuscitation for dummies: Increasing pediatric resident confidence in resuscitation leadership, a quality improvement project**

The aim of this QI project is to increase pediatric resident confidence in leading resuscitation efforts by providing additional evidence based learning opportunities. Multiple studies have been published describing the deficiencies in pediatric resident resuscitation training which subsequently produces pediatricians ill equipped to lead resuscitation efforts. Reviews of the literature suggest that a curriculum of distributed, high fidelity, role based simulations emphasizing the role of the physician as a leader, applying the learning principle of mastery, and possibly incorporating unanticipated learning opportunities would improve resuscitation knowledge, skills and confidence. Surveys were given to PHR pediatric residents to collect baseline data on resident learning opportunities, experience, and confidence regarding resuscitation. They also collected resident suggestions for resuscitation curriculum changes. This data was discussed by myself and Dr. Widener, the PICU attending who provides simulation lab training. Inviting residents to attend monthly simulation lab training was proposed as an intervention. Residents were to receive invitations to attend simulations during off service months. They could elect to attend as many simulations as their schedule allowed. A follow up survey collected data on simulation training attendance and potential changes in confidence. Only half of survey respondents knew about the simulations and even fewer residents attended the optional simulations, however several suggestions for further improvement were offered in both these surveys.

**Furgiuele, Gabrielle**

**Mentor(s) -- Dr. Brandon Bookstaver**

**Evaluation of respiratory viral panel utilization in a non-bone marrow transplant population without stewardship involvement**

Background: The respiratory viral panel (RVP) tests for several upper and lower respiratory targets, including influenza, several other viruses, and three bacterial organisms. This test aids in determining appropriate antiviral treatments, as well as avoid inappropriate and unnecessary antibiotic therapies, making it an attractive tool for antimicrobial stewardship teams. The test's easy access for healthcare providers, but expensive nature, debates its appropriate utility and ultimate necessity. Currently there is no standardized algorithm or guideline for providers at our institution to interpret these RVPs. This study aims to identify the appropriateness of this test at our institution in an effort to optimize patient care.

Methodology: This retrospective, observational cohort, single-center study was performed in patients with documented respiratory infections. Inclusion criteria identified adult patients seen in the emergency department or admitted to Palmetto Health Richland between January 1, 2012 to February 27, 2018. Patients were excluded if they had a diagnosis of cystic fibrosis. Patients were divided into two cohorts: the first comparing antimicrobial duration in patients who received an RVP to those who did not receive an RVP. These patients were matched based on sex, age +/- 10 years, and diagnosis. The second group compares antimicrobial duration among patients who had a positive RVP to those with a negative RVP. Baseline categorical variables were assessed using a chi-square test or Fisher's exact test and continuous variables were assessed using Student's t test or Mann-Whitney U test, as appropriate.

Results/Conclusions: Pending.

Presentation Objective: To evaluate respiratory viral panel utilization in a non-bone marrow transplant population without stewardship involvement.

**Garuz, Jeyko**

**Mentor(s) -- Dr. Gregg Talente**

**Increasing participation of the healthy food share box program for families in a resident pediatric clinic, a quality improvement project**

With the rise of pediatric obesity rates in the US it is important that pediatricians promote healthy, affordable and accessible food options in their clinic. The Children's Hospital Outpatient Center (CHOC) in Columbia South Carolina the residents serve many families that do not have access to affordable, healthy foods. At CHOC efforts were made to promote the food share box, a box of food filled with top-quality fruits and vegetables at a very affordable price. This initial food share box collaboration increased the workload of the office staff, limited the population size that could benefit from a healthier lifestyle, did not serve the Spanish speaking population and did not provide a sustainable project. We tackled all these drawback in our project through two simple but effective changes. Our first implemented change included revamping the flyer to to include English and Spanish. This first change only saw a small increase of participation, averaging 6.25 new participants per pickup in a two month period, pickups occur every 2 weeks. Our next implementation included posters in every room containing all the same information as the flyer in a more concise and larger format. This change caused an average of 9.7 new participants per pickup in a 5 month period. When compared to data collected prior to the new changes of this project, 2015 data, CHOC averaged 10.9 bi-monthly participants in a 5 month span. But these were not new participants and possibly included repeat participants to the program and thus might have a much lower new participants average. When comparing the last two

months from each year the 2015 data for the last two months had an average of 8 bi-monthly participants while the new changes in 2016 saw an average of 9.75 in the last 2 month of data collection. We can infer that the new changes not only increased the number of voluntary participants to the food share box program but also is more sustainable, easier to perform and more cost effective.

**Gazzola, William**

**Mentor(s) -- Prof. Roberto Benson, Prof. Wayne Carver**

**Meltblown Poly-Lactic Acid Nano-Webs as a Tissue Engineering Scaffold**

Poly(lactic acid) (PLA) nanofiber non-wovens have recently come under more vigorous investigation for their use as tissue engineering scaffolds due to its ability to mimic the physical properties of naturally occurring human extracellular matrix in a variety of host tissues. Currently, the majority of available research on PLA nano-webs has focused on their creation through electrospinning. The goal of this study was to evaluate meltblown non-woven webs made of nano-diameter PLA fibers for their application as a tissue engineering scaffold. Meltblown PLA fabrics were produced with a variety of different crystallinities, tensile moduli, and pore diameters. One fabric with mechanical properties similar to human dermis was selected as a scaffold to study attachment, proliferation and migration of human dermal fibroblasts over 1, 3, 7 and 14 days without the use of additional cell adhesion molecules. Electron microscopy demonstrated adequate cellular attachment and surface migration at 1, 3, and 7 days. MTT assay showed good proliferation up to 7 days of culture, but without increase from day 7 to 14. Finally confocal microscopy was used to investigate cellular migration into the scaffolds. The investigation found that cells were able to migrate fully through the thickness of the scaffold. The successes of this initial experiment are promising, and confirm that meltblown nano-fiber non-woven are a viable avenue for tissue engineering scaffolds. Hopefully these conclusions will open the door for others to pursue research in this exciting field.

**Gill, Harmeet**

**Mentor(s) -- Dr. Sharon Weissman**

**Social Determinants of Health and Disparities in Linkage to Care Among Newly Diagnosed HIV Cases – South Carolina, 2009-2011**

Background:

Key to improved HIV outcomes include linkage to care (LTC). As treatment for HIV has become more effective, the gap in racial disparities has widened for LTC. Social determinants of health (SDH) are conditions like poverty level, income, education, employment that account for most health inequities and disparities in HIV prevalence. The objective of this study is to evaluate the impact of SDH on racial disparities on time to LTC for newly diagnosed HIV infected individuals in South Carolina (SC).

Methods:

Data was obtained from the SC enhanced HIV/AIDS Reporting System. Analysis includes individuals diagnosed with HIV in SC from 2009-2011. LTC was calculated as the time from HIV diagnosis to first CD4 or VL test. Early LTC was defined as within 30 days. Late LTC was >30 to 365 days. Individuals not LTC by 365 days were considered as never been linked to care (NLTC). Census tract data was used to determine SDH based on residence at the time of HIV diagnosis. Factors potentially associated with late LTC and NLTC including patient demographics, and SDH were investigated.

Results:

From 2009-2011, 2151 individuals were newly diagnosed with HIV. 1636 (76.1%) were LTC early, 285 (13.2%) were LTC late and 230 (10.7%) were NLTC. NLTC was associated with male gender, lower initial CD4 count, and earlier stage of HIV at time of diagnoses ( $P < 0.01$ ). In multivariable analysis early HIV stage at HIV diagnosis (aOR: 1.82; 95% CI 1.3, 2.5) and living in census tracts with lower income (aOR 0.65; 95% CI 0.44, 0.97) are associated with late LTC. Male gender (aOR 2.66; 95% CI 1.49, 4.76) unknown HIV risk group (aOR 2.03; 95% CI 1.11, 2.74) and early HIV stage at diagnosis (aOR 4.59; 95% CI 2.33, 9.04) are associated with NLTC.

Conclusion:

In SC, almost ¼ of newly diagnosed HIV infected individuals from 2009-2011 were LTC late or NLTC. SDH were not associated with late LTC or NLTC. Living in a low income census tract was associated with a lower risk for late LTC. Male gender and earlier HIV stage had greatest association with late LTC and NLTC.

**Gillens, Kimberly**

**Mentor(s) -- Dr. Benjamin Jackson**

**Preoperative administration of L-Arginine, Omega-3 Fatty Acids and Ascorbic Acid effects on post-operative complications in diabetic orthopedic patients**

Background: Diabetes mellitus is already one of the most prevalent chronic diseases in the world and its incidence is expected to increase. Although there are different etiologies, the pathophysiology of the disease is the same: poor peripheral blood flow, decreased cellular response at injury sites, hyperglycemia, and poor nutrient transport. This altered physiology does not allow for the proper nutrients and factors to mobilize to the site of injury, leaving wounds at high risk for dehiscence or infection, even with proper care. Nutrition therapy has proven useful in modulating inflammation and the immune response, optimizing glucose control and attenuating the hypermetabolic response to surgery. Multiple studies have produced strong evidence that perioperative nutrition therapy reduces the incidence of post-surgical complications, optimizing healing and recovery. Preoperative immunonutrition may be a viable, low cost way to the greatest enhancing of the body's response to surgery by taking a proactive approach.

Study Objective(s): The primary objective of this study is to determine whether preoperative supplementation of L-Arginine, Omega-3 Fatty Acids and Ascorbic Acid will effect postoperative complications in diabetic orthopedic surgical patients.

Methods: Participants of this study will start a daily regimen of 77.2g of immunonutrition containing 20g of L-Arginine, 17g of Omega-3 Fatty Acids and 500mg of Ascorbic Acid six days prior to surgery and continue until the day before surgery. Subjects with successful completion of the regimen will be monitored postoperatively for rates of wound healing, infection and revision surgery due to dehiscence. These parameters will be recorded and analyzed to determine the effectivity of immunonutrition in this subset of patients.

Discussion: This project is still in pre-submission. Favorable results could be pertinent to remodeling the postoperative management of diabetic patients and the overall population.

**Gillespie, Jennie**

**Mentor(s) -- Dr. Lauren Castleberry, Dr. David Schriff**

**Retrospective Analysis of IV Flow Capacity in Obstetric Patients at Risk for Postpartum Hemorrhage**

Background: Postpartum hemorrhage (PPH) is one of the leading causes of preventable pregnancy-related mortality and complicates between 1-3% of pregnancies. However, unlike other causes of hemorrhage, the risk of PPH can be estimated prior to its occurrence. This allows clinicians to take the necessary precautions to manage high-risk patients, which includes establishing two, 18-gauge (large-bore) intravenous (IV) catheters. This is an imperative first step in the management of hemorrhaging patients and can help avoid a suboptimal resuscitation and its subsequent complications. This retrospective study aims to assess how often obstetrical patients at high-risk for PPH received appropriate IV access, defined as two 18-gauge or larger IVs.

Methods: Exempt Institutional Review Board approval was obtained. A retrospective analysis was performed to examine the IV access placed in obstetrical patients upon admission to Labor and Delivery or Antepartum Service at our institution from September 1, 2015 through February 29, 2016. Only patients managed by the teaching service were included. A patient's risk for PPH was determined on

admission, and patients were stratified into low, medium and high-risk groups based on the risk stratification put forth by the California Maternal Quality Care Collaborative (CMQCC). The number and size of IV catheters inserted upon admission were reviewed. Statistical analysis was performed using the T-test, Chi-Square test, Fisher's exact test and logistic regression model.

Results: In total, 922 patients were included in the study. 10% (93) were deemed high-risk for PPH. Of those patients, 93.5% (87) received a single IV catheter on admission, of which 75% were 20-gauge or smaller IVs. Only 1% (1) of the high-risk patients received appropriate IV access (two 18-gauge or larger IVs).

Discussion: Only 1% of patients at high-risk for PPH received appropriate IV access. Our data represents a single-center experience and should be confirmed. However, these results are concerning and suggest PPH patients may experience under-resuscitation and/or a delay in resuscitation due to inadequate IV access. Based on this data, the authors plan to revise the current Postpartum Hemorrhage Protocol and implement a new policy to ensure appropriate IV access is obtained in patients at high-risk for PPH.

**Gilreath, Stuart**

**Mentor(s) -- Dr. Ann Ramsdell, Mrs. Huda Atiya**

### **Left-Right Differences in Breast Cancer**

Patients with right-side breast cancer exhibit higher mortality than patients with left-side breast cancer. The mechanism by which this stratification occurs is not well understood. Our lab has previously demonstrated that right-side mammary glands express different gene expression profiles than left-side mammary glands, with higher levels of genes associated with malignancy seen in right-side mammary gland cells. Furthermore, our lab has found that right-side tumors exhibit more aggressive metastatic activity than left-side tumors. To elucidate the underlying mechanisms for these differences, we used a mouse model to compare the relative rates of proliferation and necrosis seen in left and right-side tumors. We also compared proliferation rates in metastatic and non-metastatic tumors. 4T1-RFP-Luc mouse mammary tumor cells were injected intraductally into the thoracic mammary glands of BALB/c mice. Resulting tumors were harvested and embedded in paraffin. To compare proliferation rates, we stained tumor samples with Ki-67 antibody and determined expression using fluorescent microscopy. To evaluate necrosis, tumor samples were stained with Masson's Trichrome and assessed using light microscopy. The area of necrosis was compared to total tumor area using ImageJ. Since our lab has previously demonstrated that right side tumors generate more extensive metastases to the lungs, we also compared Ki-67 expression in the cells of metastatic and non-metastatic tumors.

Result shows that right-side tumors have higher levels of Ki-67 expression, indicating higher proliferative activity. Under light microscopy, right-side tumors exhibited a higher rate of necrosis. Greater levels of necrosis are associated with increased tumor proliferation. Finally, metastatic tumor cells exhibited higher levels of Ki-67 expression compared to non-metastatic tumor cells. These findings are consistent with the elevated malignant activity exhibited by right-side tumors. However, power analysis indicates that more data are required to determine the significance of these findings. Further evaluation of Ki-67 expression and necrosis in left and right-side tumors is warranted.

**Gregory, Nicholas**

**Mentor(s) -- Dr. Taixing Cui**

### **The Role of CDK8 in Vascular Smooth Muscle Cell De-differentiation**

Background: Blood vessels can adapt to stress by undergoing vascular remodeling. Chronic stress leads to maladaptive vascular remodeling and contributes to the pathogenesis of numerous vascular diseases such as atherosclerosis. During vascular remodeling, vascular smooth muscle cells (SMCs)

undergo proliferation and de-differentiation among several other key functional changes. Cyclin-dependent kinase 8 (CDK8), a transcription-regulating kinase, has been implicated in the mechanism of cellular proliferation and de-differentiation in other disease processes, but its role in vascular remodeling is not fully understood.

**Objective:** To determine whether CDK8 plays a mediator role in vascular SMC proliferation and de-differentiation.

**Methods:** In this experimental study, we used a primary culture of vascular smooth muscle cells obtained from the tunica media of the aorta in adult Sprague-Dawley rats. We used two different forms of CDK8 manipulation: lentiviral genetic knockdown and pharmacologic inhibition using Senexin A. We conducted proliferation assays using hemocytometer for cell counting and [H3} thymidine uptake assay to measure rates of DNA synthesis. We then conducted differentiation studies using Western blot to measure expression of vascular SMC contractile proteins  $\alpha$ SMA, SM22 $\alpha$ , and CNN1 (markers of vascular SMC maturity).

**Results:** CDK8 inhibition led to attenuated cell proliferation in both studies compared to the control groups ( $p < 0.05$ ). Lentiviral and pharmacologic inhibition of CDK8 led to vascular SMC differentiation, evidenced by increased expression of  $\alpha$ SMA, SM22 $\alpha$ , and CNN1 compared to controls ( $p < 0.05$ ).

**Conclusions:** We demonstrated that CDK8 inhibition attenuated proliferation and promoted differentiation of rat aorta vascular SMCs. This supports our hypothesis that CDK8 is a positive regulator of vascular SMC de-differentiation and proliferation.

**Implications and Future Directions:** These results indicate that CDK8 inhibition may lead to a novel pharmacologic approach to preventing the maladaptive vascular remodeling that occurs in certain vascular lesions such as atherosclerosis. Future studies are needed to determine the precise mechanism of CDK8-mediated vascular SMC de-differentiation. Genetic interrogation studies are needed to verify the mediator role of CDK8 in vascular SMC de-differentiation leading to vascular lesion. Animal studies are needed to evaluate potential off-target effects of pharmacologic CDK8 inhibition.

**Hansen, Margaret**

**Mentor(s) -- Dr. Andrew Mardis, Dr. Jay Patel**

### **Chlorothiazide Use Evaluation in the Inpatient and Outpatient Settings**

**Background:** Chlorothiazide and metolazone are both thiazide-type diuretics recommended as adjunct therapy for patients exhibiting loop-diuretic resistance. Parenteral chlorothiazide may be selected over oral metolazone despite being significantly more expensive due to its faster onset and less variable absorption in edematous patients. However, there are no controlled trials comparing the two medications, and results from observational studies are equivocal. This purpose of this study is to identify potentially inappropriate use of chlorothiazide in an academic medical center.

**Methods:** The electronic medical records of 110 patients who received chlorothiazide in the inpatient and outpatient settings were reviewed to describe baseline characteristics and diuretic usage. Potentially inappropriate use was defined as any of the following prior to the first administration of chlorothiazide: no loop-diuretic, loop-diuretic dose  $<160$ mg daily furosemide equivalents (FE), no loop-diuretic continuous infusion, no metolazone.

**Results:** Chlorothiazide use was potentially inappropriate in 96% of inpatient administrations. 14% of inpatients received no loop-diuretic prior to chlorothiazide, 55% of inpatients received  $<160$ mg daily FE, 42% of inpatients were not on a continuous infusion of loop-diuretic, and only 6% received metolazone. Patients not seen by cardiology were on lower daily doses of loop-diuretic and had fewer continuous infusions. The rate of reimbursement was lowest for patients on prolonged chlorothiazide treatment ( $\geq 7$  doses). Ten outpatient doses were administered to 5 unique patients. Metolazone was not administered to any patients while in clinic, and only one patient was prescribed metolazone as a home medication.

Conclusions: Nearly all chlorothiazide inpatient administrations were potentially inappropriate. Recommendations are to first demonstrate loop-diuretic resistance through minimum doses of 160mg FE per day or using a loop-diuretic continuous infusion, and to use more cost-effective metolazone prior to ordering chlorothiazide. Current focus is on requiring order justification for chlorothiazide at time of order entry.

**Hardy, Zachary**

**Mentor(s) -- Dr. Laura Nolting**

**Solar Powered Ultrasound: A Month In The Himalayas**

Ultrasound (US) imaging has been demonstrated thoroughly in previous literature to play a pivotal role in low-resource communities as a diagnostic tool where other modalities such as CT and X-Ray are scarce or unavailable. Point-of-Care US units are becoming increasingly more compact making the feasibility of bringing these devices into more remote areas a reality. Despite the improvements in portability, the limiting factor of the battery life remains. This poster describes the usage of a Philips Lumify Ultrasound unit during a 4-week trip into the remote Himalayan region of India utilizing an Anker solar panel exclusively for battery power. The US was used during daily clinics held in a region of the Himalayas that has no road access or power grid where solar panels play an exclusive role in electrical power of the region. The ultrasound unit was able to maintain power for at least 2 days of clinical use at 10-15 scans per day before requiring recharging. The US was able to be fully recharged with the Anker solar panel in 2-4 hours depending on time of day and cloud cover. This poster demonstrates the capacity of commercially available, lightweight solar panel units to dramatically increase the utility of US as a diagnostic modality in clinical situations where standard power grids are inaccessible including disaster relief scenarios, remote clinics, wilderness medicine, and during combat.

**Hartman, Rachel**

**Mentor(s) -- Dr. Elena Farmaki, Dr. Hippokratis Kiaris, Mrs. Vimala Kaza, Dr. Ioulia Chatzistamou**

**CCL8 in mammary gland development and involution-associated breast cancer**

The migration of cancer cells in response to chemokine gradients is an important component of tumor dissemination during cancer progression and metastasis. Our previous findings indicate the development of a CCL8 gradient between the neoplastic epithelium, the stroma and the peripheral tissues that is involved in the dissemination of breast cancer cells. Inhibition of CCL8 activity interfered with the motility of cancer cells and their invasive/metastatic activities suggesting that anti-CCL8 therapy should be considered for the management of metastatic breast cancer. Our results are also consistent with bioinformatic analyses of publicly available data indicating an increase of CCL8 in the stroma of breast cancers and also during mammary involution, suggesting the contribution of the chemokine to the poor prognosis of postpartum breast cancers. In this study we investigated the role of CCL8 during mammary gland development and during involution-associated promotion of tumor growth.

**Hawley, Jordan**

**Mentor(s) -- Mr. Mathew Tharakan**

**Reducing Patient Harm Through Developing a Change-Of-Shift Communication Tool**

An increase of patient harms during an inpatient hospital stay can further the patient's length of stay and/or worsen the patients overall prognosis. Using the Palmetto Health Richland Heart Hospital Harm Index, we are able to see specifically what patient harms are occurring and where interventions need to be placed in order to reduce the numbers on these harm indexes. By communicating pertinent patient specific information during change of shift/patient hand-off reporting, we can greatly decrease the risk of falls/harms for at risk patients in hospital settings. A Unit Based Council fosters

a collaborative multi-disciplinary team in order to specify pertinent patient specific information to be included in change of shift/patient hand-off reporting. The Unit Based Council creates a PST to PST communication tool in order to effectively pass pertinent patient care and safety information from shift to shift between PSTs. When using this tool in conjunction with other patient safety toolkits, the multidisciplinary healthcare team is able to drastically decrease the number of patient harms. In creating a functional tool that has been put into evidence based practice and yielded positive outcomes, the UBC has been able to decrease patient harms during their hospital visits.

**Hetherington, Victoria**

**Mentor(s) -- Dr. Nicole Bookstaver, Dr. P. Brandon Bookstaver**

**Impact of a comprehensive transitions of care stewardship initiative on Clostridium difficile infection management**

Background:

Clostridium difficile infection (CDI) is one that affects many, with significant clinical and economic burdens for the US. Recurrence rates range from 10-65%. There are several barriers to successful CDI treatment that contribute to these high rates. Various transitions of care (TOC) initiatives for other disease states have shown benefits, leading to the development of this service for patients with CDI.

The purpose of this study is to implement a service to integrate antimicrobial stewardship, concierge pharmacy delivery, and CDI education in order to improve outcomes. This project will expand pharmacy services and facilitate interdisciplinary collaboration through healthcare transitions to benefit patients and improve processes.

Methods:

The primary outcome is process implementation, to be measured by adherence to the TOC protocol. Each element of the protocol will be evaluated for completion for every patient. Secondary outcomes include 90-day CDI recurrence rates compared to the pre-implementation period, service cost analysis, and patient satisfaction.

Patients with CDI who will complete their antibiotic therapy outpatient will be included in the service. It is made up of five components. The first is involvement and management by an antimicrobial stewardship and support team led by pharmacists. This team will evaluate the appropriateness of CDI therapy. The next step is medication delivery to the patient prior to discharge, in order to overcome access issues and decrease the likelihood of noncompliance. Then, upon delivery, counseling will occur to give the patient a better understanding of the infection, the medications, and ways to minimize the risk of recurrence. Documentation is the fourth step, which fosters communication and collaboration for patient management as transitions of care occur. The final step is follow-up. This will occur via telephone by a pharmacist within a week of discharge to answer questions, verify that a follow-up visit is scheduled, and evaluate patient satisfaction. Results pending.

**Hightower, Cody**

**Mentor(s) -- Dr. Thomas Jones**

**Supine Positioning for Proximal Humerus ORIF using arthroscopic shoulder distractor**

Introduction

Despite implant and surgical advances in treating proximal humerus fractures, maintaining anatomic reduction throughout surgery remains difficult and failure to do so is correlated with poor patient outcomes. We conducted a retrospective study to include patients treated with a novel surgical method using an arthroscopy tower that allows intra-operative control and positioning of proximal humerus

fractures. This technique facilitates fracture reduction and decreases operative time.

#### Methods

A retrospective chart review study was conducted for all proximal humerus open reduction and internal fixation procedures performed by one surgeon at a level one trauma center from January 2007 to May 2017. Data reviewed included; inpatient notes, operative reports, computed tomography scans, pre-operative and post-operative x-ray images, and outpatient follow up clinic notes. Patients were grouped based upon use of the technique described. The technique outlines the use of an arthroscopy shoulder distractor to obtain adequate intraoperative fracture reduction and how to maintain reduction throughout the surgical procedure helping to prevent varus malreduction.

#### Results

Our review yielded 15 patients, 9 were treated with the outlined technique and 6 without. Three patients were lost to follow up. The remaining twelve all achieved complete fracture healing without major complications. Eleven of the twelve achieved functional range of motion in their operative extremity. All patients treated with the described technique achieved functional pain free range of motion. The average operative time between the two groups was 132 minutes without the tower and 95.4 minutes with the tower. This revealed a 27.7% reduction in operative time using the described technique.

#### Conclusion

Proximal humerus fractures are difficult to treat and frequently seen by the orthopedic surgeon. Our described technique facilitates intraoperative fracture reduction, helping avoid varus malreuction, and also allows for a decrease in operative time.

### **Horgan, Tim**

**Mentor(s) -- Dr. James Stallworth, Dr. Lisa Knight|**

#### **Improving Practice Management Through a Business Oriented Lecture Series**

The USC Palmetto Health Pediatric Residency Program goes above and beyond in training future pediatricians with a broad curriculum, including in-patient, out-patient, specialty lectures three to four times per week, in-patient teaching rounds and a weekly morning report. However, the majority of residents have matriculated via the traditional pathway: pre-medical science courses during undergraduate training with less than two years between undergraduate and medical school and have little to no business education or experience. A better knowledge base and understanding of the business aspect of healthcare is an important, yet overlooked, portion of a resident's education. The goal of this project is to improve resident satisfaction with the practice management portion of the resident education curriculum at Palmetto Health by incorporating a four-part lecture series into the curriculum that covers topics of business basics, structures of private practices versus hospital systems, helpful information when joining a practice, coding and other careers for physicians. The foundation for the material used in the lecture series was derived from my personal finance background, careful review of the current curriculum, and input from different faculty members, a pediatrician in private practice with over 30 years of experience and an MBA graduate in the banking industry. A pre-lecture series survey was provided to the resident that include objective multiple-choice questions taken from the lecture series along with subjective questions about their level of comfort with business related topics in healthcare and demographic information. Following the fourth lecture, the post-survey was sent out and included the same business-related multiple choice objective questions along with further subjective questions about their level of comfort and if the lecture was beneficial. When comparing the pre-survey to the post-survey, improvement was seen in six of the eight objective multiple choice questions, with the other two questions having the same number correct. Overall, the resident satisfaction with the lecture series was positive. Of the residents who attended the lectures, the majority felt some degree of comfort with the business aspect of healthcare and the majority stated they are interested in learning more.

**Hrisko, Stephanie**

**Mentor(s) -- Dr. Shilpa Srinivasan, Dr. Martin Durkin**

**Trends in First Time Admissions for Substance Use in Older Adults**

Introduction: Stereotypes of aging once included the idea that older adults “mature out” of substance use disorders (SUDs); however, more recent investigations of substance use by older adults suggest a trend of increasing first time admissions for drug use in older adults from 1998-2008. The purpose of this study is to provide an update on the trends in substance use treatment between 2009-2014 among adults aged 55 and above.

Methods: Treatment Episode Data Set-Admissions de-identified data were downloaded from the Substance Abuse and Mental Health Data Archive. Total admissions by year, and admissions where various drugs were mentioned were computed, comparing the experience of older adults to younger adults (30-54). Logistic regression analyses were completed to determine if there was an age by time interaction for trends in admissions related to substance use.

Results: From 2009 through 2014, there were 221,846 first admissions for patients 55 or older. The total raw number of first time admissions for SUDs for all ages decreased from 789,358 to 547,7335; however, the percentage of first time admissions attributable to both the 30-54 and 55+ age groups increased over time. When analyzing the 30-54 and 55+ age groups, a statistically significant age by time interaction was observed for all substances except benzodiazepines.

Conclusions: Older adults continue to account for an increasing proportion of first time admissions for SUDs. Marijuana has now replaced cocaine as the second most frequently occurring problematic substance for older adults. Indeed, marijuana is the only substance for which the increase in use over time was higher for older versus younger adults. Overall trends in substances used follow similar general patterns (i.e., increasing or decreasing over time) for younger and older adults. However, there are differences in the proportions of younger versus older adults affected by particular substances. Awareness of the trends in substance use among older adults may have clinical implications in regard to screening, assessment, and treatment of older adults.”

**Huff, Logan**

**Mentor(s) -- Dr. Wendell Holmes**

**Cadaveric Study of a Novel Anatomic Reinforced Arthroscopic Medial Meniscal Root Reconstruction with Gracilis Autograft**

**INTRODUCTION:**

Numerous techniques to repair medial meniscus posterior root tears (MMPRT) have been presented in the literature. Failure to restore the normal anatomy and function of the meniscus root results in the progression of arthritis. Healing rates are variable and in a second look arthroscopy study, no MMPRT repair demonstrated complete healing. Reconstruction of MMPRT by the addition of graft tissue would be a logical and reasonable next step to improve the healing rates of MMPRTs.

**METHODS:**

A novel arthroscopic technique to reconstruct the medial meniscal posterior root was developed and tested in the cadaver lab. The arthroscopic technique consists of reconstruction of the meniscal root with gracilis autograft and reinforcement with collagen coated suture tape and mattress sutures. After arthroscopic reconstruction, the disarticulated knee was photographed and studied for anatomic graft placement and for biomechanical strength. Various arthroscopic guides were compared for their ability to reproduce the anatomic location of the tibial insertion.

**RESULTS**

Biomechanical testing on 3 cadavers showed average load to failure of 180 N which is similar to published techniques of meniscal root repairs. The procedure was found to be reproducible in the cadaver lab creating an anatomic attachment of the MMPRT. The best arthroscopic guide for locating the

posterior meniscal root was a tip-to-tip guide originally designed for ACL reconstruction.

## DISCUSSION AND CONCLUSION

The healing rates of repairs and/or reconstructions of MMPRTs is suboptimal and current techniques need improvement. We believe that direct repair of the meniscus to bone without reconstructive tissue likely results in a non-anatomic and a biologically weak construct. The novel reconstruction technique described was found to be reproducible and creates an anatomic construct with suitable load to failure characteristics with greater potential for biologic healing.

**Hulsey, Hannah**

**Mentor(s) -- Dr. Julia Balance**

### **Implementation of Education to Increase Rates of Lactation Consultation in Outpatient Primary Care Setting**

Breastfeeding has been concluded to optimize infant, child, and adult health along with child growth and development (1). The American Academy of Pediatrics recommends exclusive breastfeeding until an infant is six months of age with continued breastfeeding with complementary foods within the first year of life. It has been shown in past that primary care physicians may not have time or ability to instruct completely and adequately on lactation during primary care visits and that referral to lactation for support has improved breastfeeding outcomes over time. This quality improvement study aims to increase lactation referral rates by 10% through education that promotes lactation referral. The study was conducted in an outpatient primary care resident clinic through retrospective chart review. Lactation referral rates were compared before and after implementation of education through an informational handout. Results of the study showed an increase in documented lactation referral rates from 14% pre-intervention to 22% post-education, however the goal of a 10% increase in lactation referral rates was not reached. Conclusion is that lactation referral rates increased overall after intervention and lactation referral has been shown in previous studies to overall improve breastfeeding outcomes suggesting it is beneficial to continue to encourage physicians to refer all mothers for lactation support as indicated.

**Irby, Loverica**

**Mentor(s) -- Dr. Robert Holleman**

### **Improving Newborn Safe Sleep Habits: A Quality Improvement Project**

After the birth of their child, parents receive a multitude of information regarding various topics often times in the format of verbal education. However, many parents are unable to recall the information that was shared with them specifically on the topic of safe sleep. The aim of this project is to increase parental knowledge of sleep position and sleep location. A handout focusing specifically on this topic was created and given to all families whose newborn would follow up at Children's Hospital Outpatient Center. Chart review was then performed to assess the efficacy of the handout in improving safe sleep rates. Statistical analysis revealed a decrease in safe sleep practice after the handout was created and distributed however many factors limited this study. Further research regarding this topic would be beneficial in truly assessing this quality improvement tool.

**James, Alicia**

**Mentor(s) -- Dr. Joy Shen-Wagner**

### **Increasing chlamydia screening among 16-24 year old females at Palmetto Health-USC Family Medicine Center.**

Chlamydia infection is the most common STI among women in the U.S. The incidence of chlamydia is reported to be 1.5 million diagnoses annually, with an estimated 27,500 new diagnoses in South Carolina. 1Chlamydia infections are 10x more prevalent than gonococcal infections in women aged 18 to 26 years. 1 The USPSTF and AAFP recommend chlamydia screening for sexually active females

aged 24 years old and younger and older women at increased risk for infection. Other risk factors include women with new or multiple sexual partners, a sexual partner with concurrent partners, a partner with an STI, inconsistent condom use among those not in a monogamous relationship, and exchanging sex for money or drugs. This recommendation has been given a Grade B, which means USPSTF recommends the service to eligible patients. 3

The USPSTF has found adequate direct evidence that screening reduces complications of chlamydia infections. 2 Untreated chlamydia can lead to serious complications including pelvic inflammatory disease, chronic pelvic pain, fertility complications, ectopic pregnancy, and increased incidence of STIs including HIV.

The special population under consideration is sexually active adolescents and adults between the ages of 16 to 24 years old. This population is at increased risk as age is a strong predictor of risk for chlamydial infections. The AAFP recommends for clinicians to provide screening to those at increased risk with understanding of the community they serve to identify those at risk. 2

This quality improvement project will assess the rate of chlamydia screening using urine collection on females ages 16-24 years of age in the at risk population within the Palmetto Health Family Medicine Center before and after intervention designed to increase clinician and patient awareness of importance of screening and goals of early treatment.

**Jansen, Erika**

**Mentor(s) -- Dr. Chuck Carter**

### **Longitudinal Practice Pattern Analysis of Graduates of the Palmetto Health/USC Family Medicine Residency Program**

The Palmetto Health/USC Family Medicine Residency Program has educated 356 physicians since 1977. The goals of this project were to create and analyze a database of program graduates. Of these graduates, each physician's geographic location, current practice status, practice type, specialty focus (if relevant) was analyzed. Physicians were located through publically available web searches and their board certification or state licensure. Data collected was analyzed using Microsoft Excel. Out of the 356 physician graduates, 318 were still practicing. Of the remaining 38, 11 have an administrative position, 7 are retired, 12 are deceased, and 8 physicians could not be located. 48% (n=153) of practicing alumni are located in South Carolina. Other notable states include North Carolina (n=38, 12%), Florida (n=18, 5%), and Georgia (n=17, 5%). 70% of graduates are employed practice, 8% are in private practice, 7% are academic physicians, 5% work for the government, 3% have an administrative position, and 3% are no longer practicing. 77% of graduates are practicing exclusively Family Medicine, and the most common secondary specialties include Geriatrics, Urgent Care, and Sports Medicine. The Palmetto Health/USC Family Medicine Residency Program has a 4.4% loss of graduates to other specialties. This analysis shows that the Palmetto Health/USC Family Residency Program is successful in retaining Family Medicine physicians in South Carolina and the southeastern region.

**Jones, Ashley**

**Mentor(s) -- Dr. Fernando Navarro**

### **Colonic metastasis from infiltrating ductal breast carcinoma in a male patient: a case report and review of the literature**

Background: Colonic metastasis from infiltrating breast ductal carcinoma is a rare phenomenon in the literature. Here, we report such a case occurring in a male patient originally thought to have a metachronous lesion in the ascending colon after presenting with right lower quadrant pain.

Case presentation: The patient was a 55-year old male with a past medical history of metastatic breast cancer, who presented with right lower quadrant pain, nausea, and vomiting. A computed tomography (CT) scan revealed acute appendicitis in addition to a 2.3 cm cecal mass that correlated with a hypermetabolic region on positron emission testing (PET) the previous year. Analysis of a previously biopsied axillary lymph node demonstrated infiltrating ductal carcinoma. After an appendectomy and right hemicolectomy were performed, pathologic analysis of the specimen revealed metastatic ductal carcinoma to the cecum. The patient was diagnosed with metastatic breast cancer to the colon and was discharged with continued tamoxifen treatment and close follow up.

Conclusions: Although colonic metastases from a primary breast ductal carcinoma is rare compared to a benign process or an additional primary lesion, a low level of suspicion must be maintained in a patient with such a history presenting with abdominal symptoms. Biopsies obtained during colonoscopy are often non-diagnostic, mandating surgical excision and pathologic examination. We presented an example of this rare occurrence in a male patient.

**Justice, Ashlee**

**Mentor(s) -- Dr. James Nottingham**

### **Complicated Appendicitis In the Elderly Population**

Five percent of the population will develop appendicitis at some point in their lifetime. Despite better and quicker diagnosis, there are still subsets of the population in which care is delayed. In the literature, elderly patients tend to present later in course leading to more severe cases of appendicitis. It is apparent in the pediatric literature that there is an increase in ruptured appendicitis amongst minority populations but no clear research has been performed for the adult population. The primary aim of this study is to look at the rate of complicated appendicitis in the elderly population defined as >65 years old compared to the non-elderly population. The secondary aim of this study is to compare the rates of complicated appendicitis by race and ethnicity in the >18-year-old population as well as complicated appendicitis in the minority elderly group.

#### **Methods**

Participant Use Data Files (PUFs) via the NSQIP database were used to collect data from 2005-2016. Elderly patients were identified as greater than age 65. We defined complicated appendicitis via ICD-10 codes including appendicitis with perforation, gangrene, obstruction or suppurative. Mortality, conversion to open, discharge destination, and readmission were used as outcome measures. Statistical analysis of data was presented as +/- standard error, with  $p < 0.05$  considered statistically significant.

#### **Results**

197,678 patients were identified as having a Laparoscopic Appendectomy between 2006-2014. Within this data, we found that the odds of having complicated appendicitis as an elderly patient was 3.974 times that of a nonelderly patient with a 95% CI and  $p$ -value  $< 0.0001$ . The odds of a minority individual having a complicated appendicitis is 1.567 times the same odds in a minority individual when adjusting for age.

#### **Conclusion**

As people are living longer, the appendicitis is becoming more prevalent in the elderly population. As seen in our data collection, the elderly are more prone to having complicated appendicitis therefore increasing their risk of complications and mortality. Race or ethnicity does not appear to increase the risk of complicated appendicitis in the elderly population.

**Kerashvili, Nino**

**Mentor(s) -- Dr. Ana Mrelashvili**

### **Treatment options for episodic spontaneous hypothermia**

Episodic spontaneous hypothermia is a rare condition, occurring in isolation or associated with corpus

callosum agenesis. Hypothermia seems to be the hallmark, followed by hyperhidrosis and autonomic symptoms, such as pallor or flushing, generalized weakness, ataxia, drowsiness and bradycardia. Pathogenesis is not well understood, but thought that the low core temperature set point and increased gain of sweat response potentially play the role. The treatment options are either administration of medications (e.g., anticonvulsants, clonidine, cyproheptadine, glycopyrrolate, bromocriptine, or chlorpromazine) or sympathectomy.

Only few cases of isolated episodic spontaneous hypothermia have been described in literature. We report a case with episodic spontaneous hypothermia with hyperhidrosis responsive to sugar replacement and we will review the treatment options for this rare disease.

**Kocher, Madison**

**Mentor(s) -- Dr. James Nottingham, Dr. Matthew Doepker**

**Correlation between OncotypeDX recurrence score and race in women who choose to initiate chemotherapy for early-stage, ER+, LN- breast cancer**

Oncotype DX (ODX) is a 21-gene expression profiling panel that can be used for patients with early-stage, estrogen-receptor (ER) positive, and lymph node (LN) negative breast cancer. Its purpose is two-fold: to risk stratify patients according to recurrence score (RS) and to predict the risk of 10-year invasive breast cancer distant recurrences. The physician can estimate the benefit of adjuvant chemotherapy by risk stratifying patients. Current guidelines recommend that patients in the low-risk category (RS < 18) receive endocrine therapy alone, patients in the intermediate-risk category (RS 18-30) receive hormone therapy with or without chemotherapy, and that patients in the high-risk category (RS >30) receive both hormone therapy and adjuvant chemotherapy.

Few studies have been published that address correlations between race and whether or not chemotherapy was initiated. Multiple studies have addressed compliance with chemotherapy initiation based on ODX recurrence score, especially in the intermediate-risk category, which has unclear recommendations. No statistical difference between race and ODX recurrence scores has been demonstrated, although the difference between race and chemotherapy initiation has not been extensively investigated.

Correlation between race, tumor size, and risk stratification using ODX will be assessed in early-stage, ER+, LN- breast cancer patients within the Palmetto Health cancer registry. We hypothesize that racial bias will not affect chemotherapy initiation which is illustrated in the preliminary data analysis. We also predict that current chemotherapy recommendations are initiated based on risk stratification according to ODX recurrence scores. A thorough review of the limited, published literature will also be summarized.

**Kocher, Madison**

**Mentor(s) -- Dr. Matthew Doepker**

**Evaluating the Performance and Adherence to a National Standard for the Treatment of Cutaneous Malignant Melanoma**

Background: Variability in the treatment of cutaneous malignant melanoma exists among surgeons. The National Comprehensive Cancer Network (NCCN) provides guidelines to standardize the treatment of malignant melanoma with sentinel lymph node biopsy (SLNB) and width of margin resection. We sought to determine our institution's adherence rate to those guidelines and its impact on disease-specific (DSS), overall survival (OS) and recurrence-free survival (RFS).

Methods: Patients diagnosed with primary cutaneous malignant melanoma were identified and evaluated at a single institution from 2000-2017.

Results: We identified 553 patients diagnosed with melanoma (n=553, 73.9%) and the majority were located on the head/neck and trunk (54.4%) (p<0.001). Median age was 64 and 443 (59.2%) were

male ( $p=0.004$ ). Of the 553, 306 (55.3%) had either a thin (0.76-0.99 mm), intermediate thickness (1.00-4.00 mm) or thick ( $>4.00$  mm) melanoma based on the Breslow thickness. All 306 were eligible for a SLNB, although only 207 (67.6%) patients received a SLNB. Median follow-up of all survivors is 54 months. The 3-year DSS, OS and RFS of patients were 94%, 87% and 94%, respectively (NS). Only 52.6%, 67.1% and 38.1% of patients with thin, intermediate thickness and thick melanoma had the appropriate margins of resection as defined by the NCCN.

Conclusion: Our data show adherence rates for margin width resection and SLNB are below 80%, which is the threshold that may be utilized by the American College of Surgeons' Committee on Cancer for future accreditation of cancer programs. Long term follow-up will be needed to see if any significant difference exists between survival and recurrence.

**Konruff, Stephanie**

**Mentor(s) -- Dr. Harris Parker**

### **Paired mediastinal parathyroid glands in the setting of recalcitrant hyperparathyroidism**

Parathyroid glands are responsible for regulating calcium and phosphorus levels in the body. Occasionally, this hormonal control can be disrupted, leading to hyperparathyroidism. Hyperparathyroidism is generally separated into two classes, depending on the cause of the dysregulation. Primary hyperparathyroidism occurs when a problem exists with the glands themselves. When the glands overwork to compensate for a problem elsewhere in the body, this is secondary hyperparathyroidism. Commonly, this situation arises in the setting of renal failure. Overactive parathyroid glands deplete the body of calcium, increasing the risk for osteoporosis, kidney stones, and heart disease. Parathyroidectomy is a routine intervention to prevent these sequelae. A procedure with high rates of success, removal of the glands can be complicated if they stray from their normal anatomic location on the thyroid gland. This case report describes a rare instance of paired parathyroid glands discovered in the mediastinum. A 41-year-old male on hemodialysis underwent parathyroidectomy for recalcitrant hyperparathyroidism. Surgical exploration of the neck revealed only the superior parathyroid glands. Further dissection into the mediastinum exposed the paired, inferior parathyroid glands. Subtotal removal of the glands successfully reversed the patient's hyperparathyroidism, and he was discharged home without complication. The present case serves to add to the growing base of literature describing paired parathyroid glands in the mediastinum. Failure to account for this anatomic deviation threatens successful reversal of hyperparathyroidism and increases the risk for multiple future consequences.

**Kulik, Kelli**

**Mentor(s) -- Dr. Christina Cox**

### **Evaluation of medications and development of spontaneous intestinal perforations in the NICU**

Background/Purpose: Spontaneous intestinal perforation (SIP) is a focal perforation of the gastrointestinal tract with no discernible cause. SIP is primarily diagnosed in premature infants of very low birth weight (VLBW, birth weight  $< 1500$  grams) and extremely low birth weight (ELBW, birth weight  $< 1000$  grams). Previous research has aimed to demonstrate an association between various medications and the onset of SIP in premature neonates. For instance, indomethacin is a prostaglandin synthesis inhibitor linked to a decrease in mesenteric blood flow and increased intestinal contractility, contributing to intestinal damage. Vasopressors mechanistically cause vasoconstriction and may decrease intestinal blood flow. Furthermore, there is conflicting data regarding antenatal medication exposure and the diagnosis of SIP, including steroids, indomethacin, and magnesium. The evaluation of commonly used medications in the neonatal intensive care unit (NICU) is vital to understanding potential risk factors that may predispose premature neonates to intestinal perforations. The purpose of this study is to determine if early exposure to medications in an already high-risk population is associated with the development of SIP.

**Methodology:** This retrospective, single-center, cohort study is designed to evaluate all VLBW and ELBW inborn patients admitted to Palmetto Health Children's Hospital NICU between August 1, 2010 and August 1, 2017. The primary endpoint is the incidence of SIP following administration of pre-defined medications of interest commonly used in the NICU during the length of hospital stay. Secondary endpoints include time to SIP diagnosis following birth, time to medication administration following birth, cumulative dose of each medication received, and overall mortality rate.

**Kushinka, Marc**

**Mentor(s) -- Dr. Troy Privette**

### **Improving Time to Antibiotic Administration in Severe Sepsis**

Sepsis is diagnosed in over 1.5 million patients per year and is the leading cause of death in US hospitals. Nationwide, there has been a movement toward promoting early recognition and treatment of sepsis in order to reduce patient mortality. Therefore, emergency medicine physicians play a pivotal role in the early recognition and treatment of patients that present with severe sepsis. The American College of Emergency Physicians supports the principles of the Surviving Sepsis Campaign, which include recognizing and treating shock early, using standardized protocols for resuscitation, and timely administration of appropriate antibiotics. In addition, the Centers for Medicare and Medicaid Services (CMS) has mandated an "all or none" measure for hospital reimbursement regarding sepsis which means that all benchmarks must be met for the hospital to receive reimbursement for the patient's entire hospital stay. Emergency medicine physicians are responsible for the diagnosis and treatment of a large proportion of septic patients and therefore have significant impact on the hospital's reimbursement in addition to patient outcome. In review of patient data from July 1, 2017 to November 1, 2017, the average registration-to-antibiotic time in patients presenting with severe sepsis at Palmetto Health Richland was 3.4 hours. Through collaborative efforts and communication between resident and attending physicians, pharmacy, nursing, and other ancillary staff, the aim of this project is to reduce the time to antibiotic administration in severe sepsis patients by at least 12% to meet the current CMS Core Measure of 3 hours.

**Lai, Joseph**

**Mentor(s) -- Dr. Mark Humphrey, Dr. Keith Barron, Dr. Jeffrey Hall, Dr. Lacey MenkinSmith, Dr. Jenny Lee**

### **Uses of point-of-care ultrasound (POCUS) and its impact in a limited resource setting: Nicaragua**

**Background:** Short-term medical missions (STMMs) have become a well-established and appealing avenue for physicians and other medical professionals to provide philanthropy and direct medical care to developing parts of the world. Limited resources and/or logistics may hamper the delivery of health care and point-of-care ultrasound (POCUS) has become increasingly used in these remote areas.

Newer, smaller machines are now available allowing physicians to provide real-time information at the point of contact. There have been few studies that have examined the frequency with which this modality changes diagnosis or patient management and that have evaluated how POCUS could be applied in the setting of STMMs.

**Materials and Methods:** The authors conducted a prospective cohort study in SÃ©baco, Nicaragua, enrolling patients over the course of one week in a series of small outreach clinics to determine how often POCUS changed patient management when incorporated as part of the clinical encounter. Two attending physicians, trained in POCUS, performed or supervised residents performing studies with a handheld ultrasound device (GE Vscan) in accordance with their usual practice and expertise. A pre- and post-US diagnosis was recorded before and after the POCUS study was completed, respectively. The change in management, including the need for new referral or pharmacotherapy, was recorded as well.

Conclusion: POCUS can be of significant benefit to resource-limited countries where healthcare is limited by access to care, availability of medications and/or imaging, and the ability of the patient to adhere to treatment. The authors present how trained physicians integrated POCUS into routine patient encounters and describe the frequency that it changed management, greatly facilitating patient care in a remote, resource-limited location. Future studies should examine how this technology could be more widely applied in similar situations.

**Lim, Mihyun**

**Mentor(s) -- Dr. Souvik Sen, Dr. Kolby Redd**

**Change in Antiplatelet Therapy in Prevention of Secondary Stroke (CAPS2) study**

Introduction and Hypothesis: Approximately a third of stroke/TIA events occur in patients taking daily Aspirin prior to the index event. In this study, we studied the comparative effectiveness of three FDA approved antiplatelet agents (Aspirin, Clopidogrel, and Aspirin-dipyridamole or ASA+DP) in prevention of recurrent vascular events in stroke/TIA patients on Aspirin.

Methods: Consecutive patients identified as having stroke or TIA were screened and enrolled into this prospective longitudinal registry. Patients on dual antiplatelet therapy and oral anticoagulants were excluded. At baseline, patient's etiological stroke subtype, medication history, medication compliance and effectiveness of Aspirin. Changes in antiplatelet regimen including Aspirin dose, Clopidogrel, ASA+DP, changes in Statin therapy, at discharge were recorded. Patients were followed with a 6 and 12 months phone visit to assess primary outcomes (secondary stroke/TIA, MI, death) subsequently adjudicated by hospital chart review.

Results: A total of 183 subjects (mean age 68+12, 58% males, 50% white, 44% African-American and 6% other races) were enrolled over a 24 months period on Aspirin. Majority (63%) had ischemic stroke (NIHSS: 0-21) and remaining (37%) had TIA (ABCD2: 2-7). Ischemic strokes were attributed to penetrating artery disease (41%), large artery atherosclerosis (35%), other/undetermined (18%) and cardiogenic (6%). At the end of 12-month interview, 4.9% of participants on Clopidogrel, 15.1% of participants on aspirin and 35.3% of participants on ASA+DP had a primary outcome (Log rank p=0.006) as depicted in the Kaplan-Meier curve.

Changes in Aspirin dose from 81mg to 325mg, or statin therapy regimen did not appear to impact primary outcome.

Conclusions: Results from this study showed that there are significant differences in secondary vascular event within 12-months of index stroke/TIA that occurred while patients were taking Aspirin, based on whether the patients are discharged on Aspirin, Clopidogrel, or ASA+DP. The results may guide clinicians in choice of secondary stroke prevention strategy.

**Mahboob, Rashid**

**Mentor(s) -- Prof. Ali Rizvi**

**CHARACTERISTICS OF HOSPITALIZED PATIENTS WITH PREDIABETES AND DIABETES DETECTED BY A1C TESTING AT A COMMUNITY TEACHING HOSPITAL**

PARAMETER	PREDIABETES (A1C 5.7-6.4)	DIABETES (A1C >6.5)
Number	56	16
Female/Male	25/31	6/10
Average Age and range in yrs	65.4 (29-99)	57.5 (20-89)
Race (White/Black/Other)	26/30/0	7/7/2
Average A1C and range	6.07 (5.7-6.4)	8.98 (6.5-14.2)
Average BMI and BMI range	34.2 (17.2-48)	38.3 (24.2-43.4)
Hypertension (number and %)	49 (87.5%)	10 (62.5%)
Hyperlipidemia	33 (58.9%)	3 (18.7%)
ASCVD (%)	18 (32.1%)	4 (25%)

**Objective:** The purpose of the study was to analyze the characteristics of inpatients with elevated hemoglobin A1C levels (>6.4%) during a 3-month period.

**Methods:** This IRB-approved study protocol involved a review of all patients with elevated A1C levels who were admitted to Palmetto Health Richland over a 3-month period in 2016. Of 544 patients, 56 had prediabetes and 16 had diabetes (both previously undiagnosed) by A1C criteria (Table 1). 25 (44.6%) and 6 (37.5%) were females in the prediabetes and diabetes group respectively. The average age was higher in the prediabetes group (65.4 vs. 57.5 years). The number of White and African-American patients was roughly equal.

**Results:** The average A1C was 6.07% in the prediabetes and 8.98% in the diabetes group respectively. The average BMI fell in the obese category, being higher in the diabetes group (34.2 vs. 38.3). A majority of patients with elevated A1C also had comorbidities of hypertension and hyperlipidemia, and approximately one-third had concomitant atherosclerotic cardiovascular disease.

**Conclusions:** A significant number of patients admitted to the hospital have undiagnosed glucose intolerance and abnormal A1C in either the prediabetic or diabetic range. The statistics showed a clustering of metabolic risk factors (obesity, hypertension, hyperlipidemia, and ASCVD). Screening for glucose intolerance, especially when risk factors are present, could be an efficient way of case-finding for prediabetes and diabetes in hospitalized patients.

**Mathews, Candler**

**Mentor(s) -- Dr. James Jackson**

### **The Epidemiology of Lower Leg/Achilles Injuries in High School Athletes from 2011-2012 to 2013-2014**

**Background:** In athletes, the Achilles tendon (AT) is the most commonly injured tendon of the lower extremity. Lower leg/Achilles injury epidemiology has been documented for several populations. However, to our knowledge, no previous studies have described the epidemiology in a large sample of the high school (HS) student-athlete population using the National Athletic Treatment, Injury and Outcomes Network (NATION) HS Surveillance Program.

**Study Design:** Descriptive epidemiology, cross-sectional.

**Methods:** The Datalys Center for Sports Injury Research and Prevention provided lower leg/Achilles injury data for 27 sports in 147 high schools for the 2011-2012 to 2013-2014 academic years from NATION. R statistical software version 3.2.5 was used for analysis. This surveillance data set is a convenience sample. To reduce the burden of reporting non-time loss (NTL) injuries, participation restriction <24 hours, athletic trainers could record these injuries as “problems” rather than full injury reports. As such, the specific diagnosis was not recorded, just the body part injured and the type of injury (i.e. lower leg/Achilles sprain/tear versus Achilles tendinitis.) We labeled these injuries as minor lower leg/Achilles problems (MLP).

**Results:** Of the 27 HS sports examined during this 3-year period, there were 877 injuries. Lower leg/Achilles injuries were most commonly seen in men’s football (21%), followed by women’s cross-country and outdoor track (9%, 8%). Women’s cross-country and indoor track had the highest rates of lower leg/Achilles injury. The practice injury rate was 0.91 times competition injury rate. (95% CI, 0.78-1.07). Among sex-comparable sports, the injury rate in men was 0.79 times the injury rate in women (95% CI, 0.69, 0.91). 81% of the injuries were NTL. The most common injuries were: MLPs (76%), gastrocnemius muscle tears (7%), and posterior tibial tendon tears (5%).

**Conclusion:** Lower leg/Achilles injuries are common in HS student-athletes. An improved understanding of the most common sports in which lower leg/Achilles injuries are seen may help direct appropriate resource utilization. Our data suggests efforts toward prevention of these injuries, especially in

football, cross-country, and track, may have the greatest impact on the health of student-athletes.

**McDill, Kelsey**

**Mentor(s) -- Dr. Monica McCutcheon**

### **Nutrition at Its Finest: Improving Breastfeeding Rates in the Hispanic Population**

#### Introduction

Breastfeeding has been shown to be the best source of nutrition for infants. It is associated with maternal benefits and decrease in several diseases. A large portion of Hispanic women will initiate breastfeeding but often start formula exclusively, or as supplementation due to several circumstances. The goal of this quality improvement project was to improve breastfeeding rates in the Hispanic population by implementing specific verbal and printed education.

#### Methods

Pre-intervention data was collected between October 2015 and March 2016. Pediatric residents working with new Hispanic mothers were trained in the benefits of breastfeeding. Additionally, a specific Spanish breastfeeding handout was given. Infants were tracked by chart review in the EMR for rates of exclusive and partial breastfeeding at the newborn and 2 month appointments. The primary end point was the percentage of Hispanic infants exclusively breastfeeding at 2 months with a secondary end point of increasing partial breastfeeding at 2 months.

#### Results

Pre-intervention data collection identified 27 Hispanic infants with an exclusive breastfeeding rate of 47.6% at newborn follow-up and 33% at 2 months. During the intervention period, 14 families received education. Exclusive breastfeeding rates of patients after intervention were 20% and 30% for newborn and 2 months respectively. Secondary end point of improving partially breastfeeding rates were 47.6% at newborn and 33% at 2 months for pre-intervention and 70% at newborn and 30% at 2 months. Rates of any breastfeeding at 2 month appointments, were from 66.7% to 70%.

#### Discussion

While the primary end point was not met as there was no increase in overall breastfeeding rates, exclusive breastfeeding stayed stable over the course of the study. Partial breastfeeding rates were higher at the newborn visit but tapered off as they did not sustain the practice. There were some limitations to this project as though training was the same, presentation, connection, and timing of information all could have an effect on outcomes. Additionally, families are free to choose the plan that is best for them despite information. Finally, the appointments at the outpatient clinic conducted by different residents possibly leading to differences in final education.

**McGowan, Patrick**

**Mentor(s) -- Dr. Morgan Adams**

### **Implementation of a Diabetic Action Plan within the USC Family Medicine Clinic**

#### Background:

Diabetes mellitus type II (DM II) is a prominent, long-term health disorder affecting the daily lives of almost 20% of the 12,000 patients treated at the USC Family Medicine Clinic. DM II is one of the most frequently treated diseases in the Family Medicine setting. Significant portions of diabetic patients at our clinic are not well controlled with 30% having a hemoglobin A1c (Hg A1c) > 9.0 in the fall of 2017. Uncontrolled blood sugar levels significantly increases all cause morbidity and mortality of patients diagnosed with DM II. Reduction of Hg A1c levels by as little as 1% can drastically reduce morbidity and mortality. Identification of poorly controlled diabetic patients at the USC Family Medicine Clinic, with subsequent intervention through diabetic action plans, will attempt to reduce the percentage of patients with poorly controlled DM II. The aim of the project is to improve the communication of thera-

py plans to patients by implementation of a diabetic action plan.

#### Methods:

This quality improvement project has been approved by the Palmetto Health IRB. The clinic has two sides, East and West, in which resident physicians practice. Patients who meet inclusion criteria on the East side will be provided a diabetic action plan. Patients will be included if they are an adult aged 18-75 years with uncontrolled diabetes defined as having a Hg A1c > 9.0. Patients are to be established at USC Family Medicine Clinic, defined as 2 visits at the clinic within the past year. Patients are to be on at least one form of glucose lowering agent in an attempt to control their DM II. Providers and nurses on the East side of clinic will identify patients who meet inclusion criteria. These patients will be given a diabetic action plan and registered in the project. All patients will receive the standard of care treatment as this quality improvement project only seeks to improve communication of therapy plans with patients. The results will be compared to a randomized group of patients on the West side of the clinic who meet inclusion criteria and are of similar demographics.

#### **Meade, Courtney**

**Mentor(s) -- Dr. Robert Daniels, Dr. Andrew Gainey, Dr. Anna-Kathryn Burch**

#### **Impact of a pediatric antimicrobial stewardship program on cystic fibrosis exacerbations in a children's hospital**

##### Introduction/background:

Palmetto Health Children's Hospital functions as a National Children's Cystic Fibrosis Center and has the only Children's Hospital Antimicrobial Stewardship Program (ASP) in the state of South Carolina that manages the treatment of acute cystic fibrosis (CF) exacerbations requiring hospital admission. Palmetto Health Children's ASP Program utilizes unique strategies in the management of CF exacerbations including; extended infusion antibiotics, higher milligram per kilogram dosing, patient specific tailoring of antibiotics based on past and present microbiology, more frequent dosing intervals, use of synergistic combinations and use of newly developed antibiotics undergoing clinical trials in pediatric patients.

Due to the progressive nature of our program, we feel it is pertinent to highlight the advantages of ASP management in CF exacerbations, as well as identify areas for opportunity in the ongoing development of our program. This study will seek to identify those advantages, as well as highlight the unique services provided to CF patients through the Children's Hospital ASP program.

##### Methods:

This single-health system, retrospective, cohort study will include children admitted to Palmetto Health Children's Hospital from January 1, 2007 to December 31, 2016 with the diagnosis of cystic fibrosis exacerbation. Patients will be identified through the use ICD9 and ICD10 codes and patient charting systems will be accessed using the medical record number (MRN) assigned to the patient. The primary endpoint is PFT response, defined as the absolute difference between the percent predicted FEV1 obtained upon hospital discharge or completion of antibiotic therapy and the percent predicted FEV1 obtained just prior to or upon hospital admission. Secondary endpoints will include hospital readmission, length of inpatient stay, inpatient mortality/death, genotype, microbiology changes, receipt of outpatient antibiotics and pulmonary medications, and the empiric selection and dosing of antibiotic therapy.

Baseline patient characteristics will be collected and compared using t-tests for continuous variables and chi-square tests for categorical variables. Linear or beta regression will be used to assess PFT response. Wilcoxon rank sum test will be used to assess hospital readmissions. GEE analyses will be performed to assess admissions requiring PICU stay, in hospital mortality and obtainment of baseline FEV1.

#### **Melton, William**

**Mentor(s) -- Dr. Gregory Grabowski, Dr. Benjamin Jackson III, Dr. David Koon**  
**Orthopaedic Resident Remediation: Frequency, Interventions, and Outcomes**

Background: There has been extensive research to identify selection criteria to predict a successful orthopaedic resident. However, no current literature exists from organized committees or national surveys regarding orthopaedic resident remediation. The goal of this study is use the national survey format to determine the frequency of remediation, the underlying etiology for remediation, the intervention strategies utilized, and the outcome.

Methods: For the prospective survey design, all current 159 Orthopaedic residency program directors were emailed a non-identifying digital survey. All ACGME recognized programs in the United States were included and none were excluded. After the initial email, follow up emails were sent monthly for a three-month period. The data remained anonymous with no identifying information. The qualitative data was analyzed using descriptive statistics. Interquartile ratio (IQR) was reported due to skewed data.

Results: 71 of 159 program directors responded for a response rate of 44%. 104 residents were remediated, the majority at PGY-3. Professionalism and communication were the most common deficiency requiring remediation. Program directors reported probation being the most effective followed by feedback and supervision or mentorship. Rehabilitation, didactics, feedback, and mentorship had the highest rate of graduation on time.

Conclusion: Of the 44% of programs that responded, most were academic institutions with 4-5 residents per class. However, the IQR and median were similar to those of community programs. The number of small (33) and large (37) programs is comparable, and there was no difference in the reported outcomes. Most remediated residents were PGY-3 suggesting increased scrutiny moving from junior to senior responsibilities. The vast majority of deficiencies requiring remediation pertained to the affective domain, which supports the importance of away rotations and interviews. Although most residents graduated from an orthopaedic program on time, a large number also transitioned to another medical field. Furthermore, 63 of 104 residents reported a non-medical career. However, low numbers of termination and even lower numbers of litigation were reported suggesting an amicable exit from orthopaedics.

**Metz, John**

**Mentor(s) -- Dr. Michael Wagner**

**Lung Ultrasound Education: Determining Effective Teaching Strategies for Medical Students**

The USC School of Medicine currently has an extensive ultrasound training program designed to incorporate ultrasound techniques into the basic science years of medical school curriculum. An essential use of point of care ultrasound is in the diagnosis of lung pathology. Even though lung ultrasound is routinely used during the 3rd and 4th years of medical school, it has not been integrated into the current medical school curriculum. To determine the most effective way of teaching medical students how to perform lung ultrasound, two separate teaching methods were utilized and subsequently tested. The first method was designed to be the control group and included a PowerPoint focused didactic lecture, followed by briefly practicing their scanning ability on each other with limited guidance. The second method tested was a novel combination of PowerPoint lecture and hands-on activity. These methods were both timely and cost efficient. The population tested was comprised of 1st and 2nd year medical students with limited exposure to lung ultrasound previously. Their performance on a pre-instruction quiz was compared to their performance on a post-instruction quiz. The results were also analyzed between the two groups to determine if one method was more effective than the other. With the information acquired from both the data on assessment improvement, and a follow up survey, an effective curriculum for lung ultrasound can be developed and incorporated into the first two

years of medical school.

**Mills, Baker**

**Mentor(s) -- Dr. Erika Blanck**

### **BLUMENSAAT'S LINE AS A PREDICTION OF NATIVE ANTERIOR CRUCIATE LIGAMENT LENGTH**

Purpose:

Graft-tunnel mismatch is a condition in which the anterior cruciate ligament (ACL) graft is either too long or short. It is hypothesized that Blumensaat's line length (BLL) measured from a lateral knee radiograph, will accurately approximate the native ACL length and help to avoid graft-tunnel mismatch.

Methods:

A lateral knee radiograph was used to determine BLL. The mean percent difference (MPD), mean percent similarity (MPS), absolute difference (AD), and correlation between BLL, PLL, and the native ACL length were calculated. An inter-observer and intra-observer reliability coefficient were calculated for the measurement of BLL.

Results:

A total of 130 patients (66 male and 64 female) underwent direct measurement of their native ACL during knee arthroscopy. For males, the average length of the ACL was 32.5mm, BLL 30.4mm, and the PLL 49.2mm. The AD between BLL and the native ACL was  $2.4\text{mm} \pm 1.3\text{mm}$ , the MPD  $3.7\% \pm 1.9$ , the MPS  $97.4\% \pm 2.6$ , and the correlation coefficient (CC) 0.88 (>0.8 excellent, <0.2 poor). The CC between the PLL and native ACL was 0.08. For females, the average length of the ACL was 30.2mm, BLL 27.5mm, and PL 44.4mm. The AD between BLL and native ACL was  $2.7\text{mm} \pm 1.7\text{mm}$ , the MPD was  $-4.5\% \pm 2.4$ , the MPS was  $95.5\% \pm 2.5$ , and the CC was 0.93. The CC between the PLL and native ACL was 0.1. The inter-observer and intra-observer reliability coefficient for the measurement of BLL was 0.86 and 0.83, respectively.

Conclusion:

A strong correlation was found between BLL and the native ACL with a high inter-observer and intra-observer reliability. This correlation provides a simple and reliable method to approximate the native ACL length prior to reconstruction and possibly aide in graft-tunnel mismatch prevention.

Level of Evidence IV

**Miranda, Lindsay**

**Mentor(s) -- Dr. Kamla Sanasi-Bhola, Dr. Anna-Kathryn Rye-Burch, Dr. Matthew Marcus**

### **Whole body MRI in Pediatric Patients with Clinical Failure of Appropriate Antimicrobial Therapy for Bacteremia**

PURPOSE OF STUDY: In the pediatric population it is sometimes difficult to locate deep seated infections (osteomyelitis and abscesses) given nonspecific symptoms and signs. Early recognition of osteomyelitis and rapid initiation of management is important to avoid sequelae. The increasing emphasis on radiation dose reduction makes whole-body MRI (WBMRI) with STIR the advanced imaging modality of choice over bone scintigraphy.

STATEMENT OF METHODS: A retrospective chart review of pediatric patients, <19 years, at Palmetto Health, Columbia SC, who had WBMRI with infectious indications (clinical failure with persistent

bacteremia/ persistent symptoms) during September 2011 to December 31st 2013 was performed. The aims of this research are to describe the characteristics of patients who had WBMRI, determine the percent with osteomyelitis/deep seated infection, and describe complications of contrast/sedation. SUMMARY OF RESULTS: 20 patients were included, age 0.5- 208 months and male predominance (12; 60%). The most common comorbidity was sickle cell syndrome (n=6). The reasons for admission were fever (10, 50%), pain/swelling (4, 20 %) and abnormal labs (4, 20%). Investigations revealed temperature of 100.5 OC, WBC 15 K/uL, CRP 93 mg/L, ESR 67 mm/hr. The most common organisms isolated from blood /tissue cultures were gram-positive cocci (n=10, 50%). Of those, the majority were Staphylococcus aureus, (9; 90%) (6/9 methicillin resistant). Other organisms included 6 gram negatives and 1 candida spp. WBMRI found an average of 1-4 areas of osteomyelitis and 0-8 other locations of deep seated infections per patient. Patients had a total of 5 diagnostic studies. Duration of sedation was 88 minutes, with propofol (10/14) being the most common agent used. No complications from the sedation or MRI contrast were recorded. 19/20 patients survived their illness with 3 of them having sequelae during the follow up period of 505 days. CONCLUSION: WBMRI with STIR has led to the early detection and initiation of treatment for osteomyelitis in patients with clinical failure while on appropriate antibiotics. This modality has proven to be safe and the risk of sedation outweighing the risk of exposure to ionizing radiation from other forms of imaging. Data collection is ongoing.

**Moizuddin, Mohammed**

**Mentor(s) -- Dr. Rohan Arya**

**Veno-Venous Extracorporeal Membrane Oxygenation for severe tracheal stenosis related acute respiratory failure: Preventing a fatal outcome**

Extracorporeal membrane oxygenation (ECMO) is being extended to wide variety clinical fields given it is a novel, effective method of advanced cardio-pulmonary resuscitation. We present a case with life threatening acute airway obstruction due to severe tracheal stenosis treated effectively with Veno-Venous (VV) ECMO. A 30-year-old female patient was admitted to our medical intensive care unit with acute hypoxemic respiratory failure post endotracheal intubation on mechanical ventilation. Past medical history was significant for asthma, history of polysubstance abuse, poly-trauma, acute respiratory failure and tracheal stenosis post motor vehicle accident 8 weeks before admission. She was difficult to ventilate, and had severe respiratory acidosis (PH 6.9), hypercapnia (PCO2 undetectable), low tidal volumes and failed multiple standard interventions. She required immediate VV-ECMO support with standard 34 French, right internal jugular Avalon cannula. Emergent bedside bronchoscopy revealed circumferential stenotic area just below her 6.5 size endotracheal tube (ET) with 3-5 cm diameter opening. Computerized tomography of the neck and chest estimated this to be about 80% spanning 2.8 cm, and ET tip was noted within the cervical region above area of stenosis. She immediately underwent tracheal electrocautery with sequential balloon dilatation at bedside with successful advancement of 7.5 size ET tube beyond the stenosed area. She was subsequently weaned off VV-ECMO support, extubated and subsequently had successful operative tracheal resection three weeks later. ECMO is useful in providing supplementary oxygenation and carbon dioxide elimination when adequate ventilation cannot be provided due to presence of fixed upper airway obstruction. It is being increasingly used these days in cases requiring complicated tracheal surgery, such as severe tracheal stenosis (intrinsic or extrinsic), carinal reconstruction and upper airway tumor resections. Timely ECMO support has shown to prevent hypoxic brain injury in patients with tracheal stenosis less than 5 mm confirmed by bronchoscopy or CT scan. To our knowledge, this is the first case report where bronchoscopy with gold probe electrocautery was used to successfully treat severe tracheal stenosis at bedside with ECMO support. Patients requiring emergent tracheobronchial interventions can be safely bridged with ECMO support which is highly effective method of preventing an otherwise certain death.

**Moizuddin, Mohammed**

**Mentor(s) -- Dr. Antoinette Williams, Dr. William Owens**

**Sleep in Intensive Care Unit (ICU): Lowering Interventions by Empowering Nurses in Critical Care Environment – Noise Optimization in Sick Environment – The SILENCE NOISE! quality project**

Sleep quality in the ICU is often overlooked as there is a misconception among clinicians that sleep deprivation is inevitable in the ICU setting. Sleep deprivation has been associated with multiple physical and psychological consequences. Physical consequences are related to ventilatory, immunologic, cardiovascular, hormonal and metabolic disturbances, and physical activity. Psychological consequences are related to cognitive, psychiatric, quality of life disturbances, and delirium. Environmental factors, including noise, lighting, frequent patient care interactions for monitoring, treatment and medications all effect the quality of sleep in intensive care environment. Interventions such as music therapy, relaxation, decreased lighting, earplugs, and eye masks have been used to improve sleep quality. Despite interventions aimed at decreasing noise, sound levels continue to exceed WHO recommendations, and ICU sounds (such as alarms and conversations) may interfere with sleep. In a pilot survey, we observed noise levels up to 70 dB at midnight in our ICUs and Richards-Campbell Sleep Questionnaire (RCSQ) with a low score indicating poor sleep quality. The objective of this quality project is to review perceptions of patients sleep experience in our ICUs, and identify factors contributing to their sleep quality, noise being one of them. This is a Single center ICU Observational Prospective Study. Inclusion criteria includes all adult patients, >24 hours ICU stay, Glasgow coma scale > 13 and 24 hours post-surgical procedure. Exclusion criteria includes patients with cardiac arrest, significant brain injury, those requiring vasopressors or sedation, history or current treatment of psychiatric illness and insomnia. Primary outcome is improvement sleep quality in ICU with lowering interventions such as noise reduction in our ICU. Secondary outcome will be patient and nursing perceptions of about success of this intervention. SILENCE NOISE protocol will ensure quiet time in our ICU from 11 pm to 5 am daily during the 4 weeks' study period. We will closely monitor of noise levels daily along with RCSQ scoring by ICU nurses. Standard statistical analysis software will be utilized and T test, Chi Square tests and analysis of variance tested and results presented at the meeting given the study is in progress now.

**Money, Adam**

**Mentor(s) -- Dr. Gregory Grabowski**

**A Retrospective Comparative Analysis on the Effect of Tranexamic Acid to Reduce Perioperative blood loss in Patients Undergoing Cervical Spine Surgery**

**Background**

Tranexamic acid (TXA) has been shown to reduce perioperative blood loss in a number of operations. [1-4] Many surgeons have incorporated the use of TXA during lumbar spinal surgery to decrease perioperative blood loss. [5-7] Limited studies have evaluated the use of TXA in the cervical spine.[8, 9] This study assesses the efficacy of TXA in anterior, posterior, and combined cervical spine procedures

**Methods**

From September 2011 to March 2017 a retrospective review of a single surgeon's elective cervical spine operations was completed. Patients were divided into anterior, posterior, or combined approach. Patients were then further subdivided into TXA or control. We evaluated intra-operative blood loss, post-operative drain output, and post-operative hemoglobin. We also evaluated operative time and need for transfusion as secondary outcomes. Complications associated with TXA use were recorded and analyzed.

**Results**

The use of TXA lead to a statistically significant reduction of intraoperative blood loss in both the anterior approach group and in the combined approach group. There was an absolute reduction in intraoperative blood loss in posterior approach group, but this was not significant. There was not a significant difference in reduction in total drain output, post operative hemoglobin or operative time in patients receiving or not receiving TXA. No significant complications with the use of TXA were seen.

#### Conclusions

In our cohort TXA use led to a statistically significant reduction of intraoperative blood loss for anterior and combined approaches.

**Montague-Farwell, Elizabeth**

**Mentor(s) -- Dr. James Cook**

#### **Are Women's Perception of their BMI Consistent with their Actual BMI? Patient Survey of Attitudes toward Health and Weight.**

Background and Significance: Obesity is a rapidly increasing problem that costs \$147 billion to \$210 billion per year in current health care costs. It is an epidemic affecting our country, with two-thirds of adults now classified as overweight or obese. South Carolina now has the 10th highest adult obesity rate in the nation. There are many known health risks associated with obesity. Providers in women's health also see an increased risk of menstrual irregularities, infertility, endometrial and breast cancer and an increase in surgical and perinatal risks. From the annual exam to contraception, menstrual irregularities to cancer and prenatal care to evaluation for surgery, obesity can influence every type of patient visit and chief complaint in the OB/GYN office. Therefore, it is critical for women's health care providers to have an understanding of how women perceive their weight in order to help educate and prevent the epidemic from worsening.

Methods: Exempt Institutional Review Board approval was obtained. An anonymous survey was completed by women presenting for health care at Palmetto Health Women's Center. To compare women's actual weight with women's perception of weight, the CDC's definition of BMI was used with the following categories: Underweight: <18.5, Normal weight: 18.5-25, Overweight: 25-30, Obesity: 30-40, and Extreme Obesity: > 40. The data was then reviewed and processed as a descriptive analysis quantifying and qualifying the participants' responses.

Results: 117 patients were included in the study. Due to missing values in some of the characteristics, the sample size varies for different variables. A strong disagreement between women's actual BMI category and their perception. was noted Specifically, it was found that women underestimate their weight category.

Discussion: Women were found to underestimate their weight category and be unaware of the significant impacts to their health. Our data represents a single-center experience and is limited by race, socioeconomic, and education. However, these results are concerning and suggest further education for patients is warranted not only on how to lose weight, but also on an understanding of their current weight and the implications it has on their overall health and life.

**Nguyen, Thai**

**Mentor(s) -- Dr. Tariq Horani**

#### **Lethal Diarrhea: Neuroendocrine Tumor**

Neuroendocrine tumors arise from hormone producing cells within the neuroendocrine system. Neuroendocrine cells are defined as ""production of neurotransmitter, neuromodulator or neuropeptide hormone; the presence of dense-core secretory granules from which hormones are released by exocytosis"" and can be found in the lungs or GI tract.

Patient is a 56 year old African American male who presented with a chief complaint of syncope at work. Patient was found to be orthostatic with anasarca present. Syncope work up was negative except new onset atrial fibrillation. Patient also endorsed a history of diarrhea for a few years which was attributed to IBS. Further work up resulted in a CT scan showing multiple liver lesions concerning for metastases, MRI with a spiculated mass in the small bowel, and highly elevated chromogranin A. Liver biopsy obtained that confirmed low grade neuroendocrine tumor or carcinoid tumor. Patient was started on Lanreotide IV monthly based on slow mitotic rate.

The overall incidence and prevalence of neuroendocrine tumors have increased 6-fold between 1973 and 2012, likely due to early detection. However, patients are commonly misdiagnosed with IBS after an initial negative GI work up, often delaying diagnosis 5-7 years from onset of symptoms. From this delay, patient's mortality and morbidity often increase. Fortunately, the overall survival rate for neuroendocrine tumors has increased mainly due to improved therapies and ease of palliation. Therefore, it is imperative patients are diagnosed correctly and started on the correct treatment early. With quality history taking and effort, physicians can drastically improve these patients' quality of life and even survival.

**Odom, Nicole**

**Mentor(s) -- Dr. Tina Hardison, Dr. Julie Justo**

**Evaluating the Impact of MRSA PCR Nasal Swabs on Early Antimicrobial De-escalation in Emergency Department Patients**

Background: Methicillin-resistant Staphylococcus aureus polymerase chain reaction (PCR) nasal swab is recognized as a useful rapid diagnostic tool for early de-escalation of MRSA therapy in patients with pneumonia due to its high negative predicted value. Currently, there is a lack of comparative data regarding MRSA PCR nasal swab use in the emergency department (ED) and its impact on subsequent MRSA therapy in this specific patient population. The purpose of this study was to evaluate the duration of vancomycin therapy in emergency department patients with suspected or confirmed community-onset pneumonia with a negative MRSA PCR nasal swab as compared to patients with no performed MRSA PCR nasal swab.

Methodology: Eligible subjects in this retrospective, observational study were adult patients admitted from Palmetto Health Richland Emergency Department with suspected or confirmed community-onset bacterial pneumonia from August 1, 2016 to August 1, 2017, and who received IV vancomycin therapy in the emergency department. The primary objective was to compare the duration of vancomycin therapy in each group, i.e. negative MRSA PCR nasal swab vs. no MRSA PCR nasal swab. Secondary objectives included clinical outcomes (e.g. acute kidney injury, length of stay, duration of vancomycin therapy in patients with a positive MRSA PCR nasal swab) and pharmacist interventions. Univariable and multivariable logistic regression were used to assess the impact of MRSA PCR nasal swabs on the duration of vancomycin therapy and to adjust for other potential confounders.

Results: Pending.

Conclusions: Pending.

**Ohlsson, Jordan**

**Mentor(s) -- Dr. Daniel Clair**

**Efficacy and safety of Argatroban as a perioperative anticoagulant in cardiac surgery.**

Background: Heparin has widely been accepted as the primary anticoagulant in the postsurgical period after coronary artery bypass grafting (CABG) or valve repair/replacement. Heparin has been shown however to be associated with Heparin Induced Thrombocytopenia (HIT), which increases risk of bleeding and cardiac mortality. Argatroban, a direct thrombin inhibitor, has similar efficacy in cardi-

ac surgery for patients with diagnosed or suspected HIT but has not been investigated as a primary anticoagulant across all patient populations. The hypothesis of this study states that Argatroban will decrease bleeding, length of hospital stay, length of intensive care unit (ICU) stay, blood product utilization, exploratory surgery, and cardiac mortality as compared with Heparin while accomplishing the same anticoagulation effect. The secondary hypothesis states that Argatroban will prove to be more cost effective as compared with Heparin due to decreased resources dedicated to bleeding complications.

**Methods:** The study is a multicenter retrospective chart review of all patients administered Argatroban after CABG, valve repair/replacement, or combination at Palmetto Health Richland from October 2014 to July 2017 as compared with a historical set of patients administered Heparin after the same procedures at the Medical University of South Carolina between November 2005 and October 2008. Patients at Palmetto Health were identified by a business analyst using discreet current procedural terminology (CPT) codes. Following de-identification, charts will be examined based on demographics, comorbidities, and preprocedural medications to confirm the cohorts are comparable. Efficacy study endpoints will be analyzed based on clotting parameters prothrombin time (PT), partial thromboplastin time (PTT), and international normalized ratio (INR). Safety study endpoints will be analyzed based on blood product utilization, rate of bleeding, need for surgery to repair bleeding, thrombosis, length of hospital stay, length of ICU stay, and mortality. Propensity score matching and adjusted regression analyses will be completed for each measurable outcome.

**Okoye, Stella**

**Mentor(s) -- Dr. Sangita Dash, Dr. Majdi Al-Hasan, Dr. Sharon Weissman, Dr. Kamla Sanasi**  
**Inappropriate Clostridium difficile Testing in Community- and Healthcare Facility-Onset C. difficile Infection**

**Background:** Clostridium difficile Infection (CDI) is the most common cause of infectious diarrhea in the hospital setting. Clostridium difficile is detected by PCR in individuals infected or colonized with C. difficile due to high sensitivity of the test. This may result in over reporting of CDI. This retrospective cohort study examines appropriateness of C. difficile PCR testing for community-onset (CO) and healthcare facility-onset (HO) CDI.

**Methods:** Hospitalized patients  $\geq 2$  years of age with a positive C. difficile PCR at Palmetto Health in Columbia, South Carolina from January 1, 2015 through Dec 31, 2016 were identified. Testing for C. difficile was considered inappropriate if done in the absence of diarrhea, defined as 3 or more loose bowel movements over 24 hours, or if the patient received a laxative within 48 hours of testing. A subsequent test of cure was considered if documented as such in medical records, or if the test was repeated once diarrhea resolved. Chi square was used to compare appropriateness of C. difficile testing between patients who have been hospitalized for  $\leq 3$  days and  $> 3$  days.

**Result:** Among 199 patients with positive C. difficile PCR, 89 (45%) had HO-CDI and 110 (55%) had CO-CDI. Overall, the median age was 63 years and 101 (51%) were women. Testing was considered inappropriate in 51/89 (57%) patients with HO-CDI as compared to 27/110 (25%) of those with CO-CDI (Figure 1;  $p < 0.001$ ). Of those with inappropriate testing for HO-CDI, 28/51 (55%) had no fever or leukocytosis. Moreover, patients with HO-CDI were more likely to have a subsequent unnecessary test of cure than those with CO-CDI (42/89 [47%] vs. 26/110 [24%],  $p < 0.001$ ).

**Conclusion:** Inappropriate testing was more likely to occur in HO-CDI than CO-CDI. Given the high frequency of inappropriate testing, implementation of processes to improve utilization of C. difficile PCR may reduce over diagnosis and lead to more accurate public reporting of HO-CDI.

**O'Neal, Jayla**

**Mentor(s) -- Dr. Dev Karan**

**Obesity and Triple Negative Breast Cancer: Exploring Potential Mechanistic Links**

Over the past several years there has been increasing interest in the role of adipocytes in shaping the breast cancer tumor microenvironment. Adipose tissue, which is comprised of adipocytes, fibroblasts, and immune cells, constitutes a large percentage of the breast material. In the setting of metabolic syndrome and obesity, adipose tissue takes on an inflammatory phenotype and operates in a dysfunctional state secreting increased amounts of pro-inflammatory mediators referred to as adipokines. These adipose associated cytokines, including leptin, TNF- $\alpha$ , and IL-6 among others, have been found to interact with the various cell types that make up the breast tumor microenvironment creating conditions that regulate tumor progression and aggressiveness. Triple negative breast cancer makes up about 15-20% of all breast cancer diagnoses and is a disease characterized by its heterogeneity, extremely poor prognosis, and lack of targeted therapies. Research studies have linked TNBC to obesity and metabolic syndrome, but the molecular mechanisms of this association are incompletely described. In order to characterize a potential mechanistic link between TNBC and obesity, we review the influence of adipose tissue on the tumor microenvironment and the current research on the roles that adipokines play in triple negative breast cancer progression.

**Pacana, Matthew**

**Mentor(s) -- Dr. Guillaume Dumont**

**Acetabular Labral Tear Dimensions and Quantity of Suture Anchors Required for Repair**

Introduction:

Hip arthroscopy is a minimally invasive procedure that allows treatment of a growing number of hip injuries including acetabular labral tears. Trends have shown a shift toward labral repair as opposed to labral debridement. The goal of this study is to assess the number of suture anchors used in arthroscopic acetabular labral repairs and correlate it to the dimensions of the labral tear as defined by the location of the tear on the clock face.

Methods:

Hip arthroscopy procedures including labral repair from a single surgeon were evaluated using patient operative reports to determine the location and dimension of the acetabular labral tear and the number of suture anchors utilized. Data was analyzed to determine mean size, starting location, and ending location (based on the clock face system) of labral tears. The number of suture anchors utilized to repair the tear was recorded.

Results:

106 patients with a labral repair performed from 2014 to 2017 were included. The labral tears extended a mean of 3.5 hours (range 1.5-5.0) on the clock face or 105° (range 45°-150°). A mean of 3.07 anchors (range 1-5) was used. Tears ranged between 9:00 and 3:00 on the clock face. The mean tear starting location was 2:12 and the mean tear ending location was 10:54 on the clock face.

Discussion and Conclusions:

The results of this study demonstrate that most tears occurred in the anterosuperior quadrant of the clock face with most tears requiring one anchor per hour on the clock face. The most common tear size was a three-hour tear which required a mean of 3 anchors (range 2-4). Additionally, there is a positive association between tear size of number of anchors needed.

**Pan, Ingrid**

**Mentor(s) -- Dr. Alyson Browning, Dr. Michael Horan, Dr. David Oliver**

**Evaluating Dosing and Efficacy of Tranexamic Acid in Pediatric Scoliosis Surgery at an Urban Tertiary Pediatric Institution**

Background/Purpose: Pediatric scoliosis patients requiring surgical intervention are at risk for significant blood loss that may result in hypotension, anemia, and coagulopathy. Various preventive strategies may be utilized, including intraoperative antifibrinolytics. Tranexamic acid (TXA), a synthetic antifibrinolytics that has been shown to prevent significant hemorrhage in trauma patients, has also been studied in pediatric scoliosis patients. Despite favorable preliminary results in this population,

there are currently no standard TXA dosing recommendations. At Palmetto Health Children's Hospital (PHCH), pediatric orthopedic surgeons utilize TXA intraoperatively. However, dosing regimens are highly variable and inconsistent. The primary objective of this study, an assessment of current institutional practice in order to determine dosing and efficacy of tranexamic acid (TXA) in pediatric scoliosis surgery, will be useful in development of a standard dosing protocol.

**Methodology:** The study is a single-center, retrospective review of pediatric idiopathic and neuromuscular scoliosis patients < 18 years old who received <sup>3</sup> 1 TXA dose during scoliosis surgery from August 1, 2015 to September 1, 2017 at PHCH. The primary endpoints include description of TXA prescribing patterns and evaluation of the efficacy of various TXA dosing regimens, defined as blood loss and transfusions. Use of vasopressor infusions <48 hrs after spinal fusion, length of hospital stay, and incidence of venous thromboembolism and post-operative seizures are secondary endpoints included in the analysis.

**Results:** A total of 87 patients were evaluated for study enrollment and 70 patients were included for analysis. Data collection is currently ongoing.

**Parrott, Megan**

**Mentor(s) -- Dr. Holly LaVoie**

### **Analysis of Cardiac Function and Transcript Abundances of Extracellular Matrix Proteins in Left Ventricle of Pregnant and Postpartum Mice**

During pregnancy, extensive maternal cardiovascular changes occur to substantiate the fetus. Cardiac adaptations support increased blood volume and are accompanied by eccentric myocardial hypertrophy. Hypertrophy typically reverses 12-24 weeks postpartum in humans. In some cases, postpartum cardiomyopathy ensues, in which reversal fails. To better understand this pathologic condition, we aimed to determine the physiologic changes in cardiac gene expression during pregnancy and the early postpartum period in mice. The goal is to eventually identify genes expressed aberrantly in postpartum cardiomyopathy that could be targets for therapeutic intervention.

Twenty-two genes encoding extracellular matrix (ECM) proteins Timp 1-4; Mmp 2, 3, 9, 11, 13-16, 25, 28; Agrn; Col5a1; Fap; Fibln2; Lgals4; Tgm2; Tnxb; Vcan, were selected for further analysis based on microarray expression patterns in left ventricle (LV) of pregnant and non-pregnant mice. Age-matched non-pregnant and timed-pregnant C57BL/6 mice were utilized. Echocardiography was performed with mice at diestrus, embryonic day 10 (ed10), ed12, ed18/19, 1.5 days postpartum (ppd1.5), and ppd7. Mice were sacrificed at diestrus, ed12, ed18/19, ppd1.5, and ppd7. LV tissue was utilized for RNA isolation and real-time PCR. PCR and echocardiogram data was analyzed by ANOVA and Tukey's test with  $p < 0.05$  considered significant.

Timp4, Mmp9, Mmp13, and Col8a1 mRNA levels varied significantly depending on pregnancy status. Timp4 mRNA levels were lower at ppd1.5 than all other days. Mmp9 mRNA levels were lower on ppd1.5 than e12. Mmp13 mRNA levels were lower on ppd1.5 than e18/19. Col8a1 mRNA levels on ppd1.5 were higher than e12 and e18/19. Echocardiography data showed differences in LV inter-ventricular diameter during systole (LVIDs) and diastole (LVIDd), end systolic volume (ESV), and end diastolic volume (EDV). LVIDs and LVIDd during diestrus were lower than ed18, ppd1.5, and ppd7. ESV diestrus was lower than ed18 and ppd1.5. ESV d18 was greater than ed10. EDV diestrus was significantly lower than ed18, ppd1.5, and ppd7.

The PCR data revealed that LV mRNAs for specific ECM proteins are regulated during/after pregnancy in concert with functional heart alterations in mice. Echocardiograms showed that mouse cardiac structure and function had not completely returned to pre-pregnancy levels by ppd7.

NIGMS-INBRE-DRP-award-5P20GM103499-17.

**Patel, Nimit**

**Mentor(s) -- Dr. Renu Pokharna**

### **I KNOW INO's**

Internuclear ophthalmoplegia is a common finding and can occur secondary to multiple sclerosis or a vascular insult. Recently, with the use of immunomodulators such as TNF inhibitors for autoimmune diseases, there has been an association with demyelinating lesions of the CNS. This case adds to the very limited knowledge we have on this condition. We present a case of a 38 y/o female with a history of Rheumatoid Arthritis that presents with a right INO. Her medications included methotrexate and etanercept. MRI with thin cuts confirmed a small lesion in the pons. CSF was notable for elevated oligoclonal bands. She was given a 3 day course of IV solumedrol with some improvement in her symptoms. She was also stopped on her etanercept. This raises the question of whether TNF inhibitors decrease the threshold of bringing about MS in a patient who is already susceptible or if they work in a different mechanism to cause demyelination. We plan to repeat her MRI in 3-4 months which may help answer this question.

**Patetta, Michael**

**Mentor(s) -- Dr. Phillip Prest**

### **Improving the Surgery Clerkship**

Introduction:

It is well known that the surgery clerkship is among the most difficult rotations for medical students in the United States. Students usually express dissatisfaction with demanding duty hours, suturing expectations, lack of hands on experiences, and malignant culture.

At USCSOM, student satisfaction had been historically poor, and ranked lower compared to other U.S. programs. Realizing that the current practice may affect students' education and their career path, the Department of Surgery started this QI project to optimize its clerkship experience and encourage students to pursue a surgical residency.

Methods:

All third and fourth year USCSOM medical students, who completed their general surgery rotation at Palmetto Health Richland (PHR), were surveyed from 01/17/2018 – 01/24/2018. Students submitted an overall rating of the rotation on a scale of 1-10, and free texts of observed problems and possible solutions. No answers were excluded. Observed problems were then analyzed and categorized. For each problem, solutions were offered and implemented over future clerkships. Students' evaluation pre and post-implementation were collected and compared. Descriptive analysis was then used to identify the frequency of each variable being investigated.

Results:

Of the 128 students from the USCSOM classes of 2018 and 2019 who completed the rotation at PHR, 26 students respond (20.3%). The overall rating of the surgical rotation was  $5.38 \pm 2.17$ . The most frequent complaints were "issues relating to attendings", followed by "issues that related to residents", followed by "rotation organizational issues". The post-implementation results are only partial to date, but have demonstrated improvement in all areas including the aforementioned three categories.

Conclusion:

Our project is the first to be done by the Department of Surgery to investigate reasoning behind student dissatisfaction, and to implement solutions that will improve the clerkship. We hope to demonstrate that applying these changes will lead to higher satisfaction and greater interest in surgery. Additionally, we believe this project has the potential to serve as a model for cultural shift in other surgery rotations.

Our future aim is to repeat our survey in a year to better quantify any differences and continue to get

feedback from students.

**Pfent, Josh**

**Mentor(s) -- Dr. Scott Lamar, Dr. Morgan Adams**

**Risk Stratification for Hospital Follow Up for an Inpatient Family Medicine Team at a Tertiary Care Urban Hospital**

Hospital readmissions are a costly part of inpatient medical care, with Medicare costs in 2004 being estimated around \$17.4 billion. Readmissions are particularly frustrating to the family medicine team that cares for patients in both the inpatient and outpatient setting.

While on the inpatient service, we have limited outpatient clinic time. It is important to use our clinic visits in an appropriate manner, especially for hospital follow up visits. Unfortunately, health care providers aren't good at identifying patients at a high risk for readmission, or the reason for the readmission. We identified the HOSPITAL score as a potential tool to aid us.

The HOSPITAL score is a seven question internationally validated tool that helps to identify patients at high risk for potentially avoidable readmissions. This score uses data points that are readily available at the time of discharge. The score stratified patients into low, moderate, or high risk of potentially avoidable readmission.

We will use this tool to schedule patients determined to be at high risk of potentially unavoidable readmission within 7 days.

We will identify patients that meet inclusion criteria over a two month period, for a similar time frame to our study intervention, of month May and June 2017, which was the most recent available. We will randomly select 50 of these patients to perform data gathering and analysis on. We will assess the 30 day readmission rate over this time period as well as utilizing our electronic chart software to determine a baseline follow up rate.

The inpatient team will be educated at the beginning of this project about the HOSPITAL score, as well as the overall plan for our research. An algorithm will be placed in the call room for reference. Patients with a HOSPITAL score of 7 or above will be scheduled to be seen in the outpatient setting within 7 days. The HOSPITAL score will be noted in the discharge summary. 50 of these patients will be randomly selected, and will be assessed if they made their follow up appointment, and if they were re-admitted to the same hospital within 30 days of discharge.

**Phillips, Kristopher**

**Mentor(s) -- Dr. Shefali Patel**

**The Application of a Clinical Prediction Rule to Identify Cervical Myelopathy in a Patient with Shoulder Pain**

Introduction

Cervical myelopathy (CM) refers to compression of the spinal cord, typically due to cervical spine stenosis or a herniated disc. Patients with cervical myelopathy may present with a wide variety of symptoms, including arm and leg pain and paresthesia, balance deficits, and ataxic gait. A diagnosis of cervical myelopathy is typically confirmed via magnetic resonance imaging. If untreated, CM could lead to permanent muscle weakness or even paralysis. Physical therapists are often charged with being the front line care providers for neck and arm pain. This necessitates the performance of thorough neurological and musculoskeletal examinations to decide if patients are appropriate for physical therapy, or if they warrant a referral to a physician. There has been growing evidence to support the use of clinical prediction rules (CPR) to identify clusters of examination findings that could help to indicate the presence or absence of a condition. Previous research has identified a CPR consisting of five objective findings that are both sensitive AND specific in the diagnosis of CM. The patient met four of these five findings, and thus the presence of CM was hypothesized.

## Case Description

The patient was a 53-year-old female referred to physical therapy with a diagnosis of shoulder impingement. In addition to her shoulder pain, she reported occasional numbness in the left shoulder and face. Due to the presence of these symptoms, a neurological examination was performed. The patient was found to have hyper-reflexia in the upper and lower extremities bilaterally as well as a positive Hoffman's Reflex and Inverted Supinator Reflex bilaterally. Because the patient met four of five criteria for the CPR for CM, the patient was referred to a spine surgeon. MRI of the cervical spine confirmed posterior disc protrusions at both C4-C5 and C5-C6 causing severe stenosis and contacting the spinal cord. The patient subsequently underwent anterior cervical fusion.

## Conclusion

This case report demonstrates that a CPR for CM can be an effective tool to help identify the presence of CM. Front-line care providers should consider utilizing this valuable tool when examining patients with neck and shoulder discomfort.

## **Powers, Daniel**

### **Mentor(s) -- Dr. Jeffrey Holloway**

#### **Title: Who is my doctor? A quality improvement project assessing patient/caregiver awareness of physician-specific information in the academic hospital setting**

The majority of children's hospitals also serve as teaching hospitals to pediatric residents. The physician team that takes care of children who are admitted usually consist of a group of residents and attendings. For those unfamiliar with the structure of a teaching hospital, it can be difficult to identify who each member of the team is and their role. The aim of this study is to improve patient and caregiver knowledge of who the physicians caring for them are and which roles/responsibilities each physician will fulfill. In doing so, a secondary aim of this project is to increase patient/caregiver satisfaction with the care provided to them during their stay. The study was conducted at Palmetto Health Children's Hospital and involved using a survey to assess patient/caregiver knowledge and satisfaction. Baseline data was collected and then 2 separate changes/PDSA cycles were implemented. PDSA Cycle 1 consisted of writing the names of the residents and attendings in the patient rooms and PDSA Cycle 2 was providing a face sheet of the residents in each room included their name and photo. We found that at baseline, only 30% correctly identified the attending/resident while 44% knew who was in charge. After PDSA Cycle 1, knowledge of who was in charge improved to 56.6%, while 60% correctly identified their resident/attending. Finally, PDSA Cycle 2 improved knowledge of who was in charge to 63.6% and 72.7% correctly identified their resident/attending. Patient satisfaction with their care did not change significantly regardless of how well they knew their physician team. In conclusion, providing patients and their caregivers with the names and photos of their physician team does improve knowledge and identification of each provider and their role. Overall, the residents and attendings provide quality care and patients feel satisfied regardless of knowing the exact name of their physician.

## **Ramsey, Elizabeth**

### **Mentor(s) -- Dr. Majdi Al-Hasan**

#### **Seasonal variation in antimicrobial resistance of community-acquired Escherichia coli bloodstream infections**

##### Background

Seasonal variation in antibiotic consumption in the community has been previously demonstrated on multiple continents, with lowest rates of consumption during summer months. The aim of this study is to examine the seasonality of antimicrobial resistance in community-acquired Escherichia coli bloodstream isolates.

## Methods

All community-acquired E. coli bloodstream isolates collected between January 1, 2010 and December 31, 2015 through central microbiology laboratory at Palmetto Health in Richland County, SC, USA.

Multivariate logistical regression was used to examine resistance in E. coli isolates during the warmest four months (June-September) compared to the rest of the year after adjustment for calendar year, demographics, and baseline clinical characteristics.

## Results

A total of 339 unique patients with community-acquired E. coli bloodstream infection were included in this study. The median age of patients was 65 years, 205 (60%) were women, and 265 (78%) had urinary source of infection. After adjustments in the multivariate model, an independent association between summer months and lowered antimicrobial resistance was demonstrated in cases in which the patient used amoxicillin-clavulanic acid (p-value=0.02, OR=0.53, CI=0.30-0.92), cefazolin (p=0.001, OR=0.26, CI=0.10-0.58), ceftriaxone (p-value=0.04, OR=0.25, CI=0.04-0.93), trimethoprim-sulfamethoxazole (p-value=0.001, OR=0.27, CI=0.13-0.53).

## Conclusion

The study demonstrates two- to four-fold reduction in antimicrobial resistance among E. coli bloodstream isolates for four frequently used antimicrobial agents when comparing summer months to the rest of the year. Lower consumption associated with decreased resistance indicates that resistance to these antimicrobials may be reversible. Thus, this is promising because consistent decline in antimicrobial use in the community may produce decreased resistance rates over an extended period time.

## Reese, Miles

### **Mentor(s) -- Dr. Renu Pokharna, Dr. Souvik Sen Effect of Vitamin D on Multiple Sclerosis Relapse**

Multiple Sclerosis (MS) is an immune-mediated inflammatory disease that affects 400,000 people in the United States. Prior research has shown equivocal results with regards to vitamin D lowering MS relapse rates.

The aim of this study was to investigate the correlation between vitamin D and MS relapse. It was hypothesized that MS patients who were taking vitamin D would have a lower recurrence of relapse when compared to MS patients who were not taking vitamin D.

A retrospective chart review was conducted in patients presenting to the neurology clinic with an ICD-9/ICD-10 diagnosis of MS between the period of January 2015 and March 2017. The abstracted data included whether or not the patient was on vitamin D, whether or not the patient had a relapse and the number of relapses the patient had. The group taking Vitamin D and the group not taking Vitamin D were compared for occurrence of MS relapse using a  $\chi^2$  test and Odds Ratio (OR) analysis. Their number of MS relapses were also compared using a Mann-Whitney test.

We identified 100 MS patients (mean age  $\pm$  SD = 36.34  $\pm$  11.24 years; 72% females, 46% white, 47% black, 7% others). The cross sectional analysis showed that 38 were on vitamin D (6 of whom had a relapse) and 62 were not on vitamin D (19 of whom had a relapse). The chi-square test showed an association between vitamin D and MS relapses that was not statistically significant  $\chi^2$  (1, N = 100) = 2.04, p = .15, odds ratio= 0.42, 95% CI [0.15 to 1.19]. The Mann-Whitney test indicated that the number of relapses were not significantly different for patients on vitamin D (median relapse(s) = 0, range = 0-4) than for patients not on vitamin D (median relapse(s) = 0, range = 0-7) U=1006.0, p = 0.11.

Our retrospective study shows a lower proportion of relapse in the vitamin D group compared to the non-vitamin D group, which did not reach statistical significance. This study helps us estimate the needed sample size for a future prospective study adjusting for potential confounders.

**Rivers, Jonathan**

**Mentor(s) -- Dr. Susan Wood, Dr. Larry Reagan**

**Cardiovascular changes elicited by stress and pyridostigmine bromide in a rodent model of gulf war illness (GWI)**

Pyridostigmine Bromide (PB), an acetylcholinesterase inhibitor used as a prophylactic agent against nerve gas exposure during the Gulf War, has been suggested as a possible cause of the chronic constellation of symptoms suffered by Gulf War Veterans. Under non-stressful laboratory conditions PB was demonstrated to have minimal autonomic consequences, however it is suggested that when combined with repeated stress PB may be deleterious to the autonomic system, contributing to GWI symptomatology. To test this hypothesis, male rats were treated with either vehicle or PB (1.3 mg/kg) daily for 14 consecutive days. On the final 10 days of treatment, rats were exposed to either 6 hours of restraint stress or left undisturbed in the home cage (non-stressed control). To identify the dynamic temporal development of autonomic changes, cardiovascular telemetry was used to measure blood pressure (mean arterial pressure; MAP) and heart rate (HR) at an acute, early time point and a delayed time point (3 months post stress/treatment). Upon the first stress exposure, when acetylcholinesterase (AChE) activity is reduced by approximately 50%, PB blunted the hemodynamic and tachycardic response to restraint stress compared with vehicle treatment. Moreover, when challenged with an injection of lipopolysaccharide (LPS, 100µg/kg) 9 days after the last stress/treatment, rats with a history of stress and PB treatment demonstrated an LPS-induced hypotensive and bradycardic response as compared with the hypertensive and tachycardic response evident in PB-treated controls. Stress and PB treatment history demonstrated higher quantities and severity of arrhythmic cardiac events. In contrast to PB's acute actions, the effect of prior PB treatment on AChE activity at the delayed timepoint is distinct from that of the acute measurements, as evidence of elevated AChE levels emerge. These data are consistent with studies in GWI patients that demonstrate evidence of deficient vagal acetylcholine tone. Ongoing studies are further identifying the autonomic changes that have emerged at rest and during subsequent stress challenges. Taken together, these studies shed considerable insight into the distinct autonomic effects of PB treatment during repeated stress exposure as compared with treatment under non-stress conditions .

**Robinette, Lizzy**

**Mentor(s) -- Dr. Erin Creech, Dr. Cortney Dodson**

**Impact of venous thromboembolism prophylaxis in patients with aneurysmal subarachnoid hemorrhage**

Purpose/Background: Patients with aneurysmal subarachnoid hemorrhage (aSAH) are at an increased risk of developing venous thromboembolism (VTE). Development of VTE can lead to increased

length of stay, pulmonary edema, pneumonia, sepsis and cerebral vasospasm, all of which contribute to poor outcomes in this patient population. The Neurocritical Care Society released guidelines for the prophylaxis of venous thrombosis in neurocritical care patients in 2016 which included prevention of VTE in patients with aSAH. The authors recommend initiating unfractionated heparin at least 24 hours after an aneurysm has been secured. There is a paucity of data for outcomes relating to the timing of initiation of pharmacologic VTE prophylaxis in patients with aSAH. The primary objective of this study is to evaluate the timing of initiation of VTE prophylaxis in aneurysmal subarachnoid hemorrhage patients as it relates to clinical and safety outcomes.

**Methodology:** This is a retrospective, observational, single-center cohort study where the incidence of VTE (defined as pulmonary embolism or venous thrombosis < 2 cm from deep venous system) and incidence of re-bleed following initiation of VTE prophylaxis (defined as expansion of hemorrhage on head CT or clinician-determined stability) after the diagnosis of aSAH will be assessed. Medical records will be reviewed for patients who were diagnosed with aSAH based on ICD-9 and ICD-10 codes and who received at least one dose of pharmacologic VTE prophylaxis following neurosurgical intervention. Patients will be stratified into three groups according to when VTE prophylaxis was initiated following securing of the aneurysm. Group One will consist of patients initiated on VTE prophylaxis < 48 hours following intervention, Group Two will include patients initiated 48 to 72 hours later, and Group Three will include those initiated  $\geq$  72 hours following intervention.

**Results:** To be determined

**Conclusion:** To be determined

**Rohant, Namit**

**Mentor(s) -- Dr. Vince Vismara**

**Sudden and Profound Tirofiban Induced Thrombocytopenia in a Patient with In-Stent Thrombosis: A Diagnostic and Management Complexity**

Tirofiban, a glycoprotein IIb/IIIa (GP2b3a) receptor inhibitor that impedes platelet aggregation, is used in acute coronary syndromes to improve morbidity/mortality. Of the three GP2b3a inhibitors, tirofiban induced thrombocytopenia (TIT) has the rarest occurrence and has never been reported before in a patient with in-stent thrombosis.

A 57-year-old man with history of hypertension and diabetes mellitus presented with non-productive cough and intermittent dyspnea for 1 week. This was associated with fatigue, congestion, and an episode of sudden abdominal cramping. Physical examination revealed tachycardia, scattered lung crackles, and jugular venous distention. Initial investigations excluded pulmonary embolus and infection but suggested new onset heart failure with mild elevations in troponin and BNP levels. Transthoracic echocardiogram (TTE) unveiled reduced left ventricular systolic function, wall motion abnormalities, and an incidental apical thrombus; and cardiac catheterization showed coronary artery disease (CAD) requiring stent placement. He was treated with ticagrelor for CAD and heparin-bridge with warfarin for the apical thrombus with planned discharge once INR was therapeutic. However, a couple days later, he developed new symptoms and ST elevations. Emergent repeat cardiac catheterization exposed in-stent thrombosis of the new stent, which was remedied with angioplasty and medications including tirofiban infusion. Labs drawn immediately afterwards indicated profound thrombocytopenia with platelet levels of 5,000/uL which further decreased to 2,000/uL raising concern for heparin induced thrombocytopenia (HIT). Platelets were not transfused despite severely low levels due to freshly treated in-stent thrombosis and possibility of HIT resulting in increased thrombosis. Ultimately, patient was found to have TIT. 1 unit of platelets was transfused the next morning while holding all anti-platelet medications until platelet levels improved to  $\sim$  40,000/uL. Once platelets recovered, he was discharged on ticagrelor for CAD and apixaban for the apical clot.

TIT with the severity and rapidity seen here is extremely rare. Furthermore, he did not have prior exposure to tirofiban or similar agents further increasing the curiosity of this case. Additionally, this case demonstrates the complexity of diagnosing and managing TIT in a patient with in-stent thrombosis that is normally treated with multiple anti-platelet and anti-coagulant medications.

**Schaefer, Candace**

**Mentor(s) -- Dr. Barry Feldman**

**LAD thrombosis in a healthy young adult with Factor V Leiden and PAI-1 heterozygosity in the**

### **absence of coronary artery disease**

Factor V Leiden (FVL) and plasminogen activator inhibitor-1 (PAI-1) have been associated with heightened risk of venous thrombosis but are less strongly linked to arterial events. Here, we present the case of a young, male, non-smoker with FVL and PAI-1 double heterozygosity in whom ST-elevation myocardial infarction (STEMI) occurred due to left anterior descending (LAD) artery occlusion in the absence of coronary artery atherosclerosis. These findings emphasize the importance of considering the effects of multiple genetic variants, which may be more likely to lead to arterial emboli in combination than do the respective mutations in isolation.

**Schaefer, Candace**

**Mentor(s) -- Dr. Renu Pokharna, Dr. W. Hamilton Peters**

### **Central Retinal Artery Occlusion due to Giant Cell Arteritis – utility of p-ANCA in ambiguous cases and the importance of rapid treatment**

Central retinal artery occlusion (CRAO) can occur via a variety of mechanisms, which have equally varied treatments. While giant cell arteritis (GCA) accounts for only very small number of cases, it should always be considered. Treatment of GCA must begin immediately, and delay in seeking medical attention or in diagnosis by the clinician often leads to permanent blindness. Even new immune therapies continue to be directed at preserving vision rather than reversing damage. GCA is notoriously difficult to diagnose as many of the signs, laboratory findings, and even biopsy characteristics may be absent in some case or the results may overlap with other disease processes. We present a patient in whom CRAO was immediately recognized and a presumptive diagnosis of GCA was made at the time of admission, with the patient being treated accordingly. Further workup was ambiguous for GCA verses various types of vasculitis in many respects. In this case, it was the combined use of nonspecific markers such as ANA and p-ANCA which allowed for more a confident diagnosis. Unfortunately, due to the prolonged symptom duration prior to presentation, the patient has little remaining vision despite treatment with the recently approved biologic Actrema.

**Seddon, Megan**

**Mentor(s) -- Dr. P. Brandon Bookstaver, Dr. Julie Justo, Dr. Joseph Kohn, Dr. Hana Rac, Dr. Sangita Dash, Dr. Majdi Al-Hasan**

### **Role of Early De-escalation of Antimicrobial Therapy on Risk of Clostridium difficile Infection following Enterobacteriaceae Bloodstream Infections**

The association between broad-spectrum antimicrobial therapy and Clostridium difficile infection (CDI) has been consistently demonstrated in prior case-control studies. However, there is paucity of data evaluating the role of early de-escalation of antimicrobial therapy on risk of CDI in a cohort of hospitalized patients with serious bacterial infections. This retrospective cohort study examined the impact of de-escalation off antipseudomonal beta-lactams (APBL) within 48 hours of Enterobacteriaceae bloodstream infections (BSI) on risk of CDI.

Hospitalized adult patients with Enterobacteriaceae BSI at Palmetto Health Hospitals in Columbia, SC, USA, from 1 January 2011 through 30 June 2015 were identified. A positive stool Clostridium difficile PCR was used to detect CDI within 90 days of BSI, the primary outcome of the study. Multivariate Cox proportional hazards regression was used to examine time to CDI in patients who received  $\leq 48$  hours and  $>48$  hours of APBL for empirical therapy of Enterobacteriaceae BSI.

Among 808 patients with Enterobacteriaceae BSI, 414 and 394 received  $>48$  and  $\leq 48$  hours of APBL, respectively. Overall, the median age was 66 years and 434 (54%) were women. The incidence of CDI was higher in patients who received  $>48$  hours than those who received  $\leq 48$  hours of APBL (1.8%, 95% confidence intervals [CI] 0.4%-3.2% vs. 7.0%, 95% CI 4.2%-9.8%,  $p=0.002$ ). After adjustments for acute severity of illness, chronic comorbidities, hospital length of stay and source of BSI,

receipt of >48 hours of APBL remained independently associated with higher risk of CDI (hazard ratio [HR] 3.5, 95% CI 1.5–9.7;  $p=0.003$ ). End-stage renal disease was also a risk factor for CDI (HR 4.7, 95% CI 2.0–10.2,  $p<0.001$ ).

The empirical use of APBL for >48 hours for Enterobacteriaceae BSI was an independent risk factor for CDI. The use of clinical risk assessment tools to determine the indication for empirical antimicrobial therapy and microbiology rapid diagnostic tests for early de-escalation off APBL may reduce the incidence of CDI in hospitalized patients with Enterobacteriaceae BSI.

**Shepard, Whitney**

**Mentor(s) -- Dr. Francisco Aguirre**

### **Effects of Abdominal Binders on Planned Cesarean Sections**

Introduction:

An abdominal binder is a large elastic band with Velcro closure that is placed around the abdomen of a patient to provide additional abdominal support. The goal of this pilot study is to examine potential benefits of abdominal binders in postoperative cesarean patients as well as to evaluate any associations in patient medical and physical demographics with abdominal binder use and postpartum recovery. These initial statistics will be used to identify future study size and duration.

Methods:

Between January 2017 and September 2017, 23 patients at Palmetto Health were enrolled for prospective analysis after meeting inclusion and exclusion criteria. Participants self-selected to utilize an abdominal binder if desired preoperatively and on a daily basis postoperatively. Preoperatively and postoperatively, the quality of life, pain scores, and impressions regarding abdominal binders were assessed with surveys including an EQ-5D-5L quality of life (QOL) survey, initial numeric rating scale (NRS), and a number of multiple choice questions. This data was then analyzed to estimate the strength of the association between patient demographics, utilization of abdominal binder, and patient reported quality of life and NRS scores relative to abdominal binder use.

Results:

Participants universally desired to utilize an abdominal binder. Preoperatively, 65.6% of participants felt that an abdominal binder would improve their postoperative experience, and the majority of patients using the binder reported subjective improvement postoperatively. Postoperative pain scores were approximately the same on postoperative day 1 for those with and without a binder. However, both supine and standing average NRS pain scores were lower in those patients wearing an abdominal binder on postoperative days 2 and 3.

Discussion:

The majority of patients who utilized an abdominal binder subjectively felt that it was beneficial to their postoperative experience, and the majority of those who did not utilize a binder believed that a binder would have helped. Additionally, there was a trend towards decreased average pain scores in patients who utilized an abdominal binder. Our results suggest that there may be a difference in postoperative pain, although a larger study would be needed to further evaluate for this difference.

**Simpson, Christian**

**Mentor(s) -- Dr. William Richardson**

### **ST segment elevation myocardial infarction (STEMI) following a Crotalus horridus envenomation**

Cardiac ischemia or myocardial infarction following pit viper envenomation is rare. Few case reports are described, none of which has been reported following crotaline snake envenomation in the Unit-

ed States. We report a case of ST-segment elevation myocardial infarction (STEMI) occurring in a 73-year old man following an envenomation by a juvenile canebrake rattlesnake (*Crotalus horridus*). The 73-year old male was bitten on the left index finger and subsequently developed localized edema followed by hypotension, chest pain, and then altered mental status. His initial electrocardiogram revealed ST-segment elevation in the inferior and lateral leads. His hospital course included emergent left heart catheterization with thrombectomy and cardiac stent placement. This case captures the unique medical situation involving the approach to treatment and management of a patient with a severe crotaline envenomation complicated by a STEMI.

**Sligar, Jaclyn**

**Mentor(s) -- Dr. Martin Durkin, Dr. Eric Williams**

**Changes in the prevalence and severity of Mental Illness over time at a large, public University**

Identifying and treating mental disorders in the college-age population is critical for future well-being. Many psychiatric conditions develop by the typical college years, ages 18-24 (Kessler et al., 2005). Untreated mental illness can have a significant impact on academic success, substance use, and relationships. According to the 2013 National Survey of College Counseling Centers, 95% of responding directors feel there is a recent trend towards greater numbers of students with severe psychological problems on their campuses. 73% of directors noted increases in crises requiring immediate response, and 66% noted increases in psychiatric medication side effects (Gallagher et al., 2013). Thus far, researchers have found conflicting results, with some suggesting an increase in severity of mental health problems on college campuses, while others have found no significant differences (Krumrei et al., 2010). Studies from general populations of adolescents and young adults suggests that the prevalence of mental disorders has remained steady over time. If there has been a substantial increase in the severity of mental health problems in college students it is important to determine the magnitude and contributing factors (Hunt et al., 2010).

Consequences of the potential rise in the prevalence of severe mental health issues among college students include increased service utilizations, which has major implications on the needs of student counseling centers. Currently, the average ratio of counselors to students is just 1 to 1,604 (Gallagher et al., 2013). Also noteworthy is that many students with a mental health problem do not receive treatment. Few studies have examined how demographic differences influence health utilization among students. This information is critical to determine how to help all students have access to care.

There have been few studies examining the change in psychiatric diagnoses over time in college student populations, making it difficult to objectively assess exactly how the overall prevalence and severity of mental illness at universities has changed. This study examines how mental health diagnoses have changed over time at a large, southern, public university, specifically the University of South Carolina. My hypothesis is that prevalence and severity of mental illness have increased.

**Snider, Alicia**

**Mentor(s) -- Dr. Steven Buchman**

**Gender Differences in Cutaneous Radiation Injury and Systemic Symptomatology**

Background: Increased emphasis by the NIH on rigor and reproducibility has led to an expanding number of policies emphasizing gender inclusive pre-clinical studies. Oncologic trials have documented an increased rate and severity of side effects in female patients receiving chemo-radiation therapy. Breast cancer reconstruction pre-clinical studies commonly use a male murine model despite the fact that this disease primarily effects women. In order to ensure the translational value of the current standard model of breast reconstruction we compared male and female rat response to radiation exposure. We posit that female rats will have equivalent cutaneous radiation injury with greater systemic side effects in an age matched male cohort.

Methods: Ten Sprague-Dawley rats of equivalent age were divided into groups 1) female (n=5) and 2) male (n=5). Both received a fractionated 60 Gy radiation dose to a region of interest (ROI) on the

posterior back. Daily cutaneous assessment, weights, grooming habits, and overall behavior were observed and recorded over a 7 day period. Skin ulceration was measured through digital image acquisition of the ROI with quantitative analysis using image J software.

Results: The male group demonstrated a significant increase in skin ulceration when compared to the female group ( $p=0.004$ ). In fact, all rats in the male cohort had cutaneous ulceration while only 1 out of the 5 female rats exhibited radiation injury in the area of interest. Additionally, male rats sustained wider radiation burn patterns (56.5% of ROI) in comparison to female rats (3.6% of ROI). In contrast to the male cohort, female rats exhibited earlier and more pronounced loss of weight, self-care, and normal posture.

Conclusions: Female sex was associated with a significant reduction in radiation associated cutaneous injury when compared to male sex in a murine model. However, females trended towards earlier and more severe systemic symptoms. This data supports the new NIH emphasis on rigor and reproducibility and the need to select appropriate animal models and account for the gender differences in regard to therapeutic response. More importantly, elucidating the factors associated with cutaneous resiliency in females could have translational merit in optimizing oncologic reconstructive outcomes.

**Snyder, Brian**

**Mentor(s) -- Dr. Joseph Myslinski**

### **A Rare, Atypical Presentation of Community Acquired Streptococcal Salivarius Meningitis**

Bacterial meningitis continues to be a feared entity in today's medical world. While advances in H.flu, Strep pneumo, and meningococcal vaccines have significantly decreased the incidence of disease, mortality and morbidity rates remain high. Traditional teaching describes meningitis as a constellation of headache, fever, and nuchal rigidity. Classically, it is often seen in patients with previous sinusitis or mastoiditis, incomplete or absent vaccination history. Or, in the neonatal population, it affects infants born to GBS positive mothers with late or no prenatal care, or arises from hematogenous spread of urinary tract infection.

The vast majority of cases of bacterial meningitis are accounted for by just three pathogens: Strep pneumonia, Neisseria meningitidis, and Strep agalactiae. However, a number of other bacterial species have been implicated in meningeal infections: Staph aureus, Listeria monocytogenes, Coagulase negative staph species, just to name a few. Typically, these organisms will carry specific risk factors for transmission and present much like the traditional pathogens. Occasionally though, uncommon sources of bacterial meningitis may present in atypical fashion, in patients with no obvious predisposing risk factors.

We present a case of a 36 year old previously healthy male who was diagnosed with Streptococcal Salivarius meningitis. We believe this case to be unique in that the patient presented without the classic symptoms of headache, neck stiffness, and fever. And, unlike most of the previous Streptococcal Salivarius cases, this patient had no predisposing head, neck, or CNS procedure. This report describes the presentation, evaluation, management and ultimate course of the patient, as well as discusses some of the literature surrounding Streptococcal Salivarius meningitis. We feel that this case raises awareness of atypical presentations of meningitis and the need to maintain a high degree of suspicion in cases of afebrile altered mental status that cannot be clearly attributed to other causes.

**Starks McNeal, Antonia**

**Mentor(s) -- Dr. Janesh Patel**

### **Outcomes and Functional Use of the Elbow After Placement of and Internal Joint Stabilizer**

This case report, with ongoing treatment and review of patient outcomes, assesses the effectiveness of the Internal Joint Stabilizer – Elbow (IJS-E) from Skeletal Dynamics after closed fracture of the humerus at the elbow, fracture of the radial head, injury to the lateral collateral ligament and closed posterior dislocation of the right elbow.

Elbow dislocation is the second most common major joint dislocation in adults and most often occurs in the posterolateral direction. Elbow fracture/dislocations tend to have multiple complications including decreased range of motion (ROM), strength, functional reach, functional use of the upper extremity (UE), and ability to perform independent activities of daily living. Fixation with the IJS-E utilizes internal fixation, stabilizes after ligament/fracture repair and permits early motion to the extremity. With therapeutic intervention, patients have demonstrated improved ROM and function in the injured upper extremity after diagnosis of fracture, dislocation and instability with and without prior surgical intervention and implantation of the IJS-E.

#### Case Description

The patient presented in this case is a 53-year-old male, who presented to the initial evaluation one week post-operatively after he was treated with radial head replacement, lateral collateral ligament repair and IJS-E implantation with a posterior elbow splint at 90 degrees of elbow flexion. The patient's complaints consisted of decreased ability to flex and extend the elbow as well as limited functional use of the upper extremity during every day activities. The patient was treated with heat/cryotherapies, active ROM (AROM)/assisted AROM/passive ROM, massage, joint mobilization, strengthening, therapeutic activities, orthotic management and functional reaching exercises. The patient demonstrated an elbow flexion arc of 67 degrees at 7 weeks post-op and a rotation arc of 140 degrees. Weekly treatments and chart patient progress with changes in intervention were recorded. Current data indicates a final mean arc of elbow flexion at 119 degrees and rotation at 151 degrees at 6-month follow up assessments.

#### Conclusion

With an unstable elbow fracture and dislocation, the IJS-E may lead to increased AROM and functional use of the UE secondary to improved stabilization, early ROM commencement and decreased immobilization required at the elbow after injury.

**Stayer, Jeffrey**

**Mentor(s) -- Dr. Edie Goldsmith**

#### **Elevated Expression of Fibroblast Activation Protein Post-Myocardial Infarction**

**Background.** While changes in extracellular matrix structure and function contribute to adverse left ventricular (LV) remodeling associated with myocardial infarction (MI), the molecular mechanisms that regulate initiation of and continued LV remodeling during the post-MI period are unclear. Fibroblast activation protein (FAP) is a transmembrane protease whose expression is correlated with a myofibroblast phenotype in sites of active tissue remodeling, such as during fibrosis and wound healing. The temporal and spatial expression of FAP during and after an MI and the potential role this protein may play in post-MI remodeling are unknown.

**Methods and Results.** A coronary artery ligation model was used to induce MI in adult pigs (n=4) wherein 14 days post-MI the animals exhibited altered LV function consistent with adverse LV remodeling. Tissue samples collected from the MI and remote regions within the LV were analyzed for FAP expression by western blot and real time PCR. FAP protein levels significantly increased within the MI region compared to LV tissue distant to the MI and from the LV of referent control pigs (n=3). Expression of FAP mRNA showed a similar trend. Three-dimensional collagen gel contraction assays were used to examine the role of FAP in tissue remodeling in vitro. Fibroblasts isolated from MI and control tissue were treated with four concentrations of two different FAP inhibitors. The ability of fibroblasts to contract 3d collagen gels trended inversely with respect to the concentration of each inhibitor. Fibroblast viability was assessed in the presence of the FAP inhibitors with no significant difference detected between fibroblasts treated with inhibitor and controls.

**Conclusions.** Three conclusions can be drawn from these results. First, FAP expression is spatially regulated in a porcine MI model, with significant upregulation of FAP detected only in the infarct region. Secondly, FAP may play a positive regulatory role in LV fibroblast activation and tissue remodeling. Finally, the FAP inhibitors used in this study appear to impair fibroblast function without impacting

cell viability. The results of this work suggests that FAP may be an attractive therapeutic target for the regulation of adverse LV remodeling post-MI.

**Steverson, Kathryn**

**Mentor(s) -- Dr. Mohamad Azhar**

**The role of smooth muscle cell-produced TGFbeta2 in thoracic aortic aneurysms**

Transforming growth factor beta2 (TGFb2) is an immunoregulatory cytokine that regulates cell growth, apoptosis, migration, differentiation, and wound healing. Tgfb2 is expressed in most cell types of the heart and aorta, including cardiac muscle, fibroblasts, endothelium, and vascular smooth muscle cells. Tgfb2 knockout mice die at birth due to various cardiovascular malformations, whereas Tgfb2 heterozygous adult mice develop significant aortic aneurysm at the age of 8 months. The goal of this project is to explore the role of smooth muscle cell-produced Tgfb2 in aortic aneurysms by carrying out two related projects. The first is to determine the histological changes and quantify the collagen content in aortas from adult smooth muscle-specific Tgfb2 conditional knockout mice. The second is to produce primary smooth muscle cells (SMCs) from Tgfb2 haploinsufficient mice to study molecular mechanisms involved in aortic aneurysm in these mice. In our first project, we show that smooth muscle cell-specific loss of Tgfb2 in adult mice results in higher susceptibility of aortic root aneurysm, suggesting a requirement of Tgfb2 produced by mature SMCs in the maintenance of the aortic root structure. Our data also suggests that Tgfb2 is required for maintaining proper collagen content in the aorta. In our second project, we were able to successfully generate primary SMCs from 2-months old wildtype and Tgfb2 haploinsufficient mice. Immunofluorescence studies using alpha-SM actin antibodies confirmed that cultured cells were indeed primary SMCs. Future in vivo and in vitro investigations will determine the cell-specific role of TGFb2 in development and progression of aneurysm and TGFb2 regulation of molecular mechanisms involved in aneurysm development in order to confirm the preliminary findings.

**Stone, Jared**

**Mentor(s) -- Dr. Spencer Robinson, Dr. Christopher Gainey**

**Extrication Training for Emergency Physicians**

**Background**

Emergency physicians are among the first care providers for patients traumatically injured in motor vehicle collisions. We hypothesized that most emergency physicians in their residency training are unfamiliar with vehicle extrication and lack adequate knowledge on spinal immobilization, crush injuries, and field amputation. Our goal was to improve the residents' knowledge and skills through didactic and psychomotor training. As part of their regularly scheduled academic conference, a four-hour training session was held at the Columbia Fire Department training center. After a brief didactic session, firefighter personnel demonstrated various extrication techniques on multiple vehicles while an experienced fire chief provided commentary. Participants learned about injury patterns related various kinetic forces, including vehicle intrusion and rotational collisions.

**Survey Data**

An electronic pre- and post-test survey were administered to the participants to measure their knowledge of spinal immobilization, crush injuries, field amputation, and vehicle extrication. The same test was administered both before and after the training. There were 27 participants who completed the pre-test and 25 who completed the post-test. The mean score on the pre-test was 79%, and the mean score on the post-test was 98%. Participants stated their knowledge of vehicle extrication prior to the course was "poor," but improved to "good" after the training.

**Conclusion**

A four-hour training session resulted in an improvement in emergency resident physicians' knowl-

edge of spinal immobilization, crush injuries, field amputation, and vehicle extrication. We believe this improved knowledge may positively impact the residents' care of patients involved in motor vehicle collisions. In addition, this event provided the residents with a greater understanding of optimal pre-hospital care at vehicle entrapment scenes. Emergency service personnel also commented that this event improved collaboration between the local fire department, emergency medical services, and emergency medicine physicians.

**Tanis, Ross**

**Mentor(s) -- Dr. Carole Oskeritzian**

**Lack of skin mast cell activation and sphingosine-1-phosphate elevation in male mice may explain gender disparity observed in pre-symptomatic atopic dermatitis**

We recently reported the essential roles of mast cells (MC) and sphingolipid metabolite sphingosine-1-phosphate (S1P) in pre-lesional skin remodeling observed in female mice, using a human atopic dermatitis (AD)-like preclinical model. In human adults, females have a greater propensity to develop AD than males. Accordingly, most AD mouse models only utilize females as males do not exhibit AD-like changes. We previously showed epidermal and dermal thickening with cellular infiltration that occurred in the hypodermis of female mice after a single exposure to antigen ovalbumin (OVA), compared to saline controls and prior to IgE elevation. Using male mice in a similar preclinical model, we observed hypodermal cellular infiltration after single OVA exposure, although to a lesser extent than in female mice ( $p = 0.0001$ ), but no skin layer thickening or increased skin S1P levels, compared to female mice. Moreover, the number of activated skin MC was not increased in male mice, as opposed to female mice. The current work supports our previously reported results establishing MC as major effectors of remodeling in pre-lesional AD. In sum, we identified that the absence of local mast cell activation and elevated S1P levels observed in male mice may explain gender differences at the onset of AD.

**Taylor, Matthew**

**Mentor(s) -- Dr. Swapan Ray**

**Role of autophagy in combating radio and chemoresistance in glioblastoma**

Autophagy is an evolutionary conserved catabolic cellular maintenance mechanism that has a primary role of degrading existing cellular structures in order to reuse amino acids aiming to maintain regular protein synthesis. In times of stress, such as nutrient starvation or hypoxia, autophagic degradation can be used to provide nutrients that become essential for survival. This is called protective autophagy. However, when autophagy is prolonged in a cell, the excess intracellular degradation can lead to cell death. This is termed autophagic cell death. In recent years, utilizing this stress-induced degradation pathway has become a target for cancer therapy. In Glioblastoma, the primary chemotherapeutic drug, Temozolomide, is a known autophagy-inducing agent. Downregulating protective autophagy has been shown to increase the therapeutic capabilities of various cancer treatments. On the other hand, over-activation of autophagy can also lead to additional cell death through an alternative death pathway. This literature review discusses the situational role of autophagy inhibition vs. degradation in Glioblastoma, and how it can best be used to enhance current therapies.

**Taylor, Ross**

**Mentor(s) -- Dr. Kamla Sanasi-Bhola**

**PARVOVIRUS-ASSOCIATED HEMOPHAGOCYTIC LYMPHOHISTIOCYTOSIS, UTILITY OF INTRAVENOUS IMMUNOGLOBULIN AND HIGH-DOSE CORTICOSTEROIDS**

**PURPOSE:** Hemophagocytic lymphohistiocytosis (HLH) is a rare and potentially life-threatening hyper-inflammatory syndrome. In adults, this overactivation of the immune response is often secondary to an autoimmune disease, malignancy, or infection (mainly Mycobacteria, Epstein Barr Virus (EBV), Cytomegalovirus (CMV), Human Immunodeficiency Virus (HIV). Parvovirus B19 has rarely been as-

sociated with HLH and consequently there is a paucity on the consensus for the diagnostic and therapeutic options.

**CASE:** We discuss a 25-year-old African American male with AIDS (CD4 = <35 cells/uL) and intermittent antiretroviral therapy (ART) compliance who presented with diffuse pruritic macular rash, fever, and hepatosplenomegaly. The diagnostic work-up revealed pancytopenia (WBC 2.5 K/uL, Hb 6.6 g/dL and Platelets plateaued at 27 K/uL), ferritin 3,955.5 ng/mL and triglyceride 218 mg/dL. Bone marrow biopsy with negative mycobacterial and fungal stains but revealed hemophagocytosis (Figures 1 and 2). CMV detected in blood but < 2.6 log copies/mL, Histoplasma and Mycoplasma were not detected, and HIV viral load (VL) 256,343 copies/mL. Parvovirus DNA was detected in blood prompting the diagnosis of Parvovirus-associated HLH. Both the Lymph node and bone marrow biopsies were negative for malignancy.

**CLINICAL COURSE:** The patient received 1g/kg/day of Intravenous Immunoglobulin (IVIG) for three days and 1 mg/kg/day of prednisone starting on day 6 followed by a taper. He was transfused with 6 units of packed red blood cells and had adjustment of his ART based on his elevated HIV VL. He remained un-intubated during the hospitalization, hemodynamically stable, with increased size of his hepatosplenomegaly and had a prolonged cough without pulmonary edema. Eventually he became afebrile on day 8 and his hemoglobin stabilized on day 13.

**DISCUSSION:** The therapy for Parvovirus-associated HLH is directed towards suppression of the inflammatory response along with aggressive supportive care. Management of this high mortality illness requires an interdisciplinary team approach, as the data to support is sparse. The optimal duration and dose of IVIG is unclear; our case had a favorable outcome with high doses and short duration. Controlled, multi-institutional studies are needed to optimize treatment recommendations.

**Taylor, Dakota**

**Mentor(s) -- Dr. Julie Justo**

### **Evaluation of Risk Factors for Clinical Failure with Vancomycin Therapy in Patients with Methicillin-Resistant Staphylococcus aureus Bloodstream Infections**

**Background:**

Vancomycin has been considered the optimal therapy for methicillin-resistant Staphylococcus aureus (MRSA) bloodstream infections (BSI) for many years; however, failure with this therapy can still occur in clinical practice. Clinicians currently lack a risk stratification tool to identify patients at an increased risk of vancomycin failure. The purpose of the current study was to develop a risk tool to identify patients with MRSA BSI who may experience vancomycin failure and may benefit from alternate antibiotic therapy.

**Methods:**

This was a retrospective observational cohort study of patients hospitalized within the Palmetto Health system between January 1, 2015 and July 31, 2017. Patients with a positive MRSA blood culture who were initiated on vancomycin therapy were enrolled. Vancomycin therapy must have been initiated within 48 hours and maintained for at least 7 days from index blood culture collection. Data collection includes select comorbidities (e.g. malignancy, end-stage renal disease, liver cirrhosis, and immunosuppression), source of infection, and severity of illness markers (e.g. Sequential Organ Failure Assessment score). Information also included prior, current, and discharge antibiotic history. Univariable logistic regression was performed to identify risk factors associated with the primary outcome of clinical failure, defined as a composite of 30-day mortality, microbiologic failure, or recurrence of infection. Secondary outcomes included recurrence and mortality at 90 and 180 days, early signs of persistent infection, and breakthrough infection. A subgroup analysis compared clinical failure rates of vancomycin combination therapy (with another MRSA agent or a non-MRSA-active beta-lactam agent) versus vancomycin monotherapy.

Results: In Process

Conclusions: In Process

**Thompkins, April**

**Mentor(s) -- Dr. Christopher Goodman, Dr. Phillip Prest, Dr. Julie Ann Justo**

**Using Quality Improvement to Improve Local Diagnostic Stewardship**

Introduction: Diagnostic stewardship, which focuses on the reduction of unnecessary diagnostic testing, has recently become an initiative of antimicrobial stewardship programs. Inappropriate use of diagnostic tests may lead to unnecessary antimicrobial use and excess cost. For example, a patient with diarrhea may have both the novel rapid gastrointestinal PCR panel and a *Clostridium difficile* PCR panel ordered, when the *C. difficile* is actually already included in the newer, larger panel. In addition, a *C. difficile* PCR panel is often ordered when the patient has a very low pretest probability of infection. If the panel returns positive, the patient is assumed to be infected; however, they may simply be colonized and receipt of antimicrobial therapy results in undue risk of adverse events and cost to the patient. Rapid diagnostic PCR panels can provide a quick answer as to the cause of a patient's symptoms, but they are often inappropriately ordered.

Methods: Local investigators developed an educational session for residents, fellows, physicians, and other healthcare providers designed to educate providers on the contents of and appropriate indications for ordering diagnostic PCR panels. This educational session was implemented at Palmetto Health Richland Hospital in February through March of 2018. Provider knowledge was evaluated before and after the session using a 4-question questionnaire. Descriptive statistics were used to compare survey results before and after the educational session.

Results: Pending

Conclusions/Future Directions: Pending

**Torres, Kaitlyn**

**Mentor(s) -- Dr. Christopher Goodman**

**What We Can Learn from the Patient Experience and How We Can Use That Information to Improve Care**

Patient-centered care is at the forefront of the medical field. Including the patient and family in the decision-making process and the guidance of their care delivery can improve overall outcomes and experiences for the patient as well as the care team.

We are interested in improving the overall patient experience. We can use insight gained into the patient experience to come up with ideas for changes that will ultimately improve patient care.

The patient experience was investigated through patient shadowing at Palmetto Health Richland.

The shadowing timeline started after nursing shift change in the morning and followed through team-based rounds. Main data collection was through observation of touchpoints and timing as well as discussion with the patient after each caregiver touchpoint.

The process of patient shadowing allowed for an intimate and detailed experience of what it is like to be a patient in the hospital. Observing each caregiver touchpoint throughout the day gave important insight into how many caregivers the patient interacts with throughout their hospital stay. The patient overall reported a positive experience. The patient reported that touchpoints experienced that day were typical. Team-based rounds were important to the patient, as the patient enjoys the discussion about her care with everyone present explaining their roles and goals. A specific idea for improvement of care from the patient's point of view is not delivering cold meals.

Patient shadowing provides insight into the patient experience. We can use this information to

improve patient care by taking a patient-centered approach and including the patient in the decision-making process of their care.

**Toussaint, Christopher**

**Mentor(s) -- Dr. Walter Kaufmann**

**Rett Syndrome: A Study of Phenotypical Variability**

Background: Rett Syndrome (RTT) is a neurodevelopmental disorder that is estimated to occur in about 1 in 10,000 live-born females. It is associated with a Methyl-CpG-binding protein 2 (MECP2) gene mutation that exhibits an X-linked dominant inheritance pattern, although it is predominantly a de novo variation. The diagnosis is clinical and relies on 4 main criteria that develop over time: regression of expressive communication, regression of fine motor skills, onset of gross motor abnormalities, and onset of hand stereotypies. Very little information surrounding the heterogeneity of these 4 main symptoms has been documented, despite the diagnostic and therapeutic implications understanding the variability of different aspects of these holds. This study looks to expound on this topic of the heterogeneity of the 4 main criteria of RTT to improve the diagnosing and intervention processes.

Results: The diagnostic grouping and mutation severity grouping share the same increasing trend in variability for the age of onset of the 4 main criteria (hand stereotypies < fine motor < expressive communication < gross motor) and the same increasing trend in variability for severity of dysfunction of the 4 main criteria (expressive communication < gross motor < hand stereotypies < fine motor). For diagnostic groups, atypical mild subjects show the most overall variability, while the variability of classic subjects compared to the atypical severe subjects depends on what aspect of the 4 main criteria is being observed. For mutation severity groups, mild mutation subjects are the most variable followed by subjects with a moderate mutation and then those with a severe mutation.

Conclusions: The age of onset of hand stereotypies will provide the most accurate data for diagnosis. Observing the level of function of expressive communication could provide the most accurate and useful information on the efficacy of therapeutic interventions.

**Vaughan, Andrew**

**Mentor(s) -- Dr. Staci Shepard, Dr. Jeff Hall**

**Prenatal Care Matters: A Review of the Good Samaritan Clinic Prenatal Outreach Program**

The PHUSC Department of Family and Preventative Medicine has worked to institute a prenatal outreach program designed specifically to reach uninsured, primarily Spanish-speaking families. Several barriers to prenatal care impact this ever-growing population in Columbia, SC including language barriers, cultural barriers, health care literacy, and financial barriers. This program is designed to overcome those barriers using interpreters, trusted established visits, group prenatal classes, and specific payment plans. We hypothesize that this outreach program will improve prenatal follow-up and patient health literacy and in doing so, produce results in maternal-fetal outcomes comparable to regional standards. Using a model of group prenatal visits designed by the March-of-Dimes, the goal of this outreach program is designed to reach women at earlier stages of pregnancy, promote strong follow-up, educate women and families, and to ultimately result in healthy, safe deliveries. Specific areas of interest included: 1) baseline characteristics of our target population 2) prenatal visit attendance 3) prenatal outcomes/complications 4) delivery outcomes/complications. We have gathered the data for the first 30 mother/infant couplets to complete this program. Our data includes gestational age at the time of enrollment in the program; number of prenatal visits attended, whether prenatal labs and ultrasound evaluations were obtained during the pregnancy, and estimated gestational age of pregnancy when labs and ultrasounds were completed. Birth outcome data was also gathered including: birth weight of infant at delivery, gestational age at delivery, birth outcome (SVD v C/S), and any delivery complications. We concluded that this program provided access to prenatal care

for patients in our target demographic including prenatal labs, and anatomy US; that prenatal issues such as infection, glucose intolerance, and other high risk prenatal disorders were identified early and referred as needed; and that this program increased access to post-partum care. Furthermore we identified several future goals to improve upon this existing program.

**Vick, Kristen**

**Mentor(s) -- Dr. Keri Davis**

**Non-operative Management of Medial Epicondyle Fracture of the Humerus: A Case Report**

Medial Epicondyle fractures of the humerus account for 12-20% of pediatric elbow fractures and occur most frequently between the ages of 9 and 14. 50% of these fractures occur with an associated elbow dislocation. Medial epicondyle fractures can be caused by either direct trauma to the elbow or by an avulsion injury. Traditional treatment is non-operative immobilization with a long arm cast for 3-4 weeks followed by bracing and rehabilitation exercises. Surgical fixation is recommended in the presence of open fracture, fragment incarceration, ulnar nerve dysfunction, concurrent elbow dislocation, fracture displacement >5 mm, and fractures in upper extremity athletes. Complications with treatment of medial epicondyle fractures of the humerus are loss of motion, cubitus valgus, and bony non-union

The patient was an 11-year old female who sustained a traumatic right elbow dislocation from a fall and underwent closed reduction with concern for an unstable medial epicondyle fracture. Family was given the option of surgical fixation (ORIF) vs. casting and subsequent non-operative management. As patient had appropriate motion with finger flexion and extension and apparent ulnar nerve integrity it was determined that patient would be treated with bracing and physical therapy. At time of initial physical therapy evaluation patient exhibited significant swelling and skin discoloration around the elbow area, pain and impaired sensation, and limited right elbow active ROM (30-90 degrees). Patient attended physical therapy 2x per week for 8 weeks to address limitations in ROM and function. Treatment consisted of manual stretching, gentle mobilization, and stabilization exercises of the ulno-humeral joint. After completion of physical therapy program patient was no longer experiencing pain, had achieved full elbow active ROM (0-138 degrees), and had returned to previous level of function. The patient was thus discharged to home exercise program due to her achievement of PT goals and resolution of symptoms.

This case report demonstrates the effectiveness of non-operative management of a medial epicondyle fracture of the humerus focusing on stretching and joint stabilization. In the absence of fragment incarceration or significant fracture displacement non-operative management should be considered in the pediatric population.

**Vinnakota, Ramya Deepthi**

**Mentor(s) -- Dr. Mary Beth Poston**

**Metformin Induced Lactic Acidosis – A rare but life-threatening cause of metabolic derangements.**

Metformin is in a class of medications called biguanides which work by increasing insulin sensitivity and is used in patients with Type 2 Diabetes. The most common adverse effects are nausea, vomiting and diarrhea which can be seen in about 10% of the patients. However, the most fatal adverse effect is metformin induced lactic acidosis. Even though this is relatively rare (<10 cases per 100,000 patient years per report), it does have a high mortality rate (up to 50%). The risk of metformin induced lactic acidosis increases in patients with renal insufficiency. Due to the risk of metformin accumulation with decreased renal clearance, the use of Metformin is contraindicated in patients with a GFR of less than 30. However, its use is still seen in several patients with chronic kidney disease which can be life

threatening.

We present the case of a 67 year old patient with a medical history of Type 2 Diabetes Mellitus, Hypertension and CKD (Baseline GFR 30) who presented with a two week history of vomiting, diarrhea and a one day history of progressive dyspnea, weakness, slurred speech and confusion. His home medications included Metformin 1000 mg twice daily. Initial lab values were significant for a Lactic acid level of 20, BUN 83, Creatinine 14, Bicarbonate of 5, Anion Gap of 39. ABG reported a pH of 6.85. This patient was admitted to Medical ICU and was promptly placed on mechanical ventilation and started on hemodialysis. Several other causes for his metabolic derangements were considered but were ruled out. After holding his home medications and starting on dialysis, the patient's metabolic derangements improved dramatically overnight. After just one session of hemodialysis, his pH improved to 7.3, lactic acid trended down to 2.6, Bicarbonate was up to 19, BUN down to 47 and Creatinine came down to 8.

We present this case with the objective to highlight the adverse effects of Metformin use in the setting of renal insufficiency and discuss the immediate management options that could potentially reverse the metabolic derangements in an otherwise fatal overdose with almost a 50% mortality.

**Wells, Derek**

**Mentor(s) -- Dr. Mary Beth Poston**

**Lurking Liver Lesion**

Introduction

Pyogenic liver abscesses (PLA) are uncommon but the incidence is increasing. The etiology is usually related to peritonitis, biliary infection, hematogenous seeding and possibly colonic carcinoma. The microbiology of these infections is broad, likely due to the many different etiologies that causes PLA.

The clinical presentation of PLA is fairly nonspecific with fever, right upper quadrant pain and chills being the most common symptoms. The most common lab abnormalities were hypoalbuminemia, leukocytosis, elevated alkaline phosphates and alanine aminotransferase. Diagnosis is usually made via CT.

Treatment is usually a combination of extended antibiotics and percutaneous drainage of the abscess if possible.

Case

A 36 yo white male with a history significant for AIDS complicated by cryptococcal meningitis presented with a week of headache, fevers, chills and malaise. On ROS he also describes periumbilical abdominal pain occurred right before eating. Also has a nonproductive cough that had been more indolent.

On exam, T = 38°C, HR = 107, BP = 138/77, RR = 18, SaO<sub>2</sub> = 100% on room air. He was alert and oriented, lungs were clear, abdomen was soft but with mild tenderness to palpation in the right upper quadrant.

There was initially concern for meningitis given his history and LP was obtained and proved to be unremarkable as was the MRI of his head.

His chest xray was unremarkable but there was still concern for early PCP infection. A CT was obtained to further characterize his lung parenchyma, and an incidental 4 cm liver lesion was found. His admission LFTs were normal except for a mild elevated alk phos of 127. He continued to have fevers

up to 103 during this time.

Dedicated abdominal imaging showed a 7.5 cm hepatic abscess. This was drained and grew *Strep intermedius*. He continued to improve clinically and was discharged with oral moxifloxacin and outpatient follow up with Infectious Disease.

## Conclusion

In conclusion, PLA usually have nonspecific presentations with a wide variety of clinical and microbiologic causes. They are best treated with percutaneous drainage, antibiotic therapy and close follow up.

## Werner, Kristina

**Mentor(s) -- Dr. Morgan Adams, Dr. Mark Humphrey, Dr. Patricia Witherspoon**

### **Reducing Non-Emergent ED Utilization in Patients of the Family Medicine Center**

The Family Medicine Center (FMC) is primarily a resident clinic that serves over 12,000 patients. From July 2016 to June 2017, our patients visited Palmetto Health Emergency Departments (ED) 1,332 times. ED visits contribute to overall rising costs in our healthcare system and may lead to fragmented care due to lack of continuity with their primary care physician. Further, ED visits may lead to overmedication and utilization of diagnostic testing. With this in mind, a yearlong quality improvement (QI) project was implemented at the FMC to reduce ED utilization by 15%. The QI project focuses on five specific drivers, including education of both patients and providers, access to primary care, evaluation of disease states, utilization of resources (such as time, transportation to appointments, and cost), and patient experience and perception. From August 2017 through January 2018, multiple PDSA cycles have been implemented. "Super utilizers," defined as those who use the ED six or more times per year, were contacted to determine if they were aware of the FMC after hours phone line and same day appointment availability at the FMC. Same day appointments and next-day walk in priority visits were developed in order to care for patients in the clinic instead of the ED. Flyers were developed to educate patients on the signs/symptoms of serious illnesses versus minor or acute illnesses that can be addressed in the clinic. Additionally, patients were encouraged to call the after hours line if they experienced concerning symptoms outside of clinic hours so that they may be triaged by a provider instead of reporting directly to the ED. As of February 2018, the ED utilization rate has decreased by 9% with these interventions alone. Future interventions will focus on connecting patients to care coordination services and targeted interventions for specific disease processes.

## White, Spenser

**Mentor(s) -- Dr. David Ford**

### **Case Report: Simultaneous presentation of pyloric stenosis in monozygotic twins**

Infantile hypertrophic pyloric stenosis (IHPS), although rare, is the most common surgical cause of vomiting in the infant. Pyloric stenosis is caused by hypertrophy of the pylorus muscle connecting the stomach to the intestine. This results in a gastric outlet obstruction leading to post-prandial emesis, dehydration, and severe or life threatening metabolic abnormalities. While the exact etiology is unknown, it is thought to be multifactorial, depending on both genetic and environmental influences. IHPS is accepted to occur more frequently in twins, and numerous case reports in monozygotic twins exist in medical literature. Almost all cases of co-twin disease involved temporal discrepancy in onset of symptoms and disease diagnosis. This case report discusses monozygotic twins that presented to the Emergency Department with symptomatic vomiting that began at the same time. Their diagnosis was determined by ultrasonography and confirmed by surgical intervention to be due to pyloric stenosis. This case is rare in that both twins present with symptom onset simultaneously.

**Williams, Kevin**

**Mentor(s) -- Ms. Pamela Olenchuk**

### **A Case Study of a Proximal Tibial Anterior Open Wedge Osteotomy and Associated Rehabilitation**

#### Introduction

Physeal (growth plate) injuries compose 15-30% of all bone injuries in children. Each physis is unique according to its anatomical location. Physeal damage can lead to growth disturbance. This depends on the area of highest stress concentration, the patient's bone age, and the physeal closure status at the time of injury. The most common injuries of the proximal tibia occur in the medial or lateral growth plates. Far less common are growth plate disturbances in the anterior or posterior physis which can occur following a traumatic event.

#### Case Report

Patient is a 17-year-old male with no past medical history. He recalled a previous proximal tibial physeal fracture in 2015 which was treated non-operatively at the time whilst playing lacrosse in high school. He described an experience of knee instability with mechanical symptoms and anterior knee pain. His athletic trainers noted significant instability during certain exercises as well as a hyperextension deformity of patient's knee.

Radiographs were obtained from his orthopedist's office which demonstrated significant genu recurvatum (posterior angulation at the knee joint) and 15 degrees of anterior tibial slope (normal = 10 degrees posterior slope). An MRI was obtained which demonstrated insufficiency of his PCL. Following a failure of anti-inflammatory medication, physical therapy exercises, and bracing, patient and family elected for an anterior opening wedge osteotomy (bone resection) of his proximal tibia.

Patient underwent the aforementioned osteotomy and tolerated the procedure well. He continued to improve in terms of his active range of motion (AROM) and quadriceps strength per protocol. His bone healing was also supplemented with medication. Ultimately, at 6 months after surgery he began full weight-bearing exercises and was able to return to squats and aggressive PT. At 7 months he was able to start light jogging, plyometrics and drills. He was also able to return to some non-contact lacrosse practices with hopes of full return by 8 months.

#### Conclusion

This case report demonstrated the effectiveness of a proximal tibial anterior opening wedge osteotomy and subsequent physical therapy and eventual return to sport of a 17-year-old lacrosse player.

**Wulf, Siobhan**

**Mentor(s) -- Dr. Kathryn Stephenson**

### **Breathe Easy: Improving Asthma Care in the Outpatient Setting**

**Background and Objectives:** Asthma is a common childhood disease that makes up a significant number of emergency room visits each year in South Carolina. Our hopes with this project was to provide residents with education on proper spacer teaching and appropriate documentation so that comprehensive asthma care can be provided to patients at outpatient visits with the ultimate aim to decrease the number of asthma related emergency room visits.

**Methods:** A survey was provided to resident physicians to identify how comfortable they were in providing spacer education to family members in Children's Hospital Outpatient Center. Standardized asthma documentation provided to residents in the form of a Quick Text. We provided an educational session conducted by a respiratory therapist to demonstrate the proper technique of spacer use with metered dose inhalers. We provided a follow up survey to identify improvement in both resident

educations of families as well as appropriate documentation. Chart review was done from periods before and after intervention to quantify resident compliance with adequate documentation. We also reviewed number of emergency room visits by patients from Children's Hospital Outpatient Center for asthma related complaints from December 2015 to January 2016 and compared them to post intervention dates of December 2016 to January 2017.

Results: There did appear to be a significant improvement in self-reported resident comfort with spacer teaching. Both self-reported and documented spacer teaching was also improved following intervention. There was no improvement in complete asthma history documentation throughout the duration of this project. While spacer teaching interventions were improved, our primary outcome of decrease in ED visits was not shown.

Conclusions: We conclude that our intervention improved their comfort level with spacer teaching at asthma outpatient appointments. We also improved overall documentation and classification at outpatient appointments. We were unable to show statistically significant improvement in the number of emergency room visits by our patients with asthma as a result of our project. Further intervention and analysis would be needed to increase population and thus power of our project.

**Xu, Adrian QingYu**

**Mentor(s) -- Mr. Johnie Hodge, Dr. Daping Fan**

**Emodin as a Naturotherapy for Triple Negative Breast Cancer**

Breast cancer is the most prevalent cancer to affect women in the U.S. Triple negative breast cancer (TNBC) is the most devastating subtype of breast cancer without any effective targeted therapies. Therefore, it is urgent to develop effective and low toxic therapies for TNBC, in addition to cytotoxic chemotherapies. Emodin, an extract from *Rheum rhabarbarum*, has shown anti-tumor effects in previous breast tumor models by reducing M2 macrophage polarization in the primary tumor. In this preliminary study, we investigated the efficacy of emodin as a neoadjuvant therapy to reduce lung metastatic recurrence by modulating the tumor microenvironment of TNBC. Breast cancer 4T1-Luc2 cells were injected into 4th pairs of mammary fat pad of female Balb/C mice to establish an orthotopic breast cancer model. After tumor volume reached 200 mm<sup>3</sup>, the mice were randomized into two groups and received intraperitoneal injections of emodin (80 mg/kg) or vehicle. Both groups received 3 daily injections before and then 3 daily injections after the surgery to remove of the primary tumor. The mice were then sacrificed 14 days after the last emodin injection. The volumes and weights of the removed tumors showed no significant difference between the two groups; however, the intensity of an M2 macrophage marker, CD206, showed significant lower in emodin treatment group compared with vehicle control group ( $p = 0.0127$ ). No differences were shown in total number of lung metastatic nodules between the two groups. In summary, in this preliminary study, emodin led to fewer M2-like tumor-associated macrophages in the tumors, but did not reduce the number of lung metastasis. We suspect that the six injections of emodin are not sufficient to result in significant reduction in metastatic recurrence. In future studies, emodin will be administered at increase doses or for prolonged periods to evaluate its efficacy in reducing post-surgery metastatic recurrence of TNBC.



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