

Office of Research
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DISCOVER UofSC

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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 UofSC System.

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Undergraduate Students

presentations

2020 Cohort, Smart Start Nursing Program

Mentor(s): Dr. Robin Dawson, Dr. Sue Heiney

“Just be safe and be aware”: UofSC undergraduate student experiences during the COVID-19 pandemic

Background/Significance: The COVID-19 global pandemic has taken thousands of lives, sickened even more, and changed the daily routines of many. It has also resulted in significant challenges for universities, including the need for rapid development of COVID-19 guidelines to mitigate community spread (e.g., mask use, social distancing) and alternative educational delivery strategies (e.g., virtual, and asynchronous). Students have also had unique experiences adapting to this “new normal”.

Purpose: The purpose of this qualitative descriptive study was to explore the experiences of UofSC undergraduate (UG) students living on campus during the 2020 fall semester.

Methods: This study was guided by the Transitions Theory Framework. Participants were recruited via convenience and snowball sampling. Data included audio-recorded, semi-structured phone interviews lasting from 10 to 45 minutes. After transcription, data were analyzed using a thematic analysis approach, including open/axial coding and identification and naming of emergent themes.

Results: Participants included thirty-four UG students. The majority were female and white. Seven over-arching themes captured the UG student experience during the COVID-19 pandemic: COVID-19 knowledge and personal safety behaviors; Making the decision to be on campus; Sources of COVID-19 information; Online classes, isolation, and quarantine; Perceptions of the university response to the pandemic; Perceptions of others’ pandemic-related behaviors; and Suggestions and recommendations as the pandemic continues.

Conclusion/implications: Overall, the University implemented successful policies that, although at times met with student confusion, resistance, and noncompliance, were viewed positively by the participants. Student suggestions to enhance the university response included: 1) eliciting student input on the UofSC COVID-19 policies, similar to a course evaluation; 2) the development of a COVID-19 policies module to be completed by students prior to return to campus, similar to the mandatory AlcoholEdu course; and 3) faculty should demonstrate more empathy regarding the unique pressures the COVID-19 pandemic has placed on students.

Abdullah, Badr

Mentor(s): Dr. Michael Myrick, Ms. Caitlyn English

Fluorescence Microscopy Studies of *Lyngbya wollei*

Lyngbya wollei is a large, filamentous, and mat-forming cyanobacterium that is responsible for a large proportion of the harmful algal blooms taking over freshwater bodies in the Southeastern United States. These algal blooms negatively affect water quality through their formation of dense mats that adversely affect aquatic life. Their role in the depletion of water oxygen levels, the blocking of solar radiation, and the production of toxic metabolites such as cyanotoxins have negatively impacted fisheries, water supplies, and local agriculture. The growth and spread of *Lyngbya wollei* are favored by warmer temperatures; climate change and rising global temperatures are thus increasing the urgency of understanding and mitigating the impact of *Lyngbya* on freshwater ecosystems.

The analysis of *Lyngbya* was performed using a customized fluorescence excitation instrument that allows for excitation of individual cells, as opposed to conventional bulk excitation methods that record the fluorescence of large samples. This technique is well suited to organisms like *Lyngbya* as their dense mats

are prone to trapping sediment and organisms which interfere with the true fluorescence signal.

Fluorescence excitation signatures of chlorophyll A, phycoerythrin, and phycocyanin were found at 425nm, 580nm, and 612nm, respectively. The excitation spectra of these pigments were taken at each cell while going down the length of a single filament. The excitation ratios were then plotted as a function of their position along the chain, and trends in pigment heterogeneities were then correlated as functions of cell age, growth stage, injury, and environmental stress. This was done to find spectroscopic indicators of the organism's state, with the end goal of elucidating the cellular physical conditions that favor toxin production, which can then be used in the development of tools to determine risks of water toxicity.

Ablonczy, Lukacs

Mentor(s): Dr. Homayoun Valafar, Dr. Cynthia Corbett

Improving on existing annotation procedures for the training of nascent artificial neural networks

Background:

Artificial intelligence (AI) is a highly versatile and growing field in computing. Human-supervised AI approaches heavily rely on a set of annotated data to initiate their training process. Training defines the upper boundary of an AI's performance, therefore training data must be well annotated to be effective. Currently the hand annotation of data introduces obstacles including accuracy and speed when implementing AI solutions within healthcare. Therefore, there is a palpable gap in the existing technology to assist and facilitate data annotation.

Purpose:

Our aim is to develop an automated mechanism for annotating accelerometer data intended to train AI solutions to interpret human medication-taking activity.

Methods:

Our approach develops a progressively automated method to annotate accelerometer data.

First, we develop a nascent neural network using a small set of hand-annotated data. The second stage will utilize the classification results of the nascent network to annotate active and inactive portions of data. This newly annotated data will be used to further refine the detection capabilities of the initial network.

During the final stage, reinforcement learning principles will be utilized to further enhance the accuracy of the detection network that will be used to annotate the sensor data. This progressively enhanced and automated annotation/detection system will facilitate a faster annotation process. This approach requires occasional confirmation by a human supervisor.

Results:

We have obtained and manually annotated 1690 individual gestures from 22 participants. The nascent ANN exhibits a performance of more than 95% accuracy in identifying data from nearly 15 participants. Our efforts are now focused on leveraging the existing network in developing a semi-automated annotation of the remaining participants.

Conclusion and Implications:

There are many use cases for this method in improving automated annotation. For instance, the method could use hand-annotated data from only ten participants to train a nascent network. After, the trained network could automatically, but with supervision, annotate more than 95% of the data from the remaining participants. A second generation of network could then be trained based on the new annotated data, improving its capabilities comparatively. This can then be repeated.

Abraham, Amy

Mentor(s): Ms. Wendy Chu, Dr. Kimberly Becker

The Role of Paraprofessionals in the Mental Health Structure of India

The mental health treatment gap in India is part of a growing public health crisis, with over 95% of those in need of services never receiving them. Over 197 million Indians suffer from at least one diagnosable mental health disorder, and this number continues to grow given the treatment gap. The treatment gap is a result of four major factors: lack of government support, stigma, limited treatment facilities, and dearth of professionals able to provide treatment. The current study aimed to analyze several factors of paraprofessional-led mental health interventions including setting, treatments delivered, treatment models, and client outcomes. A narrative literature review was conducted to synthesize the current available research on paraprofessional-led mental health interventions in India. Twelve studies published between 2010 and 2020 were included in the review. Most studies (n = 10, 83%) with paraprofessionals were conducted in both peri-urban and rural areas, and in a variety of different clinical settings (e.g., healthcare facilities, schools). All (100%) paraprofessional interventions used evidence-based treatments for mental health problems, including psychotherapy and pharmaceutical treatment. Paraprofessionals provided services under a collaborative stepped care model in many studies (n = 9, 75%). Of the studies that used quantitative methods to evaluate changes in client outcomes, all ten (100%) found that paraprofessionals significantly reduced the severity of symptoms of mental disorders and improved functioning. These findings provide support for the efficacy of paraprofessional-led interventions in treating the mental health needs of the Indian population. Moreover, they illustrate that paraprofessionals can be a solution to mitigating the mental health treatment gap in India. Future directions will be discussed.

Ackroyd, Madison

Mentor(s): Dr. C. Nathan Hancock

Utilizing Bacteriophage Endolysins for the Inhibition of Bacteria

As antibiotic resistance has developed into a global issue, scientists and medical professionals are striving to find alternative methods to treat bacterial infections. Many common infections such as pneumonia, tuberculosis, and foodborne diseases are becoming very difficult to treat with the antibiotics because they have been used for many years. In these attempts to find new methods of inhibiting bacteria, the use of bacteria's natural enemy – bacteriophage - is promising. Bacteriophages are viruses that infect bacteria by inserting their genetic material into the cell to produce proteins including endolysins, which lyse the cell wall. Bacteriophage endolysin proteins have been shown to work independently of the virus as a strategy to lyse bacteria. In this study, we expressed multiple phage endolysin proteins and tested if they would kill various bacteria strains. To do this, the phage endolysin genes were cloned into expression vectors and transformed into Arabidopsis and E. coli. We predict that protein extracts will inhibit bacterial strains that have susceptible cell wall structures. We will add endolysin extracts to filter paper disks placed on to bacterial cultures and measure bacteria growth. If the proteins are effective, we expect to see a halo of clearing.

Adams, Adarius

Co-Author(s): Bryce Miley, Christopher Gibbs

Mentor(s): Prof. John Gerdes

Integrated Information Technology Website to Showcase Student Work

This project aims to create a simple, attractive website that provides access to previous Integrated Information Technology student work, particularly focusing on capstone projects. This will, as hoped, provide an easy way for instructors, prospective students, parents and potential employers to gain either an overview of the variety of work being done by iIT students at USC or a low-level view of a particular student's

contributions and areas of focus. This project will create a functional baseline website that offers these basic features and serves as a proof-of-concept with the overall idea being considered for integration with the University's College of Engineering and Computing webpages.

Albert, Maegan

Mentor(s): Dr. Bert Ely

Genomic Comparison and Phylogeny of Small Bacteriophage that Infect *Caulobacter crescentus*

Bacteriophages are ubiquitous in the environment and have major impacts on the microbial world, yet their phylogenetic relationships are poorly understood. Viruses are highly diverse, and their method of replication raises unique challenges when characterizing their relationships. This research focuses on small bacteriophages that infect the model organism *Caulobacter crescentus* to better understand viral phylogeny. Phages were selected based on their genome size of approximately 40 kilobasepairs, their capsid morphology as podoviruses, likeness to *Caulobacter* phage Percy's capsid as found through PCR, and later their overall genetic similarity to the *Caulobacter* phage Percy. Three phages, KSC, ERS, and BL199, were isolated in this laboratory, then the nucleotide sequence of their genomes was determined and assembled using PacBio single molecule real time technology. The genomes of the *Caulobacter* phages Percy, Cd1 and Lullwater and *Sphingomonas* phage Scott rest were downloaded from NCBI. Gene products were suggested using RAST annotation and NCBI's BLAST comparisons. Genomes were viewed and edited using Artemis. Phylogenetic trees were built using Mega-X and the amino acid sequences of conserved genes. Preliminary results show that gene order is highly conserved among all of the tested phage genomes suggesting that KSC, ER,S and BL199 comprise a new bacteriophage genus with Percy as the founding member. *Sphingomonas* phage Scott is closely related but not part of this genus. Cd1 and Lullwater are more distantly related and not closely related to each other. These findings suggest that gene order is not as variable in related phage as previously thought, that closely related phage will have similar length genomes.

Aleman, Dylan

Mentor(s): Dr. Kelly Goldberg

Evolution of *Homo neanderthalensis*

The *Homo neanderthalensis* (also known as the Neanderthal) is the closest extinct human relative and were replaced by *Homo sapiens* (humans) between 35,000 and 24,000 years ago. The study of Neanderthals and how they evolved into humans is very important in distinguishing exactly how humans came to be. This poster will dive into the evolution of the *Homo neanderthalensis* and discuss from the time of their origins, leading up to their extinction, and ultimately discussing how and why they became extinct. It is important to discuss this topic because it gives us a better understanding of where us humans came from and how we developed into the species we are today. I will discuss the ways Neanderthals lived and survived during their time period and compare them to how humans are today. This poster will encourage further research into the development of different primate species and provide insight into a particular species that is very similar to us humans.

Alexeev, Sergei

Mentor(s): Dr. Jason Kubinak

B-Cell-Intrinsic MHCII Signaling Shapes Microbiota Composition

Recent studies demonstrate that immunoglobulin A (IgA), the most abundant antibody secreted at mucosal surfaces, is critical for limiting chronic inflammation but the mechanism by which this occurs is undefined. Regulation of the composition of the commensal bacterial community in the gut (i.e. the microbiota) could be one mechanism. IgA can be produced through T-cell-dependent (TD) and T-cell-independent

(TiD) pathways. While TiD IgA is the most abundant IgA secreted into the gut, the relative contribution of TD and TiD IgA in regulating microbiota composition is controversial. Antigen presentation by B cells to T cells is essential for TD responses, and this is carried out by MHC class II molecules. Here, we sought to address the hypothesis that B-cell-intrinsic MHCII antigen presentation promotes anti-commensal TD IgA responses that influence microbiota composition. In order to do this, RAG1-/- mice, that lack their own T and B cells, received adoptive transfers of wildtype (WT) T cells along with MHC+ B cells, or WT T cells along with MHCII- B cells. Results of our experiments demonstrate that the presence of MHCII on B cells leads to higher levels of IgA secretion into the gut, is critical to the formation of germinal centers, enhances binding of gut bacteria by high-affinity IgA, and is associated with greater species richness in the gut microbial community. Our results support that TD IgA responses promote species diversity in the gut, which is thought to benefit host health.

Alger, Grace

Mentor(s): Dr. Judith Kalb

Exilic Consciousness and the Poetic Self: Alienation as a Lifestyle

This thesis examines concepts of exile and poetic identity through the writings of two Russian authors, Joseph Brodsky and Olga Grushin, comparing their respective depictions of alienation and consciousness. More specifically, I examine the theme of self-alienation, or spiritual exile, and its impact on each writer's poetic and exilic consciousness.

I use Brodsky's poem "Odysseus to Telemachus" (1972) and his essay "Less Than One" (1987) to introduce the role of self-alienation and spiritual exile as a consciousness exemplified throughout his texts, from his days in the Soviet Union to his later period of exile. In order to surmount a lack of choice and possibility, what he calls a prison of infinite time and limited space, Brodsky assumes a life of alienation even before his physical exile. Brodsky's exilic consciousness necessitates the depiction of time as infinite and cyclical, underlying a larger exilic perception of temporal passage. In order to create a future outside of societal expectations, the past, present, and even possible futures become muddled and simultaneous, with familial relations and acts of estrangement serving sporadically as anchors to an otherwise hazy reality.

Grushin's novel *Forty Rooms* (2016) similarly presents an exilic consciousness that begets poetic creation through repeated acts of self-alienation and self-deprivation. Through dreams of conversations with the Greek god Apollo, serving as a sort of poetic advisor to the narrator, and through images of varying mirrored reflections of the narrator, Grushin suggests that a poet must suffer in order to create, a notion famously exemplified by Brodsky's own history. The narrator thus denies herself any fulfilling relationships or happiness, never sharing her true, poetic self with anyone. As a result, like Brodsky, she is haunted by memories, traditions, and unwritten poetry she has forgotten, in addition to endless possible futures. Unlike Brodsky, however, she is unable to create meaningful works of literature, dedicating herself instead to an ultimately unfulfilling domestic existence.

Comparing the two authors' texts, I am able to delve into questions and of poetic identity and self-expression. I examine the differences these issues take on depending on gender, family relations, and cultural assumptions.

Allen, Stephanie

Mentor(s): Dr. Kelly Goldberg

The historical significance of australopithecus africanus and its impact on modern life

Understanding human origins allows us to more completely understand modern life and the way in which we relate to nature and other organisms. *Australopithecus africanus* was the first fossil of a human ancestor found in Africa. This research seeks to highlight and connect the historical significance of the *australopithecus africanus* to our modern understanding of human behavior.

Almanza, Cecilia

Co-Author(s): Malachi Harris, Anthony Foti

Mentor(s): Prof. John Gerdes

SET solutions project team

Presenting project for SET solutions. Project consists of finding solutions to file sharing and efficiency within the company.

Altman, Julia

Mentor(s): Dr. Jeff Dudycha, Mr. Trenton Agrelius

Optimization of Primers for Quantitative PCR for Three DNA Methyltransferase Genes in *Daphnia pulex*

While DNA methyltransferase (DNMT) expression patterns have been well studied in genetic model organisms, little is known about how DNMT expression changes in ecologically important organisms in response to environmental stressors. Prior research shows a clear connection between induced stress/trauma to an organism and increased expression of DNMTs. This trend has been demonstrated for DNMT1 and DNMT3 in many vertebrates, including zebrafish and mice. In an effort to analyze changes in DNMT expression patterns in response to stress in an ecological model organism, primers were designed to amplify specific segments of these target genes in *Daphnia pulex*. RNA was then extracted from *D. pulex* and converted into cDNA for use in optimization. Molecular tools such as gel electrophoresis and quantitative PCR were used to optimize assay conditions to measure expression of the genes of interest. A second set of primers was optimized using the same method to amplify in a different area of the gene so as to not amplify any residual viral RNA in later RNA interference (RNAi) applications. Future research includes the use of these optimized primers for analyzing the changes in gene expression of DNMTs due to stress and verifying gene knockdown after RNAi treatment.

Andriello, Emily

Mentor(s): Dr. Dirk den Ouden

Vowel Formant Dispersion in the Aging Brain Cohort

The Aging Brain Cohort (ABC@UofSC) is conducting a study that will analyze how the brain ages. Over 600 participants aged twenty to sixty will take part in the five-year study. Many aspects of the brain are being studied. Due to the COVID-19 pandemic, the study changed to focus on how the brain may be affected by the coronavirus. One of the questions that is studied is to what extent speech articulation may serve as an early predictor of cognitive decline in healthy aging. To what extent stability of articulation correlates with other cognitive, behavioral, and neurological measures that are collected in the study? To answer this question, we focus on the articulation of vowels, measuring the variance in core (formant) frequencies. Formants in speech sounds are the resonant frequencies of the vocal tract- these are the frequencies that resonate loudest and that allow us to distinguish between speech sounds, for example between different vowels (i, a, u, etc.). These resonant frequency bands are measured in Hertz and are labeled from the lowest to higher bands as F1, F2, F3, and so on. They are amplified with different mouth movements, which produce different sounds.

Under the mentorship of Dr. den Ouden, I have learned valuable statistical analysis tools. First, using the Praat software, I was able to extract over two-thousand vowel formants from over twenty participants. After collecting vowel formants in Praat, I summarized the data in Excel and used R to create graphs that analyzed the vowel formant dispersion data. We hypothesize that a sign of an aging brain is one in which vowel formant dispersion increases over time. Although this change may be small, it is possible that it is enough to indicate aging.

Arabis, Lauren

Mentor(s): Mx. Caleb Morris

Marching Through Leadership

During my time at Carolina, I spent my fall semesters with The Carolina Band. For my junior and senior year, I was selected to be a color guard captain and serve in a leadership role. I decided that I was fit to lead because of my experience of being a captain for my high school team. I knew that the team needed guidance. I was in charge of teaching flag work to my peers and getting things ready for game days. I had a week of leadership training to help me learn how to be a better leader. I found that leadership is not just some glorified title that someone holds. Leadership means extra work and extra time dedicated to helping others when they need guidance. It means being a role model and helping to leave things better than you found it. Because of my leadership experience in The Carolina Band as a color guard captain, I have learned better time management, how to be a better listener, how to empathize, and how to help others when they are struggling. Most importantly, I learned better communication skills.

Ashcraft, Madeline

Mentor(s): Dr. Kelly Goldberg

Research on *Ardipithecus ramidus*

Studying fossil species of hominid ancestors gives insights into the larger history of *Homo sapiens*, as well as helps establish a timeline for human evolution. Researching a particular fossil species, in this case *Ardipithecus ramidus*, shows not only where today's humans evolved from, but also explains the origins of some human behaviors and characteristics. Drawing on the physical morphology of the species, when and where they lived and in what environment, fossil finds, and scientific interpretations of the species, this research shows the importance of understanding human evolution over time. These findings demonstrate the origins of particular characteristics of today's humans, through the placing and understanding of the fossil species *Ardipithecus ramidus*.

Ashroff, Zahida

Mentor(s): Dr. John Kupfer

The Impact of COVID-19 on U.S. National Park Visitation

From the Black Death to more recent cases like Cholera, Spanish Flu and COVID-19, pandemics cause global socio-economic disruption and have wide-reaching impacts on human interactions with the environment. Since the creation of Yellowstone in 1872, national parks have had a central mission of providing for the enjoyment, education, and inspiration of this and future generations. The COVID-19 pandemic has provided both challenges to and opportunities for the ways in which the National Park Service (NPS) can meet this mandate. The purpose of this study is to analyze variations in responses of individual units and the NPS as a whole to COVID at various points in time since last March, including closures, partial or full re-openings, and increases / decreases in visitation. Specifically, we are documenting media and online accounts of the impacts of COVID-19 on National Park visitation to provide perspectives on the importance of parks for outdoor recreation during COVID, including support for or concerns about this role from the public or the NPS. These narratives are complemented by analyses of actual visitation counts and geotagged social media data from four heavily-visited National Parks in the western U.S.- Yosemite, Yellowstone, Grand Canyon and Zion. The objective is to increase understanding of regional visitation trends and park-specific policies enacted during the pandemic. The observed trends will be displayed graphically to determine the accuracy of predicted perceptions of increased National Park visitation during the pandemic, as well the prevalence of other trends relating to park responses to the pandemic. Through this study, we seek to provide a better understanding of human perception of nature during the current pandemic. It also allows for a better understanding of policies and actions that the NPS imple-

ments during pandemics, while providing a framework for analyzing the effectiveness of these solutions for future use. Further research could be conducted specifically targeting National Parks in other regions of the U.S such as those in the Southeast, including parks like the Everglades, and other NPS units like national seashores and recreation areas.

Askins, Abby

Mentor(s): Dr. Miroslav Cuturic

Effects of Alcohol on Huntingtons Disease Polyglutamine Mutants of *C. Elegans*

This is a preliminary study which aims to examine the impact of alcohol exposure on the onset and progression of Huntington's disease. Huntington's disease is a genetic, neurodegenerative disorder which is fatal and has no known cure. It is caused by an abnormality on the Huntingtin gene, and this defect leads to the production of an abnormally long polyglutamine chain, which is toxic to brain cells. The result is progressive chorea, cognitive decline, and psychiatric symptoms. In this study, we used *C. elegans*, a non-pathogenic nematode whose physiology is suitable for studying neurobiology, polyglutamine strains to model HD in a study organism. The organisms were studied for effects on both longevity and motility with exposure to alcohol. For the motility studies, the worms were subjected to alcohol exposure by flooding plates with 0%, 1%, 5%, and 10% ethanol dilutions. The organisms' motility was recorded for 5 minutes and scored by ImageJ software. For both strains, there was statistically significant impairment of motility in the 5%, and the 10% dilutions. In the 1% dilution, there was a statistically significant improvement of motility in the wild type, and borderline improvement in the HD strain. For the longevity studies, worms were age synchronized and transferred daily to new plates until death. These longevity trails were done blindly with respect to the 0%, 1%, 5%, and 10% ethanol exposures. No statistically significant difference was found in longevity between the WT and HD strains without ethanol exposure, but at 5% ethanol exposure the HD strain longevity was significantly shorter than that of the WT. This study helps to establish the protocol needed to conduct motility and longevity studies on *C. elegans* at the University of South Carolina. Further experiment directions include replication of these results, and applications of these protocols in various other neurodegenerative disorders including Parkinson's disease and spinocerebellar ataxias.

Augenblick, Lee

Mentor(s): Dr. Susan Wood

Microglial regulation of social stress susceptibility in female rats

There is a significant link between stress and the development of psychiatric diseases such as depression and anxiety. Additionally, females exhibit increased susceptibility for the development of depression and anxiety; however, the reasons for this are unclear. The locus coeruleus (LC) is known to regulate the stress response, in part, through its projections to the central amygdala (CeA). All LC neurons contain norepinephrine (NE) and project NE to the CeA, which in turn activates the stress-sensitive corticotropin-releasing factor (CRF), which can mediate the anxiety-like response to stress. Importantly, social stress activates the brain's resident immune cells (microglia) and overactivation of these microglia are implicated in stress-related disorders. These studies seek to understand the molecular cascade between the stress sensitive LC-NE system and the CeA. Therefore, here we test the hypothesis that microglia within the LC may be regulating, in part, the stress-evoked LC response to CeA.

We identified the ability of clodronate (CLD), a drug selectively toxic to microglia, to reduce microglia by approximately 50% when injected intra-LC (LC microglial number \pm SEM; vehicle: 55.3 ± 5.3 , 25 μ g CLD: 27.4 ± 2.6). The current study uses a witness-stress (WS) paradigm capable of evoking a stress-like response in female rats. In this WS paradigm, a female rat is placed behind a clear partition in a dominant "resident" male's cage and observes social defeat between the resident and a smaller male "intruder". Fe-

male rats received an empty liposome (vehicle) or 25 µg CLD three days before WS or control (Con) exposure (5 daily exposures, 15 mins/day). 5 days after WS/Con, rats in all stress/treatment conditions were euthanized under resting conditions or 1 hour following a WS exposure. Blood and brain tissue were collected. Preliminary results demonstrate elevated IL-1b, a cytokine release from microglia, in the LC 5 days after stress in vehicle-treated witness-stressed rats, an effect that was absent in CLD-treated rats. Ongoing studies are assessing NE and CRF expression in the CeA in these studies. These data lay the foundation to better understand the underlying causes of stress susceptibility in females, which could have implications to improve treatments of psychiatric disorders in females.

Bacon, Madelyn

Mentor(s): Dr. Jabari Bodrick

Madelyn Bacon's Abstract

For the past year and a half, I have worked for the South Carolina Department of Corrections (SCDC) as a Procurement Intern. For me, this internship was about gaining deeper knowledge of supply chain processes. I applied for this internship to learn more about procurement and to see if that was what I wanted to do after graduation. As an SCDC employee, I was taught to focus on the safety of everyone around me, to improve the lives of and meet the needs of the inmates, and to help them reenter society. In SCDC's procurement division, we are focused on having quality products available for inmates. We also work to get the best value through efficient processes. While working, I have had the opportunity to create purchase orders, sit in on meetings with vendors, learn Systems, Applications, & Products software (SAP) and ERP Central Component (ECC) programs, generate third party supplier data analysis, and more. As an Operations & Supply Chain major at the Darla Moore School of Business, I have been able to take the knowledge I gained in the classroom and apply it in a real world setting. Through both experiences, I have learned I want my future career to be in procurement. I plan on graduating in May of 2021 and being a buyer for a manufacturing company.

Bain, Ian

Mentor(s): Dr. Parastoo Hashemi

Histological Analysis of Brain Tissue Following Neurochemical Analysis

Neuropsychiatric diseases like depression have been linked with increased levels of neuroinflammation. Histamine, well known for its role in peripheral inflammation is predicted to also mediate inflammation in the CNS. Fast scan cyclic voltammetry (FSCV) can be used to measure histamine release and reuptake in the posterior hypothalamus of rodents. Preliminary data suggests that differences in the exact location of the electrode can result in variable types of signals. This work focuses on the examination of the brain tissue of mice following chemical analysis using FSCV to correlate hypothalamic microelectrode placement in reference to the type of histamine signal detected. Classification of histamine signals is particularly useful in characterizing histamine's ability to inhibit serotonin release (via the H3 receptor), and for exploring the role it plays in inflammation-associated depression. This study is important for improving our understanding of the chemical factors associated with depression, which could lead to the development of effective methods for diagnosis and treatment of the disorder.

Baker, Adam

Mentor(s): Dr. Troy Herter

Cortical Damage and Disconnection Effects on Motor Impairment from Stroke

Stroke is a prominent, debilitating cerebrovascular incident that often results in chronic difficulties performing functional motor tasks like cooking, walking, and driving. Traditional brain-behavior studies in stroke have focused on elucidating causal relationships between stroke-induced damage (i.e., lesions)

to different brain regions and their resulting behavioral deficits. In addition, we know that stroke leads to disconnection (i.e., atrophy) of white-matter tracts between brain regions. Recent studies have used a novel approach, termed connectome-based lesion-symptom mapping (CLSM), to demonstrate that cortical disconnection is a strong predictor of post-stroke deficits in speech production and comprehension. To our knowledge, however, no previous studies have used CLSM to examine the extent to which cortical disconnection is predictive of post-stroke deficits in motor performance. This knowledge gap is significant because understanding how cortical damage and disconnection are related to functional motor deficits is crucial for improving post-stroke rehabilitation. The objective of this study was to examine the extent to which cortical damage and disconnection are related to deficits performing an upper-limb, visuomotor task. We studied 47 subjects with a single stroke of the left middle cerebral artery at least 6 months before enrolling in the study. Magnetic Resonance Imaging (MRI) and Diffusion Tensor Imaging (DTI) were used to measure cortical Damage (Lesion Volume) and Disconnection (Connectivity Bias). Subjects also performed an upper-limb, visuomotor task (Object Hit) in which they used both hands to hit away objects moving towards them in a virtual environment. Data from the Object Hit task was used to measure deficits in limb-movement (Hand-Speed Bias), spatial awareness (Spatial-Miss Bias), and overall task performance (Objects Hit). Traditional lesion symptom mapping and CLSM will be used to assess the extent to which damage and disconnection of motor cortical regions are predictive of upper-limb, visuomotor deficits. We hypothesize that combining these techniques will improve our ability to predict visuomotor deficits that are characteristic of difficulties performing functional motor tasks.

Barnhill, Casey

Co-Author(s): Lilian Hutchens

Mentor(s): Dr. Kelly Goldberg

Studying Homo heidelbergensis and Human Evolution

Members of the Homo heidelbergensis species are early ancestors of modern day humans or Homo sapiens. Understanding this species is key to understanding human history and evolution. In this presentation, we will draw on existing anthropological research to summarize the current body of knowledge of Homo heidelbergensis and variation amongst human ancestors. Particular emphasis will be placed on physical morphology, fossil record, and habitat of Homo heidelbergensis. A hominin phylogeny will be included to highlight the relationships between known hominin species and further contextualize Homo heidelbergensis in human evolutionary history. The goal of this research project is to describe the life and environment of the Homo heidelbergensis and demonstrate the importance of the field of biological anthropology to modern understanding of human evolution.

Barrett, Chandler

Mentor(s): Mrs. Tiffany Conde

Being All-In

During this past fall, I got the privilege of working for FedEx as a Global Marketing Strategy Intern at their corporate headquarters in Memphis, TN. Unfortunately, due to COVID I did this internship remotely in Columbia, SC while also being a student here at USC. I worked specifically within the Freight Division of FedEx analyzing our current market share for each lane in the US. In a nutshell, what do we make the best margins on and how can we ship more of it? I analyzed commodities, margin by commodity, customer accounts, and geographic distribution. With this I was able to give the sales teams an extremely precise picture of who, what, and where.

I was originally supposed to do this internship over the summer but ended up having to adjust in order to do it during the fall while attending school as well. Which leads to an important point, scrappy people don't get frustrated, they find a way.

This internship helped me so much in my personal and professional development. My project was extremely data heavy, therefore my data analysis and synthesis skills benefited immensely. It was also cool to be able to see the real world application of my data analytics concentration. My executive presence and teamwork skills increased as I constantly was interacting with coworkers, teammates, etc routinely. I also made it a point to reach out to every executive in the company and set up times to pick their brains. This allowed me to get super valuable advice and insight into things they learned along the way through their successes and failures. As my dad always says, "Smart people learn from their mistakes, but really smart people learn from the mistakes of others." Overall, interning at a Fortune 50 company really gave me experience that separated me from a large portion of my peers as I interviewed for other full time roles.

I've always heard that at the end of a great internship you should either be hot or cold on that as a career, and FedEx did just that for me.

Bateman, Corey

Co-Author(s): Taylor Jeter, Brian Greene

Mentor(s): Prof. John Gerdes

IIT PHD and Online Program Pages

IIT students develop web pages using a source code editor and cloud computing platform to be used on the official UofSC website. These pages will expand awareness of the new Informatics PhD program and online IIT undergraduate course in order to connect potential students to these programs, both internationally and nationally

Batson, Sierra

Mentor(s): Dr. Sourav Banerjee

Forensic Investigation of Aerospace Composites using NDE after Impact to Characterize the Nature of the Impact

Non-destructive Evaluation (NDE) is in increasingly high demand with specific applications in a variety of fields, including forensic investigation of materials and aerospace structures. Aerospace structures are made of composite materials to save fuel and overall expenses of space missions. However, that same material can put the structure in jeopardy due its very brittle nature and catastrophic failure mode. Aerospace structures are subjected to wide varieties of external loads and sometimes numerous impacts by space debris. It is imperative that they withstand such impacts and complete the mission. The forensic investigation in this study of an aerospace composite after impact, not only explores unique interactions of ultrasonic waves with composite materials, but also a quantitative acoustic contrast thermograph of the composites. The aerospace composites are analyzed after impact utilizing the Scanning Acoustic Microscope (SAM) to determine the effects of the collision inside the composite which are otherwise unseen through other methods. A collision or an impact may not reveal the severity of the damage inside the composite if observed superficially with an optical microscope. Hence, an in-depth forensic analysis of the composite is required. SAM emits very high frequency wide band ultrasonic waves through a focused transducer. These waves then interact with the top surface as well as penetrate the entire composite, revealing internal features of the damage propagation. The ultrasonic scans can then be evaluated to determine the remaining structural integrity, the effectiveness, or the energy propagation through the material. These scans are focused primarily on the region of impact in order to capture any delamination or fractures of the material. Through the methods described, the scans proved that the material experienced significant trauma to create abrupt fractures not only on the surface but also throughout the interior of the composite, capturing the spiral path of delamination from the initial impact. Based on the severity of the damage, degree of delamination, the stacking energy of impact is determined.

Battaglia, Brittany

Mentor(s): Prof. Matthew Childs

Land Ethic

Whenever I have asked someone, what do you consider to be a part of your community, their answer typically involves people and pets. Many people don't consider the land that they live on to be a part of their community, but once you think about it you begin to realize that without it, your life wouldn't be the same. The way we think about land has to change if we want to see a positive change in the environment. If we begin to think of our land as a part of our community, and a substantial part of our day to day lives, maybe we will begin to treat it better. An experience that really opened my eyes to this problem was participating in a beach cleanup in Hawaii in January of 2020. During this cleanup I was also able to talk to and meet a native who devotes a big part of his life to cleaning up these beaches and making Hawaii as beautiful as it can be. During this beach clean up I really was able to put Leopold's land ethic theory into perspective, especially while talking to the native, Austin Kino about how he views the land and marine life of Hawaii as a part of his community. In my presentation I will talk more about how important it is to treat our land as a part of our community, and discuss my journey in making daily changes to become more energy conscious and environmentally friendly. As a student pursuing a pathway in professional and civic engagement, I have recently changed my professional goals to match a more eco friendly lifestyle in hopes of making even the slightest positive change for the land that we seem to take for granted everyday. I think that it is important that I keep this aspect of my goal for not only my piece of mind, but also to make my dreams have a bigger and more important message and meaning.

Baucom, Anna

Mentor(s): Dr. Peiyin Hung, Dr. Kevin Bennett

Trends in Telehealth and Remote Patient Monitoring System Adoptions across Hospitals in the United States

Background:

In the wake of the COVID-19 pandemic, telehealth has become a promising measure to improve access to quality care. Little is known regarding spatial-temporal distributions of hospital telehealth adoptions prior to the pandemic. Understanding geographic disparities in telehealth adoptions is essential to guide future efforts for telehealth accessibility, especially in rural America where healthcare supply is limited.

Objectives:

This study examined spatial distributions of telehealth and remote patient monitoring availabilities and the differential trends of telehealth adoptions over time across urban and rural hospitals.

Research Design:

This retrospective longitudinal study derived nationwide hospital data from 2008-2017 American Hospital Association Annual Surveys. To identify differential trends of telehealth adoptions over time by hospital location, we employed generalized logistic regression models controlling for hospital characteristics and state indicators, adjusting for state-level clustering.

Subjects:

All 5,183 unique U.S. hospitals across urban, rural micropolitan, and rural noncore counties in 2008 and 2017.

Measures:

Two dichotomous outcomes include whether a hospital had telehealth and/or remote patient monitoring systems in a year. Hospital locations were categorized into urban, rural micropolitan, and rural noncore counties based on 2013 Urban Influence Codes. Other explanatory variables include hospital- and county-level characteristics.

Results:

Urban hospitals had a substantial increase in telehealth adoption from 44.1% in 2008 to 84.1% in 2017,

compared to a less marked increase for rural micropolitan hospitals from 47.5% to 82.8%, and the least increase across rural noncore hospitals from 47.5% to 68.1%. Despite the increasing trend in rural hospitals, small rural hospitals and freestanding hospitals have lagged in adoption. Similar but less prevalent trends were found in adopting remote patient monitoring systems across all hospitals.

Conclusions:

Increasing telehealth availability across U.S. hospitals signal the success of federal financial incentives for telehealth adoptions. However, its maldistribution across rural hospitals and the slow adoption among rural freestanding hospitals in recent years question the sustainability of federal interventions. Going forward, as COVID-related pro-telehealth policies are relaxed, there will be critical opportunities to boost telehealth in rural America to ensure access to telehealth services and continuity of care for all.

Bauman, Taylor

Mentor(s): Dr. Melissa Moss

Influence of A β Oligomers on Cellular Inflammation Associated with Alzheimer's Disease

Alzheimer's disease is the sixth leading cause of death in the United States, and the number of people affected is predicted to double in the next 30 years (Alzheimer's Association, 2020). A prominent feature in the pathogenesis of Alzheimer's disease is the aggregation of amyloid- β protein (A β). During the progression of Alzheimer's disease, A β peptides in the brain aggregate to form oligomers, and eventually fibrils, which deposit in the brain as senile plaques (Mori et al., 2012). Recent research on Alzheimer's disease and A β has shifted analyses towards the detrimental effects of the intermediate oligomers of the A β aggregation process. A β oligomers have been linked to neurotoxicity and the provocation of other characteristic occurrences of Alzheimer's disease, such as neuroinflammation, which is a major pathological hallmark of the disease (Chen et al., 2017). A β oligomers can elicit an inflammatory response in the brain, characterized by the release of inflammation-related mediators that promote neuronal death and inhibit the breakdown of toxic A β aggregates (Mori et al., 2021).

Uncovering more information about this A β oligomer-induced inflammation is the focus of this project. THP-1 cells, or primary human peripheral blood monocytes can be differentiated into macrophages, which, like microglia cells, are mononuclear phagocytes that can reside in the human brain. Microglia cells have been found to associate with A β oligomers as an important pathological feature of Alzheimer's disease (Fakhoury, 2018). A β monomers were oligomerized using multiple oligomerization techniques then applied to cultured THP-1 macrophages at varying concentrations. To assess the cellular response to the A β oligomers, inflammatory cytokine production by the cells was analyzed through an ELISA (enzyme-linked immunosorbent assay). The results have implications for advancing the understanding of A β oligomer-induced inflammation in the etiology of Alzheimer's disease and establishing a cellular model that can be used to explore potential therapeutics for treating Alzheimer's disease via reducing brain inflammation.

Beldyk, Julia

Mentor(s): Mrs. Maegan Gudridge

Empowered Women Empower Women

During the fall of 2019, I had the opportunity to serve as a Panhellenic Recruitment counselor, also known as a Pi Chi, during sorority recruitment. In the spring semester before recruitment, all Pi Chis went through training where we learned the ins and outs of Greek Life, what it means to be a Panhellenic woman, and discussed ways to handle some of the potentially sticky situations that a recruitment with 1,800 women may cause. Through training I was able to meet women in all chapters presents at the University of South Carolina, and was eager for recruitment to start. Shortly later, the ball was rolling, and recruitment was in full swing. I immediately loved each woman in my Pi Chi group and truly wanted each of them to find their home here at Carolina, specifically in Greek Village as I know I had just three short

years prior. Having gone through the process myself, I anticipated what might make some women upset, and also understood when it was appropriate to celebrate. I was faced with many different personalities within my group. Throughout this process, I learned way more than I could have imagined about how to adapt to the present situation. I witnessed first-hand how hard women can be on each other and themselves. I was determined to support each woman as my fellow Pi Chis had supported me, and hoped to teach my group to continue to support themselves and each other. I hope to use these skills that I learned through my experience as a Pi Chi to continue to build women up in my future career in healthcare where women are the minority.

Bell, Kimberly

Mentor(s): Dr. Hilary Lichterman

Stepping Out of My Comfort Zone by Crossing Borders

Ever since I started studying Chinese when I was 12, I knew I someday wanted to study abroad in China and improve my language skills. I was fortunate to be able to spend the fall semester of my junior year of college in Shenzhen, China at the Chinese University of Hong Kong, Shenzhen. I am currently pursuing a minor in Chinese, and I knew that studying abroad in China would not only fulfill my childhood goals, but also achieve professional, and academic goals that I had set for myself. In the future, I would like to work in a multinational corporation as a part of their development team for Asia. Therefore, I knew that my experience studying in China would only further help me achieve my goals. The university in Shenzhen was also focused on innovation and the integration of Eastern and Western teaching styles with courses taught in English. This gave me a greater opportunity to interact with students from China and gain a new perspective on innovation and entrepreneurship that was completely different than any opportunity I would have been offered at UofSC.

Benjamin, Cassidy

Mentor(s): Prof. Rico Reed

Examining the Importance of Communities and Relationships in Professional Environments

College has proven to be a fulfilling experience where I held various leadership positions and took in-depth looks into topics surrounding my Political Science major and Women and Gender Studies minor. Through these experiences I was able to take away a few key concepts that I can translate to my professional career as well as other communities I am a part of. These concepts include creating opportunity, building community in professional environments, and adapting leadership to cultural shifts. In my presentation, I take a look into these key concepts while relating my experiences from within and beyond the classroom. My goal is to look at the importance of using leadership to ensure the success of not only ourselves but the lives of others around us.

Bennett, Andrew

Mentor(s): Dr. Carolyn Banister

Novel Genetic Markers for Adverse Reactions to Fluoroquinolones

Fluoroquinolone antibiotics (FQ), consisting of ciprofloxacin, levofloxacin, and moxifloxacin, are some of the most commonly prescribed antibiotics. FQs had roughly 22 million prescriptions in the United States in 2015. These drugs are known to have neuropsychiatric adverse effects, referred to as Fluoroquinolone Associated Disability (FQAD). A preliminary study investigated the DNA of 25 FQ-affected patients through whole-exome sequencing and found that 13 subjects had genetic markers for one specific gene related to drug metabolism. These genetic markers were identified through Polymerase Chain Reaction (PCR) methods which amplify small sections of DNA. A follow-up study has begun and is currently in the process of collecting data from 100 samples. If consistent, the presence of a genetic marker will allow for

screening for at-risk individuals for adverse reactions to FQs. It is unknown to what extent the markers exist in the world population, but the FDA has received more than 60,000 reports of adverse reactions since the 1980s up until 2015 in the United States alone. This is a summary of all findings leading up to the ongoing followup study.

Benton, Donzelle

Mentor(s): Dr. Claudia Grillo

Regulation of food intake and neuronal activation following intranasal leptin administration

Leptin is an adipocyte derived hormone involved in the regulation of body weight, food intake, and energy expenditure acting on leptin receptors expressed in the Central Nervous System (CNS). Since obese individuals accumulate adipose tissue, they develop hyperleptinemia and consequently leptin resistance, which are thought to be caused by alterations in leptin receptors or by an inability of leptin to cross the blood brain barrier (BBB) to reach the CNS. Intranasal (IN) drug administration bypasses the BBB, allowing compounds to directly access the brain and avoid first-pass elimination via the liver. We hypothesized that IN leptin administration will reduce both food intake and bodyweight. Since leptin has shown to have precognitive and antidepressant effects, we also hypothesized that IN leptin would increase neurogenesis in the hippocampus, the main brain area involved in memory and learning that is profoundly affected by depression. In order to test our hypothesis, we treated the rats with 25 μ L of either leptin solution (0.2 mg/kg bodyweight) or 25 μ L vehicle for 7 days, and we measured food intake and body weight daily. At the end of the treatment, animals were intracardially perfused with 4% paraformaldehyde 2 hours after IN leptin administration. Brain sections were stained for doublecortin (DCX), a protein expressed by immature neurons, using immunohistochemistry. Plasma levels of leptin from the first and last day of treatment were analyzed by ELISA. Leptin treated animals did not show any significant increase in plasma leptin levels, indicating that IN administered leptin did not leak into the periphery. IN leptin did not cause a significant decrease in bodyweight and elicited a significant transient decrease in food intake on the first day of treatment, but no significant effect on the last day of treatment was observed. DCX expression in the dentate gyrus of the hippocampus was significantly lower in leptin treated animals compared to vehicle treated animals. Conversely to our hypothesis one week of IN leptin treatment decreased neurogenesis.

Betancourt, Andrea

Mentor(s): Mrs. Maureen Grewe

Peer Leading and Learning

University 101 and the First-Year program not only promoted academic and personal growth and success, but cultivated my confidence and leadership skills. Through the peer leader program we were able to pursue philanthropic causes, develop both personal and professional relationships and grow; together. One of the most prominent roles I took on at the University of South Carolina was my time as a peer leader. Serving as a peer instructor to a University 101 class of 19 students was something I will forever cherish. I learned how to command a room, present myself as both a friend and an authority figure, think critically, promote diversity and inclusivity and so much more. My presentation will discuss in detail the insights I gathered about engaging with not only my students but with everyone around me, as well as the impact of being part of the First-Year program had on shaping who I am today.

Bhamani, Sabah

Mentor(s): Dr. Susan Steck, Dr. Mike McCall

Association Between Anxiety and Diet in College Students: Potential Mediation by Gut Microbiome

Anxiety is the most prevalent mental health disorder yet is typically not given the same level of medical

attention as other health related conditions due to subjectivity in diagnosis and presented symptoms. It is estimated that 64.3% of US college students felt overwhelming anxiety at any time in 2018 while 22.3% were diagnosed/treated by a mental health professional. Anxiety can have a negative impact on students' academic progress and needs to be addressed on a larger academic scale. The purpose of this study is to review the literature on diet and anxiety to examine effects of nutrient intake on anxiety symptoms as well as to study the overwhelming presence of anxiety on college campuses. An initial review of current literature suggests that the intestinal microbiome can affect mental processes and may mediate the association between diet and mental health. The chemical implications and definitions of anxiety are studied to better define the problem. Diet and anxiety are also holistically studied to understand the relationship between the two with a focus on the effects of specific nutrients (e.g. fats and caffeine) as well as the gut microbiome on anxiety symptoms. Preliminary research shows that increasing variety in diet as well as reducing sugar and fat intake can have a positive effect on mental wellbeing and anxiety levels.

Bishop, Ana

Mentor(s): Dr. Erin Meyer-Gutbrod

Examining patterns in fecundity variation between individual North Atlantic right whales

This study aimed to analyze fecundity variations in North Atlantic Right Whales (NARW) based on multiple variables including matriline, habitat usage, age, and calf survival probability. The NARW is a critically endangered species, and understanding factors that potentially drive fecundity variability could be a major step in advancing knowledge of how to protect NARWs in the future. Sighting data collected with aerial and boat samples from the North Atlantic Right Whale Consortium was used to create a calving index for the whales. This index was calculated by dividing a whale's total calves birthed by the whale's total time being a reproductive adult, to create a uniform parameter for comparing each whale's fecundity. Furthermore, case studies of three significantly fecund females (>6 calves) were conducted to analyze factors that potentially contributed to their success. The results of this project are still being developed, but preliminary results show that there is a significant difference between the age and fecundity of whales who differ in certain aspects of their habitat usage. Recent survey data has shown a habitat distribution shift; some individual NARWs have begun consistently visiting the Gulf of St. Lawrence, instead of conducting their usual trip to the Gulf of Maine. Analyzing the fecundity of whales associated with this trend may help to identify environmental drivers explaining this phenomenon. Further research will determine if specific matriline are more successful than others, whether whales born in various decades were more or less reproductively successful, and what factors made certain females who were very fecund so successful. I hypothesize that various matriline can be categorized into high, moderate, or low fecundity groups, potentially indicating a relationship between the mother's and offspring's fecundity. The results of this study have the potential to be a significant addition to the body of knowledge on NARW behavior and reproduction, and with low calving rates of NARWs in the past seven years having a major role in the species' decline, understanding more about what contributes to these historical lows could be a critical step towards guiding effective protective policies.

Blottenberger, Jacob

Mentor(s): Dr. Sourav Banerjee

Quantifying Material Memory

All materials have a working "memory" that remembers the type—and amount—of loading these materials have experienced in the past. Theory holds that this memory can be accessed to help predict when a material will break, which is helpful in a variety of Material Engineering Fields. For instance, aerospace engineers will be able to pick the best rocket panels from a large sheet of bulk material. Because of this, NASA has funded this research project in hopes of quantifying this "material memory" phenomenon (the existence of which has already been evidenced in previous research).

The process of quantifying material memory goes as follows. Twelve unidirectional (UD) composites were created and then sanded down to expose the UD fibers. These specimens were then separated into two groups: group 1 experienced mechanical loading via an MTS machine followed by thermal loading via an oven and ice-bucket system, while group 2 experienced thermal loading followed by mechanical loading. Current material memory theory holds that the final state (state function) of these groups will differ after experiencing the same amount of total loading. However, monitoring and recording the path function of these specimens will provide the numerical data on how much, and at what rates, material memory influences material degradation. Between cycles of thermal and mechanical loading, a SAM machine will scan the specimen and record the time it takes for back waves to travel to and from its transducer. This data will quantify internal imperfections (material degradation) based on different loading patterns. To further reduce variables, two frequencies were used in mechanical loading (3 hertz and 5 hertz). Once the data is gathered (at a microscopic level), the effect that loading order has on degradation will be identified and quantified via a mathematical relationship. While the experiment is still in progress, working data is showing that the most recent batch of specimens are identical enough for experimentation, and that the glue used to attach tabs to the specimen (for loading in an MTS machine) is not a factor. Furthermore, emerging state function data points to the existence of material memory.

Boatwright, Jackson

Mentor(s): Dr. Kelly Goldberg

The Homo antecessor: A human ancestor.

Almost 1 million years ago, in the heart of what is now Western Europe, “the boy of gran dolina” was thriving. His life probably consisted of a lot hunting deer with his community. Transporting and sharing the food so that his family would be able to eat. His body was covered in scars and other signs of trauma, suggesting that ritual and ceremony could have been an integral part of his life. He was probably very familiar with cannibalism. Using archeological findings, I will explore more of his life and how his physical self contributed to his role socially. In learning more about the Homo antecessor, I hope that we will be able to appreciate more of our own culture and the world around us.

Boggs, Jill

Mentor(s): Prof. Stanley Dubinsky, Prof. Michael Gavin

The plight of Tajikistan’s Pamiri population and their search for recognition

The development of language rights plays an important role in analyzing the evolution and resolution of ethnolinguistic conflicts. Understanding the significance of language provides valuable insight in determining how and why conflicts develop between different groups, where language can serve as a marker of religion, social background, ethnicity, educational background, and political affiliation. Ethnic conflicts are complicated and amorphous subjects, and language remains an effective method of identifying differences in individual identity and group self-perception. This case study outlines the development of ethnolinguistic conflict in Tajikistan between the Pamiri minority and ethnic Tajik majority as part of a larger project that provides an accessible online resource for the public cataloguing ethnolinguistic conflicts. For centuries, the Pamiris lived in relative isolation in Tajikistan’s mountainous Gorno-Badakhshan province until their assimilation into the Soviet Union in the twentieth century. Rather than the Russian and Persian languages that are spoken by ethnic Tajiks and dominate Tajik politics and society, Pamiris speak several related Eastern Iranian languages. These typically lack written forms and are referred to as Pamiri languages. Pamiris suffered under Soviet governmental policies, including forcible resettlement in the 1950s, the elimination of Pamiri languages in schools in favor of Russian or Persian, and proposed 1989 legislation that advocated limiting Pamiri languages’ use in legal, governmental, and business proceedings. During the 1980s and 1990s, tensions grew between the Pamiris and the Tajik government while passive social discrimination against Pamiris continued, contributing to a Pamiri separatist movement

in the 1980s and 1992-1997 civil war. Today, tensions remain between Pamiris and Tajiks, who remain suspicious of the Pamiris' separatist history. This is compounded by the government's refusal to recognize the Pamiri ethnicity or language, further disenfranchising an already disadvantaged group. A range of academic and news publications were used to compile this case study, which involves the suppression of the Pamiri minority by the dominant Tajik ethnicity and emphasizes the role language rights played in the conflict. In addition to writing on the historical and linguistic backgrounds and events, several contemporary anecdotal stories are included to humanize the conflict and demonstrate its modern-day impact.

Bongalonta, Ian Jef

Mentor(s): Dr. Vitaly Rassolov

Development of Computational Models for the Rational Design of Mercaptocarborane Structures

Closo-carboranes are a class of molecules which consist of dodecahedral boron cages with two adjacent vertices substituted by carbon. They demonstrate three-dimensional aromaticity as a result of the non-classical bonding, resulting in bond length equalization, robust stability, and versatile ability to accept substituents. These physical characteristics give them great potential in the development and synthesis of novel materials with various tunable properties. Two structural isomers of o-dimercaptocarboranes, which are carboranes with two adjacently attached thiol groups, have shown a significant empirical difference in pKa. The purpose of this study is to develop a computational model for the appropriate representation of this difference. A triply parametrized thermodynamic cycle was derived to calculate a set of parameters based on the bond energy in vacuum and difference between solvation energies. These parameters were calculated using a set of molecules with similar structure and functional groups, including thiol groups and aromatic rings. Simulations using one explicit water molecule under the Langevin Dipoles solvation model have yielded parameters which accurately portray the difference in pKa between the two isomers. Future steps are currently being taken to improve the numerical accuracy of the model.

Bonner, Brynn

Co-Author(s): Matthew Osborn

Mentor(s): Dr. Brian Parr

Quantifying Physical Fitness and Functional Fitness Deficits in Adults

Over 30% of the United States adult population is obese, and 60% are overweight. Obesity is defined as a body mass index (BMI) of greater than 30.0 kg/m² and is associated with a higher risk of diabetes, heart disease, and some cancers. It is also associated with lower physical function, impaired core strength, and poorer health-related quality of life in middle and older-aged adults. Poor functional fitness may also be associated with lower physical fitness, especially with obesity. In a previous study, we established a relationship between physical fitness (strength, endurance, and flexibility), physical function (balance), and functional movement (Functional Movement Screen, FMS) in young adults. In this study, we found that traditional fitness tests of flexibility, muscular endurance, aerobic fitness, and some measures of physical function and functional movement were lower in obese young adults than young adults with a normal and overweight BMI.

The purpose of this current study is to identify deficits in physical fitness, physical function, and functional movement in adults. Body mass index, physical fitness (muscular endurance, muscular strength, and flexibility), physical function (balance), and functional movement (FMS) were measured in male and female subjects between 25-65 years of age and varying BMI (normal, overweight, and obese). Muscular endurance was measured by push-up and sit-up tests. Muscular strength was measured by a one-rep maximum (1-RM) bench press, 1-RM leg press, and handgrip. Flexibility was measured by the traditional sit and reach test, and aerobic fitness will be assessed with a 12-minute walk/run test. Functional fitness tests include core strength with a timed plank, physical function with a Timed Get Up and Go test (TGUG),

and dynamic balance with a Star Excursion Balance Test (SEBT). A Functional Movement Screen will determine the overall functional movement capacity.

Boswell, Emma

Mentor(s): Dr. Myriam Torres

Consequences of Sexual and Relationship Violence Amongst American Teenagers

Sexual assault and relationship violence (physical and sexual) are chronic, global issues, particularly for women and girls. These traumatic events are associated with immediate and long-term consequences, especially in regard to the mental health of survivors; these experiences are associated with a higher risk of suicide in teenagers (Cash & Bridge, 2009). Using the results from the CDC's 2019 YRBS questionnaire, this investigation attempts to better quantify the association between sexual assault and poor mental health via bivariate analysis and multiple logistic regression. The conclusions drawn from this study are particularly important because of the lack of similar studies; there are very few studies conducted with the same methodology at the national level. The large sample size and variety of questions allow significant conclusions to be drawn about the association between variables while recognizing the potential impact of confounding variables shown to affect mental health, including bullying, being LGBTQ+, and substance abuse. Differences in this association between the sexes and ethnicities are also being examined, as previous studies have shown that these populations are more likely experience sexual assault (Silverman, Raj, Mucci, & Hathaway, 2001; Cavanaugh, Messing, Del-Colle, O'Sullivan, & Campbell, 2011). Early results from the 2019 YRBS indicate that 8.2% of the respondents reported experiencing dating violence in the year before the survey, while 10.8% experienced sexual violence from anyone. Both dating and random sexual violence were higher amongst female respondents, and Hispanic respondents were more like to experience both forms of dating violence and sexual violence by anyone (Basile et al., 2020). 8.9% of the respondents attempted suicide, while 18.8% seriously considered it in the year before taking the survey. Females were more likely to seriously consider or plan a suicide attempt, and white, Hispanic, and African-American females were all about equally likely to seriously consider it (Ivey-Stephenson et al., 2020). Black, non-Hispanic respondents were more likely to have attempted suicide than their white or Hispanic female peers or any race/ethnicity of males (Ivey-Stephenson et al., 2020). With the results from this investigation, we will develop recommendations to establish programs that address the consequences of violence in adolescents.

Bowman, Alyssa

Mentor(s): Mr. Timothy Lewis

Mentorship and Collaboration: My Orientation Leader Experience

Each student who decides to enroll at the University of South Carolina is required to attend a New Student Orientation session. When I attended my freshman orientation, I created a bond with my Orientation Leader that made me more comfortable and prepared for college. I decided to apply to be an Orientation Leader my freshman year because I knew that I wanted to have an impact on incoming students and help Carolina to feel like home for them the way that it does for me. I was a part of the Orientation Team for the summer of 2018, 2019, and 2020. The Office of New Student Orientation gave me the opportunity to become a peer mentor for incoming students and make deeper connections with my peers at the University. I was also given the opportunity to become a mentor to new Orientation Leaders. In this role, I helped lead and guide the Orientation Leaders through their experience. As a mentor, I learned more about caring for others within a team and the strengths and leadership style I bring to the team. Working in a collaborative team allowed me to grow in my leadership abilities, communication, and decision-making skills. These skills will be put to use in my future as an educator as I will be working collaboratively with my colleagues and developing similar skills in students. Each of the skills that I have gained from my time as an Orientation Leader have prepared me for my future career as an educator along with the knowledge

I have gained inside of the classroom.

Boyt, James

Mentor(s): Dr. Susan Richardson, Mr. Tareq Aziz

DBPs Due to Pollen: More Than Just a Runny Nose

The disinfection of drinking water is considered one of the largest modern achievements in public health. Drinking water plants use disinfectants, such as chlorine, to disinfect water by killing any harmful pathogens that may be present. While this process helps make water safer to drink, the chemicals added form harmful byproducts known as disinfection byproducts (DBPs). DBPs are associated with adverse health effects, such as bladder cancer, birth defects, and miscarriage. While only eleven DBPs are monitored under the U.S. Environmental Protection Agency regulations, hundreds more exist and go unmonitored, despite the known toxicity of many of these. DBPs are an important health and safety problem today, and are present in all of the disinfected water we drink.

DBPs are formed when common disinfectants react with organic material found in source water. Pollen is composed of a large amount of organic material, primarily amino acids, triglycerides, and phospholipids, all of which can be precursors to DBPs. Because of the structure of pollen, it can be assumed that the addition of pollen to local river waters would lead to an increase in DBPs found in water that has been treated by nearby drinking water treatment plants. During the Spring season, our lakes and rivers are saturated with pollen. Although this saturation of water sources with pollen is well known, and the correlation between organic compounds and DBP production is clear, no previous studies have ever been done to find a relationship between pollen and DBP production. A deeper look into the effect that pollen has on our drinking water is necessary, as it is important to know how water disinfection should change and adapt with the environment. Without looking more into the seasonal changes of the composition of our water systems, disinfection plants run the risk of generating unsafe levels DBPs that nobody is testing for. In this project, we seek to determine the identity and concentration of DBPs formed in pollinated waters, and compare these DBPs to those of unpollinated water to understand exactly how pollen affects the formation of DBPs in drinking water.

Bradley, Tyneisha

Mentor(s): Dr. Nathan Hancock

Identifying the Location of ORF1 and TPase Proteins in Arabidopsis

Transposable elements are DNA sequences that can move around within the genome of an organism, causing mutations. The transposable element that will be used in this project is mPing. mPing is mobilized by ORF1 and TPase proteins from the Ping and Pong elements. Prior localization results in yeast showed ORF1 appearing in the nucleus while TPase was primarily found in the cytosol. The goal of this project is to locate the ORF1 and TPase proteins in *Arabidopsis thaliana*. A construct previously designed by the Hancock lab will be used to express the Pong TPase:GFP protein. I have cloned the ORF1 SA1 gene into pEG104, which adds the YFP protein onto the N-terminal of ORF1 (YFP:ORF1). These constructs will be transformed into *Arabidopsis thaliana* and visualized by confocal microscopy, allowing us to determine their location within the cell. It is expected that the ORF1 SA1 protein will be found in the nucleus and we will be able to assess how the presence of ORF1 effects the location of the TPase protein.

Bradley, Zhané

Mentor(s): Ms. Payge Jennings, Ms. Anuja Parikh

Interning Abroad During a Pandemic

I spent the first half of my junior year preparing to spend the summer studying abroad in Ghana, not knowing that a global pandemic would soon come and change everything. Despite having to cancel my

study abroad trip, I was elated when I discovered that I was still a recipient of the Benjamin A. Gilman International Scholarship. With this grant, I decided to pursue a safer international opportunity: a virtual global internship. I spent six weeks as a Digital Media intern with L.I.F.E. Argentina, a nonprofit organization based in Buenos Aires, Argentina. They aim to provide recreational, educational, and social activities to youth living in socially marginalized and impoverished areas of Argentina. Through this experience, I was able to apply the knowledge acquired from my visual communication studies by redesigning L.I.F.E.'s branding image. Working with a team of on-site organizers has also taught me how cultural difference impacts communications. Culture plays an essential role in every sector of society. To successfully work in an intercultural environment, regardless of the field or industry, one must have the following skills: adaptability, open-mindedness, self-awareness, and the ability to deal with ambiguity. These are all skills that I have strengthened through my internship experience, all of which have made me a better intercultural leader. Through weekly cultural debriefs, I also learned that creativity and culture are of central importance in Buenos Aires, both in terms of identity and from an economic point of view. However, their cultural sector was one of the hardest hit due to the COVID-19 pandemic. Learning about this has started my interest in creating and promoting sustainable solutions for global creative and cultural communities. This internship has shown me how creative work can contribute to the future of the well-being of organizations and underserved communities.

Brewton, Tai'Asiyah

Mentor(s): Ms. Maureen Grewe

Practicing Today to Become a Better Physician Tomorrow

As an aspiring physician, I have engaged in service learning, career experiences and peer leadership opportunities that speak to my desire to be an understanding, hard-working and compassionate public servant. For a service learning project for Applied Aspects of Nutrition, I had to volunteer with a food assistance organization whose purpose was to alleviate hunger in the local area to understand the impact of nutrition from a public health perspective. I chose Fresh Start Ministry, a church led organization, which provides meals, foods/snacks, shower access, laundry services, and access to free medical clinical services to homeless individuals and people in the surrounding area in need. This experience solidified the importance of showing kindness and having comradery in our communities & the positive impact of community involvement.

My career experiences are that of a lab assistant for four years and a Building Operations Assistant. As a lab assistant, I became familiar with biomolecular terminology and research techniques by observing the process of conducting research projects from beginning to end. This work experience opened my eyes to pursuing biomolecular research as a graduate student. As a building operations attendant, I am responsible for ensuring that clients have effective and efficient meetings/events which cater to their purpose. We prepare for and set up events & meeting areas to client specifications and provide all necessary equipment. I frequently engage in conflict resolution and problem-solving among coworkers & clients, which was rather unexpected. Engaging in these skills daily has helped me improve these skills and become an effective communicator, which are applicable skills in everyday interactions, personal relationships, and professional settings.

Through my peer leadership experience as a peer mentor for the TRIO Opportunity Scholars Program I was able to mentor incoming freshmen who were first-generation college students like myself. I had several occurrences where a mentee was having a hard time adjusting to college and learning to handle failure. I was always willing to share my experience with academic failure and offer advice in hopes that I could encourage them to keep chasing their aspirations.

Briggs, Reagan

Mentor(s): Dr. Brie Turner-McGrievy, Ms. Christina Chauvenet

Relationship Between Stress, Food Insecurity, and Eating Behaviors Among African American Adults

Background: Stress and food insecurity can affect an individual's eating behaviors. Studies have shown maladaptive eating behaviors are associated with increased prevalence of obesity.

Purpose: The purpose of this study is to measure food insecurity and perceived stress among African American individuals to examine the association with diet disinhibition, susceptibility to hunger, and cognitive control.

Methods: African American adults in the Columbia, SC area were recruited and completed surveys for the NEW Soul study at baseline. Measures included the Perceived Stress Scale (stress), the U.S. Adult Food Security Survey Module (food insecurity), and the Three-Factor Eating Questionnaire (diet disinhibition, susceptibility to hunger, cognitive control). With regard to the Three-Factor Eating Questionnaire, dietary disinhibition is defined as the loss of control of food intake, susceptibility to hunger refers to sensitivity to hunger cues, and cognitive control is the degree of restraint involved in food consumption. Regression models were used to assess the relationship between stress, food insecurity, and the Three-Factor Eating Questionnaire, adjusting for age, sex, and education.

Results: Based on survey results from the NEW Soul study participants (n=159), no significant associations were found between cognitive control and disinhibition with stress and food insecurity. However, stress and age were found to be significant predictors of susceptibility to hunger. A one unit increase in perceived stress was significantly associated with a 0.151 increase in susceptibility to hunger score (p=0.001). Every one year increase in age was significantly associated with a 0.051 decrease in susceptibility to hunger score (p=0.040).

Conclusions: This study examined the roles that stress and food insecurity may play with eating behaviors among African Americans. These findings indicate that younger individuals and those with higher perceived stress may be more susceptible to hunger cues. This suggests the need for further research into the relationship between age, stress, and eating behavior. More knowledge concerning this relationship will help to better develop interventions concerning obesity among African American adults.

Brock, Jacob

Mentor(s): Dr. Timothy Mousseau

Determining Habitat Preferences for South Carolina Species Using Motion Triggered Camera Traps

Different species of animals prefer living in and using different habitats, depending on a number of factors and trade-offs that are specific to each species. Determining the habitat preferences of different species of animals and the characteristics these habitats have is vital for conservation efforts to target places that may have the greatest effect. Having information on the habitat preferences of mammals will also assist continuing ecological and camera trap research in the area. This research was done to determine the habitat preferences of mammals in McCrady South Carolina Army National Guard (SCARNG) Training Center and identify which habitats each species prefers. To find the habitat preferences of the species in McCrady SCARNG Training center, data accumulated from motion triggered camera traps placed throughout the area were used. The images from these camera traps were collected and recorded with species and location data. Landsat 8 satellite imagery for the area was used to characterize the habitats in the SCARNG Training Center. Using mapping and GIS software, camera trap species data was analyzed to determine habitat preferences. Habitat preference and characteristics for several species inhabiting the McCrady

Training Center was determined using this data.

Brock, Jansen

Mentor(s): Prof. Holly Crocker, Prof. Kristina Grob

Greek Life - Best Decision on Earth

When I decided to attend the University of South Carolina I instantly knew I wanted to be a part of Greek life. I thought this would be a good way to make friends and it would be something to get involved with on campus early on as a freshman. I was unaware of what benefits I would soon gain in my next three years. My freshman year I became a part of Pi Beta Phi sorority. Through Pi Beta Phi, I have enhanced my leadership skills, developed friendships with people all over the United States, and became a part of something that was bigger than myself. My second year in Pi Phi, I became the Director of Housing for the sorority. I went through an interview process and was voted into the DH position by my peers. I was responsible for overseeing the everyday use of the chapter facility, enforced chapter bylaws, and served as the chapter's liaison between chapter members and Greek House Chefs, our food service provider. During my presentation I will demonstrate the positive impacts that Greek life has had on my time here at U of SC.

Broome, Samantha

Mentor(s): Dr. Elizabeth Easley

Mentorship Results in Leadership

Mentorship impacts the development of a leader. Throughout my undergraduate journey, I had many mentors from fellow peers to professors. As a Peer Advisor at Lancaster (PAL), I had the opportunity to connect with many students at different levels in their college journey. This role also granted me the opportunity to receive peer mentorship from a senior nursing student. In my Psychiatric Mental Health Nursing course, I learned that therapeutic communication is the purposeful use of communication to build a trusting relationship. In nursing, it is used to create a rapport with patients. However, this concept can be used outside of nursing to develop connections such as in my relationship with my mentor. As a result, a newfound confidence was instilled in me that helped me grow as a leader. The leadership qualities of my peer mentor, such as active listening and maintaining a non-judgmental perspective, are ones that I strive to exemplify. As a senior, I have transitioned from the mentee to the mentor for newer PALs and other USCL students. My goal is to develop relationships that will stimulate personal and educational growth in my mentees. In my role as a mentor and a student leader, I strive to help my mentees find their identities on campus. I communicate with them opportunities that will promote and enhance their leadership skills. I have also learned that serving as a mentor and a mentee can occur simultaneously throughout life. Even though I serve as a mentor among my peers, I still seek mentorship in other aspects of my life where I need guidance. After graduation, I will transition back into a mentee role as I begin my nursing career. I will actively seek mentorship, from my fellow nurses to help guide me in my clinical practice. Through my previous experience as a mentee, I learned that I must be honest with my mentor when I need help. Asking for help takes confidence and humility, which are values that I have learned from my previous mentorship and leadership experiences.

Brown, Khalaya

Mentor(s): Dr. R. Mac Jones

Applied Behavior Analysis Therapy versus Complementary and Alternative Medicine: Do they measure up?

Applied Behavior Analysis (ABA) Therapy was founded by Dr. Ivar Lovaas in the 1980s. ABA therapy has since become the most widely used form of therapy for children with Autism Spectrum Disorder (ASD). In recent years, another form of treatment has become increasingly popular to help control the symptoms of

ASD: Complementary and Alternative Medicines (CAM). This study examines the literature on the perceived effectiveness of both ABA therapy and CAM, with the aim of constructing a comprehensive set of measures that can be used to adequately compare the effectiveness of two.

Brown-Campbell, Rylei

Co-Author(s): Layla Dorn

Mentor(s): Prof. Marius Valdes

Winners By Design: Student Athletes Alter Ego

In 2019, Professor Marius Valdes organized a teaching/research project to provide experiential learning for graphic design seniors and women student athletes of UofSC Soccer by having them collaborate to create a unique design project that was exhibited at one of the top soccer venues in college sports, UofSC's Stone Stadium. Our purpose was to creatively visualize student athlete's passions beyond soccer in a publication that will deliver a fresh perspective of our research using a familiar format, a broadside newspaper, but in an unexpected manner. How can we research, visualize, and portray a different perspective of a diverse group of female student athletes to the community by exploring their passions and interests beyond the sport of soccer through graphic design? As the primary investigators, we took the design lead on this class project and acted as the "creative directors" of the project, meaning we were responsible for creating a design system for the publication that would unify 16 different compositions into one thoughtful and well-designed publication. With each design student interviewing one of the 16 players from the women's soccer team and with a class competition held for the design of the cover and the center 2-page spread, we were able to successfully combine original imagery with professional level typography. Our project allowed student athletes to express who they are beyond the soccer field and serve as role models and examples to the community. Additionally, this creative initiative builds upon a solid but new relationship with the UofSC Women's Soccer Team and graphic design students and builds an innovative and creative partnership between art and athletics.

Brucato, Morgan

Mentor(s): Ms. Jordyn Brucato

Carolina Community

Volunteering within the community has a critical role in fostering personal growth, promoting success in academics, establishing relationships with not just your close peers, but those outside your circle, and encouraging leadership. At the University of South Carolina, my most momentous role has been my compassion and determination to serve the outside community in numerous ways. Becoming a U101 Peer Leader, a volunteer at Prisma Health and substantially more leadership positions where I volunteered my time has greatly enhanced my experience. It has allowed me to seek excellence, learn about the others around me, and cultivate my leadership skills. Through these volunteer positions, I learned how to remain ethical and unbiased, accurately communicate and interact with individuals who identify differently from me. My presentation will outline the insights of the knowledge I acquired throughout my experiences as well as the how the community I submersed myself in has had an impact on my college career and individual self.

Bryant, Dillon

Co-Author(s): Sarah Sellers, Emily Gosnell, Stefano Belmonte

Mentor(s): Dr. Sean Norman

The Hunt for SARS-CoV-2 in UofSC's Campus Wastewater

The Norman microbial ecology lab within the Arnold School of Public Health has been monitoring SARS-CoV-2 abundance in wastewater across the UofSC campus as part of the overall campus pandemic response. During fall and spring semesters, we collected wastewater samples from 10-13 locations

across campus, including resident halls and classroom/office buildings and measured viral abundance using droplet digital polymerase chain reaction (ddPCR). This technology is used to analyze specific RNA markers that are extracted from the virus to track the prevalence of SARS-CoV-2 that is shed by infected individuals into campus wastewater. Composite wastewater samples were collected using ISCO liquid auto-samplers at 30 mls wastewater every 15 minutes over a 24-hour period. Samples were homogenized using a blender and centrifuged to remove solids. The liquid (50 mls) was concentrated to 400 μ L through ultrafiltration using Millipore Amicon filters with a molecular cutoff of 30 kDa. RNA was extracted from 200 μ L of concentrated liquid wastewater using the QIAGEN AllPrep PowerViral DNA/RNA extraction kit. RNA was analyzed through amplification of the SARS-CoV-2 nucleocapsid protein encoding genes, N1 and N2 using ddPCR, which provided absolute quantitation of viral abundance (viral copies per liter wastewater) in the wastewater samples. We have found through our research that there is a trend between the concentration of SARS-CoV-2 in the campus's wastewater and the number of COVID-19 cases presented in each specific housing location. However, the continuing study will provide more data that will be used to further strengthen this correlation and to determine how extrinsic factors may contribute to the viral signal. In terms of practical implementation, as wastewater samples are localized to defined buildings, saliva testing response teams can be directed to areas with high levels of SARS-CoV-2 in the wastewater to potentially mitigate further exposure. The data we collect has the potential to slow the spread of the virus on campus and the surrounding midlands communities because this research is a population-level testing method. This means that the viral load of SARS-CoV-2 can approximate the prevalence of COVID-19 cases without relying on individual testing to identify positive cases.

Bryant, Malik

Mentor(s): Prof. Timothy Lewis

Growth Through Adversity

During the summer of 2019, I was an Engineering Intern with a company named Thorne. Thorne manufactures wellness products akin to vitamins, omega oils, bone, and joint care. In only two months during my internship, I was qualified to complete three critical tasks. The tasks were to continue tracking the number of goods produced. Deciding on any refinements with the refilling process of the apparatuses on the floor. My final task to complete was the process improvement on the assembly of manufacturing machines. As my time ended as Thorne's Engineering Intern, it dawned on me that I gained skills for growth and accomplishments in life. Skills including personal research on the company's regulations and why they are flourishing. The increased ability to report back to senior-level officials with confidence in my research during meetings. Absorbing as much information as possible on how to gather affordable ingredients, produce, and then market the desired products. I reflect the most significant skill to obtain was open, free, and respectful communication. All of those experiences culminated with a direct presentation to over three-hundred workers. That presentation included officials who executed decisions on a more senior-level in the company than me and my intimate group. Challenging my engineering career's individuality. It is not a trivial task to share research and decision-making information coherently with the public. Thorne's mission statement: "To redefine what it means to be well and to continue to push the limits of human potential." What transpired over my USC career and time as an Engineering Intern represents development of a thriving life. Excelling with care and the attention to detail in life for my success. Whether that be reliable, authentic, or well-grounded for premium products. I am a Chemical Engineering major who is from an impoverished neighborhood. It was a great experience learning and interacting with a service that could positively impact the health of my former or following communities. I am transferring my skills to aid children in developing and maintaining improved health standards.

Bryer, Evan

Mentor(s): Dr. Colin Wilder

The Use of Clustering to Clean Early Modern European Book Titles

Clustering is a powerful tool in computer science to group and clean repetitive data. We will analyze multiple existing algorithms and compare their effectiveness in cleaning this data, as well as improving the best performing algorithm through the implementation of spell check system, transforming it into a ranked clustering algorithm. Our data set consists of approximately six million European publication records from 1500-1800, provided by the Online Computer Library Center. These publication records, due to being taken from thousands of libraries over hundreds of years, naturally contains many duplicated records as well as ones with misspellings and typos. Additionally, a title may still be correct, but spelled differently throughout different years, which would still cause problems for querying. By using clustering to group these similar records that are meant to refer to the same thing, we can normalize the data and cause only one version of each title to exist in the data set. Clustering will normally choose the most common value in the cluster to normalize, but by implementing a rank system through spell checking and finding which title has the least amount of spelling mistakes, we greatly increase the accuracy of normalization, ensuring the correct title is the one normalized to the others. We found that, in the most favorable conditions, the accuracy increase due to the ranked clustering doubles the accuracy increase from the best performing generic clustering algorithm.

Burnett, Jacquelyn

Mentor(s): Dr. Stanley Dubinsky

Multilingualism and the Struggle for Linguistic Dominance in Belize

This presentation surveys ethnolinguistic conflicts in the Central American state of Belize and investigates how these impact the country's social, cultural, and educational well-being. It draws on materials developed for an entry in the "Language Conflict Encyclopedia."

Belize, a country with a complicated history of settlement and colonization, has an ongoing border dispute with Guatemala, as well as an extremely heterogeneous population and culture. Key to understanding this complex society is the relationship between English (the official language) and Spanish (an unofficial but widely used language). Research for this presentation commenced with the collection and analysis of data regarding national laws and education policies, political parties and cultural organizations, and pre-existing studies measuring Belizean citizens' attitudes towards both their first language and other languages spoken around them.

I expected to find evidence of language discrimination towards Spanish speakers in education and in the workplace, given that the conflict with Guatemala has heightened fears of "Latinization" and a possible language and cultural shift. However, upon preliminary review, the government of Belize appears to be relatively accommodating of the different languages spoken in the country. Belizean education policies actually promote bilingual education in primary school and allow for education in indigenous languages when necessary. In the judicial system, citizens are constitutionally guaranteed the right to a trial and sentencing in a language they understand.

My findings are significant because language is one of the most important aspects of group identity, and because, over the past few decades, issues of linguistic identity have played an increasing role in domestic and international politics across the globe and have shaped social tensions and conflicts worldwide. Studying these conflicts is essential to a better understanding of past and ongoing disputes and to making better policy decisions with the goal of alleviating or avoiding future language conflicts and rights violations worldwide. The policies employed by Belize and their effects on mitigating language conflict in the state provide useful examples of positive strategies that should be improved upon and cautiously adopted elsewhere in the world.

Burroughs, Kellie

Mentor(s): Dr. Marketa Kubickova

Retail Internship

In the fall semester of my junior year, I was given the amazing opportunity to work as a retail intern for two small business owners in the health and wellness and retail industry. I chose to intern at the Well Collective because their business concept was similar to the type of business I would like to own in the future, which is a fitness boutique. As an intern, I was able to gain firsthand experience about what responsibilities and challenges are associated with owning and operating a small business in the health and wellness and retail industry. I gained insights about financial and managerial tasks that are required of a small business owner as well as possible obstacles and challenges that could occur. This experience was significant to me because I was able to see if this was a career path I would enjoy before taking the leap and investing time and money into starting my own fitness boutique. I also gained many insights which will help me to plan better for my own business in the future and hopefully avoid some obstacles that my bosses encountered.

Burton, Darren

Mentor(s): Ms. Maegan Gudridge

Leadership Through Personal Strengths

During my time at the University of South Carolina, I have had the amazing opportunity to serve as a resident mentor (RM). Resident mentors are traditionally upperclassmen who live with incoming freshman residents to guide them through their Carolina experience. My most significant contribution as an RM has been creating a sense of community in students' lives and advising them on their academic, social, and personal concerns. Becoming involved with peer mentorship has allowed me to learn the true definition of what leadership is. Originally, I believed leaders to be assertive extroverts who live for competition. It was not until I enrolled in University 290 and worked as RM that I realized that a leader's personal characteristics have no exact answer. I discovered that leadership is about believing in who you already are and having the fundamental belief that you can make a positive difference in others' lives. My presentation will discuss the insights I have gained about using my own personal strengths to empower and lead others.

Cabana, Meghan

Mentor(s): Ms. Maureen Grewe

My Time Down Under

In February of 2020 I set off to spend four months at the University of Newcastle in Australia learning about the culture, meeting new people, and gaining invaluable experiences. Although my experience was cut short due to COVID-19 pandemic I was still able to learn and experience a lot. Being an exercise science major I choose to study abroad in Australia, in hopes of learning about how daily life practices can effect a persons health. During my time in Australia I learned that Austrlians lead a much more active and health conscious lifestyle. I found it much more convenient and cheaper to eat healthier than it is in America. I also found that it was uncommon to eat fast food or highly processed foods, the majority of opinions were fresh foods. While I was in Australia one of the courses I took was the Introduction to Nutritional, Physical and Psychological Wellness. In this course we learned that Australia has low obesity rates, low heart disease prevelance, and low diabetes prevelance, this can all be contributed to the healthy lifestyle that is common practice in their culture. My experience helped me get a glimpse at another culture and how health practices differ internationally. I feel that I that my time down under helped strengthen some of the concepts that I have studied throughout my time at college, as well as, letting me experience a healthier lifestyle first hand. In addition to the knowledge that I gained about how healthy

lifestyles impact health outcomes I also experienced some personal growth. I became a more outgoing and learned a lot about adaptability. While every student who studies abroad experiences some level of adaptability my experience tested my adaptability skills in more extreme ways due to the COVID-19 pandemic. I needed to learn how to navigate changing location and cultures as well as having to adjust to a changing world climate. In my presentation I will delve deeper into the insights that I gained during my study abroad experience, specifically what I learned in connection to my future health care career.

Caime, Dawson

Co-Author(s): Jueling Chen, Mark Romba

Mentor(s): Dr. John Gerdes

IIT Promotional Video Team – Capstone

Our group is creating a promotional video that outlines the benefits of the Integrated Information Technology program. This video will be placed on multiple outlets and will allow for students in high school to get an overview of the program.

Callahan, Sara

Mentor(s): Mr. Timothy Lewis

New Student Orientation Changed my Life

One of the first things I did when arriving on this campus in the fall of my freshman year was apply to become an Orientation Leader. This experience is what put the course of my college career on the right path. After weekly training sessions and a two-week intensive training period, we entered into the summer where we served over 6,000 newly admitted students along with transfer students and guests. As an Orientation Leader, I lead several small groups consisting of freshmen and transfer students where I helped them transition into their first year at the University of South Carolina. I did this by giving them necessary tools to succeed in the transition, performing informative skits, and displaying information about the university. These small actions helped change several students' lives.

Being an Orientation Leader made me realize that I wanted to help change people's lives as much as I could, in any capacity. One of the major important principles I learned was to always be positive, no matter the situation. This attribute is important because having someone on a team that people can always count on to motivate and uplift others will help drive the entire team. One of the other important lessons I learned was to take initiative and be reliable when needed no matter what the task. The smallest task helps the entire organization run. Lastly, being an Orientation Leader taught me how to be unapologetically myself, which has made me the happiest version of me. Orientation taught me that I was hired not because I fit a certain role, but because of who I was.

I want others to learn from my experience of how one small act, such as applying to be an Orientation Leader, can completely change one's life for the better. Orientation showed me that I want to change people's lives. I want to be able to influence people through my leadership. This led me on the path to becoming a Public Health major where I am able to do this exactly.

Cameron, Jenna

Mentor(s): Ms. Maureen Grewe

Leadership Through Vulnerability

As a Changing Carolina Peer Leader (CCPL) I have had the opportunity to develop, implement and support initiatives surrounding mental health on UofSC's campus. The negative stigma surrounding mental health is something that I have worked against as a peer leader but have also been impacted by in my personal

life. I am passionate about mental health because of my personal struggle with depression; something I used to keep hidden. The Mental Health Ambassadors program provided me with training on how to share and use my personal experiences to help my peers know that they are not alone, as well as the importance of seeking help. I have had the opportunity to share my story through the online magazine Her Campus as well as through interviews with the Hear Me Out Podcast and the College of Social Work. After each of these experiences I received very touching feedback from my peers who were inspired to seek help or be more open about their mental health. I have been able to utilize vulnerability in other settings as a Body Project Facilitator, an opportunity within CCPL. The Body Project consists of two, two-hour sessions surrounding the topic of body image and how we as college-aged women can combat toxic beauty standards. I am able to share my own experiences with body image and encourage my peers to be open as well. This has allowed for in-depth conversations and very productive sessions. I have found that if I as a facilitator am not willing to share my personal experiences, then the participants are not going to be forthcoming with their stories either. Becoming comfortable with leading through vulnerability has made me more outspoken within the classroom as well, even when I have insight that goes against the norm. In the social work field, it is common to work with groups across different disciplines, and it is essential to be open to sharing your perspective even if it might vary from the expectations of others. This is how meaningful change occurs; we must be willing to be vulnerable and share our thoughts.

Campbell, Sarah

Mentor(s): Ms. Maegan Gudridge

Student Teaching in South Carolina During the COVID-19 Pandemic

In my last year of college, I was placed in an internship at W. A. Perry Middle School here in Columbia, South Carolina. For my internship, I planned lessons, assisted students with classwork, and collaborated with my coaching teacher to create a Long Range Plan for the two-week units I taught. During the eight months I was at the internship site, I instructed around eighty students in the virtual and hybrid modalities in sixth grade World History and seventh grade World Geography. Due to the COVID-19 pandemic, much of my instruction to the students was online which allowed me to learn new and innovative ways to engage students in content and help them become excited learners. As a Middle Level Education major, this internship provided me with the opportunity to network with many middle level educators, as well as administrators, and it also prepared me to confidently enter and instruct students in a middle level classroom in any learning modality in the future. In this presentation, I will discuss how my education classes at UofSC aptly prepared me to adept to student teaching during the COVID-19 pandemic.

Cancian, Olivia

Mentor(s): Dr. Abbi Lane-Cordova

Post-Pregnancy Weight Retention and Endothelial Function

Olivia Cancian, Erin O'Connor, William Tucker, Brooke Wilson, Abbi Lane-Cordova

Introduction. Endothelial function is a measure of the reactivity of the reactivity of the blood vessels and is critical to cardiovascular health. Endothelial function is lower in adults with obesity and improved with weight loss. The purpose of this study was to determine whether endothelial function differed among women who did versus did not retain weight gained during pregnancy.

Methods. Women aged 18-45 who delivered a singleton infant 6 months to 3 years ago and were non-smoking and free from diabetes were included. Post-pregnancy weight retention (Y/N) was assessed via self-report. Height and weight were measured using a stadiometer and a scale, respectively. An oscillometer sphygmomanometer was used to obtain brachial systolic and diastolic blood pressure. Reactive hyperemia was measured with venous occlusion plethysmography as a surrogate for endothelial function.

Forearm vascular conductance was computed as max reactive hyperemia/mean arterial pressure. Differences in reactive hyperemia and vascular conductance between groups were assessed using a two-sample t-test and associations between endothelial function, post-pregnancy weight retention, and current BMI were evaluated using a linear regression model.

Results. Mean age was 33.4 ± 0.7 years, mean BMI was 26.4 ± 0.9 kg/m². There was no difference in reactive hyperemia (10.47 ± 0.84 versus 10.92 ± 0.98 , $p=0.73$) or vascular conductance (0.13 ± 0.012 versus 0.13 ± 0.008 , $p=0.77$) between those who did versus did not lose all the pregnancy weight. BMI was associated with endothelial function, $\beta = -0.41$, $p=0.001$ for vascular conductance.

Conclusions. There was no difference in max reactive hyperemia or forearm vascular conductance between participant who did versus did not lose all the weight from the most recent pregnancy. BMI, not weight loss status, was strongly associated with maximum reactive hyperemia and forearm vascular conductance.

Cantrell, Bryanna

Mentor(s): Mr. Jim Sidletsky

Digital Sculpting in a Virtual Reality Environment

I am a digital artist specializing in the creation of 3D character models for use in video games, animation, and visual effects. I applied for the Magellan Grant to research the capabilities of sculpting in a virtual reality environment. The goal of this project is to discover if the process of digital sculpting in a 3D virtual reality environment could produce viable results that can then be used to create an animated short and thus be an adequate solution for character creation in the entertainment industry. To accomplish this goal, I worked closely with my mentor, Professor Jim Sidletsky, in order to create two digital characters. One was created using Pixologic ZBrush which is industry standard software. The other character was created with Oculus Medium, later known as Medium by Adobe, a virtual reality program. As expected, sculpting in VR came with a learning curve. I found that at times it was easier to navigate around the object in virtual reality environment rather than using hotkeys and a pen drawing tablet. Getting the level of detail needed to complete the model in a VR environment was a difficult process. Overall, I was able to create a good base to work off but ultimately needed to bring the model into ZBrush to finish it. As the technology for VR advances and more artists have access to the VR environment, VR art design software will be improved and one day may change the way that digital artists work.

Cao, Matthew

Mentor(s): Mr. Jay Pou

The New Zealand Quarantine Experience

In the Spring Semester of 2020, I studied abroad at the University of Auckland in New Zealand as a member of the Moore School's Global Business Innovation (GBI) program. Alongside my cohort (a mix of UofSC, CUHKSZ, and UoA students), we were set to study entrepreneurship and intrapreneurship around the world. This included practical experience such as working alongside a real company as a student consultant to provide research and analysis towards a potential new venture. The Covid-19 pandemic brought along a whirlwind of challenges. I had to decide whether it was safer to return to the US or remain and continue my studies in New Zealand.

Differentiating from the majority of my peers, I chose to stay, and had to learn how to adapt to quarantining in New Zealand. Living alone in a tiny student studio apartment, I studied full-time through online lectures while also consulting for RLB Packaging, a leading New Zealand packaging supplier. However, my most valuable learning point was learning the necessity of a healthy work from home work-life balance in order to maintain mental health and professional success. I additionally gained valuable digital network-

ing and communication to carry forward in my own professional career.

When New Zealand's successful quarantine brought the number of cases to zero, I experienced a sense of normality, something I never thought would be so rare and precious. In traveling the country post-lockdown, I gained a worldly experience of admiring a country that strives to cherish its natural environment and protect its heritage. Each aspect of my study abroad experience, from my first internship in Southeast Asia right before coming to NZ to enduring a pandemic through a team effort made me into a better global citizen. I aim to carry this experience with me as I pursue my own professional career path in International Business.

Caputo, Matthew

Mentor(s): Dr. Abigail Hogan, Ms. Kayla Smith

Eye Gaze and Heart Rate Deceleration as Indices of Attention in Autism

Autism is a neurodevelopmental disorder that is characterized by social communicative and interactive impairments, as well as restricted and repetitive patterns of behavior. There is strong evidence that atypical attention is one of the earliest signs of Autism Spectrum Disorder (ASD), with significantly higher rates of atypical visual attention features identified in infants that are later diagnosed with ASD. In addition to behavioral approaches of studying attention in children, physiological methods have also proven to be a reliable and affordable measure. Heart rate-defined sustained attention (HRDSA) is a well-validated biological measure that analyzes heart rate decelerations to provide incremental information about attentional behavior. The present study compares eye gaze and HRDSA patterns during a social and potentially fear-inducing situation: the Stranger Approach episode of the Laboratory Temperament Assessment Battery. Correlations with Preschool Anxiety Scale (PAS) scores were also examined to address high comorbidity rates of anxiety in ASD populations. Participants included children between 3 and 5 years of age, which comprised typically developing (TD) and autistic (ASD) groups. While the validity of HRDSA is well-established, few studies have looked at heart rate decelerations as an index of attention in autism. Additionally, few studies have examined HRDSA past infancy, leaving gaps in our current understanding of how heart rate decelerations develop into childhood. The results of this study help build on the HRDSA profile of both autistic and typically developing children. Examining these profiles in relation to ASD symptomology and anxiety helps us better understand the physiological basis for these disorders. Since HRDSA is an affordable and portable method that can be utilized as early as infancy, the results of this study may further validate and encourage the use of this measure in early screening and intervention efforts.

Carson, Aliana

Mentor(s): Mr. Timothy Lewis

My Campaign Experience

Elections play an important role in the success of democracy in the United States specifically, political participation of the people is essential to ensuring the prosperity of the government and ensuring that the people are represented within the State. I experienced just how important political participation from every citizen is during my internship with Senator Lindsey Graham's Campaign office. My internship occurred towards the last stretch of his campaign for re-election, and so I was able to experience many of the exciting aspects of working in a campaign. I used my experience as a political science major to contribute financial data entry, assess public approval of the Senator, and work political events such as one for the Republican party put on by Vice President Mike Pence. This internship allowed me to use my various knowledge from political science in areas such as mass media, public knowledge, and most importantly communication. One of the best ways to incorporate the voices of the people into elections is through hearing their concerns during campaign season. I saw just how essential campaigning was for hearing these concerns and addressing them in order to better serve the community. This opportunity

allowed me to gain essential experience and skills in order to achieve my life-long goal of attending law school.

Carter, Melanie

Mentor(s): Dr. Hannah Rule

The Importance of Mentorship During the First Year Experience

Being involved with Student Organizations during college can play a major part in promoting academic success, cultivating personal growth and fostering leadership. During my time here at the University of South Carolina my most significant contribution was my commitment to improving first year students experiences in student organizations. Becoming a member of Greek Life freshmen year greatly enhanced my college experience. This organization provided me with leadership skills and the ability to grow socially and academically. Through the experience of serving as the Vice President of New Member Education and working to rebuild our first-year mentorship program for underclassmen, I learned to adapt to challenges and communicate effectively. My project will discuss the insights I gained about my abilities as a leader and how the first-year experience impacts a college student, as well as the positive impact student organizations such as Delta Zeta has had on my time at the University of South Carolina.

Carter, Christopher

Mentor(s): Dr. Lang Yuan, Mr. Tianyu Zhang

An Analysis of Solidification Conditions in the Simulated Melt Pool of 316L Stainless Steel during Laser Powder Bed Fusion Additive Manufacturing

During the laser powder bed fusion process, metal powders are melted layer-by-layer by a laser to form complex 3-dimensional shapes. During the melting and cooling processes, the material undergoes rapid changes in temperature. The thermal gradient and cooling rate directly correlate to the microstructures developed within the printed material, resulting in changes to the overall physical properties of the material such as strength, ductility, or hardness. Variations in laser scanning speed and power have overarching effects on thermal gradient and cooling rates. In this study, multiple laser scanning speeds and powers of the laser powder bed fusion process are simulated using computational fluid dynamics package, Flow3D, with consideration given to multiple physics models. These models include powder packing, heat transfer, fluid flow, surface tension, evaporation, gravity, and multiple laser reflection. Using the results of the computer models validated from comparisons to experimental melt pool dimensions, the thermal gradient and cooling rate histories were extracted from multiple points within each simulation. The mapping of thermal gradient and cooling rate to solidification maps can pinpoint the 316L microstructures developed at localized areas within each model. Comparing the results from varied laser scanning speeds and powers will provide a better understanding of their effects on the development of part physical properties during the additive manufacturing process.

Carter, Griffin

Mentor(s): Dr. R. Michael Gower, Ms. Candice Cheung

Investigating the Effects of Nanoparticle Delivery to Myoblasts on Differentiation into Myotubes

Sarcopenia, or age-related loss in skeletal muscle mass, affects an estimated 5-13% of adults between the ages of 60 and 70 and 11-50% of adults over the age of 80. The musculature changes caused by sarcopenia can lead to lowered quality of life for patients and higher risk of injury and mortality. This loss in skeletal muscle mass is associated with a decrease in the number of satellite cells, a population of myogenic precursor cells that reside in the skeletal muscle and repair the muscle after heavy use or injury. All-trans retinoic acid (ATRA) is a promising bioactive agent that has been previously shown to enhance differentiation of myoblasts into myotubes. The goal, therefore, was to create an ATRA-loaded PLG NP treatment

that would maximize the repair capabilities of this limited satellite cell population. First, the PLG NPs must be evaluated for safety and compatibility with C2C12 myoblasts.

We hypothesized that poly(lactide-co-glycolide) (PLG) nanoparticles (NPs) would be readily uptaken by C2C12 myoblasts and that PLG NPs would induce differentiation of C2C12 myoblasts into myotubes. In order to test this hypothesis, a cold-binding assay was first conducted to analyze the uptake of fluorescent, coumarin 6-loaded PLG NPs by C2C12 myoblasts. This assay revealed that PLG NPs are internalized into C2C12 myoblasts through cellular uptake mechanisms. Another experiment will be conducted to assess the effect that PLG NP internalization has on differentiation of C2C12 myoblasts into myotubes. The degree of differentiation will be quantified by measuring myotube size and the number of nuclei within each myotube, which indicates how many myoblasts fused to form the myotube. We expect that blank PLG NPs will not affect the degree of differentiation compared to untreated cells.

We also hypothesize that ATRA-loaded PLG NPs will increase differentiation to a greater degree than blank PLG NPs. To assess this, the previously mentioned differentiation experiment will be conducted again, this time assessing the degree of differentiation between cells treated with ATRA-loaded PLG NPs and untreated cells. We expect that cells treated with ATRA-loaded NPs will exhibit a greater degree of differentiation than untreated cells.

Castleberry, Samara

Co-Author(s): John Freeman

Mentor(s): Dr. Pearl Fernandes, Dr. Daniel Kiernan

Effect of Exercise on Heart Rate and Blood Pressure in Student Athletes at USC Sumter

It is well known that exercise is beneficial to health, more specifically cardiovascular health. Several long-term studies have shown that increased physical activity is associated with a reduction in mortality, an effect which is strongly linked to a decline in the risk of developing cardiovascular and respiratory diseases (Paffenbarger et al, 1986). Generally, the normal heart rate of an adult (at rest) is said to be around 60 to 100 beats per minute (Guyton, 2006). Studies have shown that the resting heart rate of an athlete is lower than that of non-athletes of the same age. Regular exercise and/or physical activity causes a reduction in resting heart rate (Huang et al, 2005). The purpose of this study was to see if a difference in heart rate exists between student athletes and non-athletes at USC Sumter. Our hypothesis was that student athletes would have a lower heart rate before and after exercise as compared to students that are non-athletes. An anonymous and voluntary survey was conducted to gather information about the general health and training habits of the student volunteers. All participants had to sign an informed consent. Height, weight and heart rate was recorded before and after moderate exercise on a treadmill for 40 student volunteers (20 athletes/20 non-athletes). Preliminary results support our hypothesis that heart rate will be lower in athletes as compared to non-athletes before and after exercise. An extension of this study also entailed recording blood pressure. Our results indicate that after moderate exercise non-athletes seem to experience a higher deviation from resting blood pressure as compared to athletes. Our results add to the growing evidence of the impact of exercise on the cardiovascular system.

Cerillo, Jessica

Mentor(s): Mr. David DeWeil

Let's Get To Know You!

Since 2018, I have been working as a Peer Consultant at UofSC's Student Success Center (SSC). As a Peer Consultant, we meet with students, in a one-on-one setting who are seeking help with time management, study skills, or exam preparation. We go through curriculums to focus on how to help them succeed in their classes. My experience as a Peer Consultant has greatly enriched my experience at UofSC as a student. I have had the opportunity to help a diverse group of students succeed in college academically and socially. I have developed skills such as, active listening, empathy, and patience since working at the SSC.

When a student comes in for a consultation, it is imperative that we assess the needs of the student. In order to best help the student, it is essential that we try to understand the reasons why they are attending a consultation so that we can tailor the time we have to focus on their needs. In my Introduction to Health, Promotion, Behavior, and Education class (HPEB 300), we learned about the Generalized Planning Model. One of the key steps in this model is “Conduction of Needs Assessment”. A needs assessment evaluates the situation of the problem you are trying to fix and compares the current state to the desired state. Serving as a Peer Consultant for the past 3 years, has reassured my decision to become a Speech Language Pathologist. I am excited to create relationships with my future clients to help them feel comfortable in communicating and succeeding in other avenues of their lives. My presentation will highlight what I have learned from my HPEB 300 class and how I was able to apply it to my work as a Peer Consultant to better help the success of USC students.

Chapin, Mary

Mentor(s): Dr. Meredith DeBoom

Bias in the International Criminal Court?

The International Criminal Court (ICC), which began hearing cases on July 1, 2002, is the only treaty-based, permanent court to prosecute perpetrators of the most heinous crimes. The court was founded primarily for the purpose of prosecuting perpetrators of genocide, crimes against humanity (CAH), and war crimes, no matter the public stature of the individual accused. This was a major step by the international community in the global fight against impunity, but it has not been without controversy. Most notably, the court’s decision to issue arrest warrants for then sitting president of Sudan, Omar Hassan Ahmad Al Bashir, in 2009 was met with significant criticism from the African Union (AU) and its member states. The decision to act on the Bashir case has been criticized as being an overreach of the court’s authority and a breach of Sudan’s sovereignty. This project investigates these criticisms and others in addition to the text of the Rome Treaty, to determine if there is any validity to the claim of the court being biased towards sub-Saharan Africa. It also evaluates proposed reform efforts, such as efforts to increase state cooperation with the ICC and also bolster regional court systems that deal with human rights cases. Finally, the project identifies areas for future research on the relationships between sub-Saharan African states and the ICC.

Chappell, Sarah

Mentor(s): Ms. Maureen Grewe

Peer Leadership

Having the opportunity to lead others is one of the most rewarding experiences and best way to learn about yourself. I had the opportunity to lead others and make a difference at the University of South Carolina in the University 101 Program by becoming a University 101 Peer Leader for my junior and senior year of college. As a freshman I took the University 101 Course to help me navigate the challenges of being a first-year student, and my peer leader guided me through that time. I knew I wanted to opportunity to guide others through the first-year experience, but I did not expect to learn as much about myself and grow as a person as I did. I became more confident in myself, formed strong relationships with my students and co-instructor, and learned how much I enjoy being a leader. I learned to balance the relationship as a peer and a leader, have serious conversations about real issues, but also have fun and create a bond with the class. My presentation will dive deeper into the insights gained from my leadership experiences and the impact I could make on first-year students, as well as the impact The University 101 office has made on myself as a leader.

Chen, Jueling

Mentor(s): Mr. David Dohan

Beyond the Classroom Connection with Internships

Over the duration of two summers, I had the opportunity to work with Savannah River Nuclear Solutions out in Aiken, SC and The Boeing Company out in Seattle, WA. After taking many IT classes, I was able to use my knowledge and take it to a more professional level at my internships. One of my big projects involved a mass amount of data that needed to be analyzed, condensed, and turned into graphs for the use of executives when they review the business case/needs. This exposed to me to analytical skills and taught me how to understand data in a better sense. My second internship with Boeing taught me more IT skills on a business level. A major project I was working on involved using diagrams to create an organized structure of submitted work requests through the engineering and computing department at Boeing. As an IT major, I always wanted to put a heavy focus on IT Business. My internships with SRNS and Boeing really helped me prepare for the skills I needed in IT Business. I had the opportunity to lead meetings, engage in business cases, and create business needs documents. Through all of my experience, I hope to improve not only my career development, but also my personal development so that I can show the best version of myself.

Chen, Andrew

Mentor(s): Dr. Emily Mann

Doctor Knows Best? Clinicians' Approaches to Implementing South Carolina's Immediate Postpartum Long-Acting Reversible Contraception (LARC) Policy

In the past ten years, efforts to reduce the unintended pregnancy rate among economically and racially marginalized women in the United States have focused largely on increasing their access to and use of highly effective, long-acting reversible contraception (LARC). LARC, which include intrauterine devices (IUD) and subcutaneous implants, are contraceptive technologies that are inserted in the body for the purpose of preventing pregnancy for up to 10 years. Both the IUD and the implant require trained personnel for insertion and removal. Efforts to increase LARC access and use among populations at risk for unintended pregnancy are unfolding nationwide. In South Carolina, one initiative is the state's immediate postpartum LARC (IPLARC) Medicaid policy, which facilitates access to and insertion of LARC for Medicaid beneficiaries immediately following childbirth, prior to hospital discharge. This study examined the implementation of this policy from the perspectives of two groups: Medicaid beneficiaries who had recently given birth (n=30) and the clinicians who provide contraceptive counseling and IPLARC access to this population (n=14). Qualitative data analysis of individual interviews reveal that clinicians' approaches to contraceptive counseling with this population involve an enthusiasm for LARC methods over other contraceptive options that often results in them pressuring their patients to use LARC while overlooking or minimizing their patients' concerns and preferences. Although clinicians often regarded their approaches to contraceptive counseling as empowering for their patients, Medicaid beneficiaries found their clinicians' practices problematic because they did not feel they had enough information to make an informed choice about their postpartum contraceptive options and in some cases, felt the timing and style of the counseling was coercive. These findings indicate that clinicians' approaches to implementing the state's IPLARC Medicaid policy does not prioritize patient autonomy or a shared decision making process. Clinicians would benefit from critically reflecting on the assumptions that inform their practices of contraceptive counseling and engage in a more patient-centered approach to contraceptive care in order to improve Medicaid beneficiaries' experiences with the implementation of the IPLARC policy.

Chenworth, Allison

Mentor(s): Ms. Denise Wellman

Accounting is the Language of Business

The summer before my senior year, I had the opportunity to work at Eaton Corporation as a finance and accounting intern, as a member of a financial planning and analysis (FP&A) team located at one of the company's two aerospace division headquarters. During the internship I was able to experience 3 month-end processes, create a fixed asset cycle count for test lab assets and assist on various other projects. I worked with plant controllers located globally and presented my ideas for the cycle count to corporate level leadership in the aerospace sector. While this internship was considered to be nontraditional as an accounting major, it allowed for me to confidently make a plan for my next steps and how to launch a career in manufacturing accounting and finance. This experience taught me that accounting can be used in so many ways within a business setting and it allows us to communicate actual performance, projections and goals within an organization. While a decision or career path may not be the traditional choice for a major, it does not mean that it is wrong, and I hope to share this with other accounting students. I became an advocate for what I wanted to do with my career and how to set myself on the right track to become a plant controller one day. After graduation, I will be completing a 3-year rotational program with Dana Incorporated where I will complete rotations in shared service center accounts payable/receivable, plant operations controlling and internal audit.

Chestnut, McKenzie

Mentor(s): Ms. Theresa Harrison

Everyone is an Environmentalist- they just don't know it yet

During my junior year, I led a UofSC Alternative Break during the fall break with the theme of environmentalism. An alternative break (AB) is a service trip meant to immerse participants in a social issue that is affecting a certain community. I was inspired to lead this AB trip because I wanted to combine my love of community service and environmentalism and to try to impart at least a little of my passion for these topics on others. Throughout my time planning and leading our AB trip, I learned that although people may come from different backgrounds, everyone has a bit of an environmentalist in them, even if they do not know it yet. I believe that although my participants came from different backgrounds, the opportunity to connect over a shared experience and to learn about an interdisciplinary topic such as environmentalism pushed them to grow as individuals. This experience allowed them to integrate new information presented to them into their lives in their own ways. My AB trip participants will be able to use their experiences to guide their future actions as doctors, nurses, businesswomen, and scientists.

Clavecilla, Mira

Mentor(s): Dr. Daping Fan, Dr. Junfeng Wang

Boosting immune cell function in response to breast cancer through the effects of miR-155 OE tumor-derived exosomes

Breast cancer is a disease in which DNA mutations induce the uncontrolled growth of breast cells. Although the body has many immune functions that work to prevent these genetic mutations, breast cancer still impacts 2.1 million women each year and is the second leading cause of cancer-related death in women. Cancer therapy resistance and metastatic processes both contribute to the prevalence of cancer and mortality in women and might be responsible for high rates of cancer recurrence in patients. Tumor-derived exosomes collected from miR-155 overexpressed cell lines were tested to determine if they have the ability to boost immune response to breast cancer through the enhancement of dendritic cell maturation and T cell activation. Exosomes were isolated from miR-155 overexpressed E0771-GFP (control) and E0771-Bic breast cancer cells. Both in vitro and in vivo experiments were conducted in order

verify results regarding boosted immune function at the cellular and pathological levels. This research project investigated the mechanisms through which we can improve this immune response and may provide vital information to supplement immunotherapy research in this field. More specifically, we expect this research to further validate the findings of the Fan Lab at the University of South Carolina School of Medicine and contribute to their study on miR-155's role in breast cancer progression. The ultimate goal of this research topic has been to help improve treatment outcomes in breast cancer patients.

Cloherty, Shannen

Mentor(s): Prof. Timothy Lewis

Shannen Cloherty GLD

Student leadership is the heart and soul of any university, including the University of South Carolina. Within my experiences in student leadership, my most significant contributions have been as a part of the executive committee of my sorority, Zeta Tau Alpha as both the Vice President of Programming and the President. I have been able to build relationships, define my identity, and amplify the voices of others within these roles. Within Zeta Tau Alpha, I learned how to amplify the voices of others in rooms where they are not present, solve problems, and communicate efficiently and effectively. I was able to transform not only myself and my leadership abilities, but also my organization as a whole. Although leading my chapter amid a pandemic, I was able to deal with adversity and eventually make a strong enough impact for us to earn the title of "Exceeds Expectations with Distinction" as a part of our Annual Chapter Expectations. My presentation will dive into my insights on my experience in my greek leadership and how they were able to shape me as an individual as well as create an overall influential college experience.

Collie, Emily

Mentor(s): Dr. April Scott, Ms. Kathleen James

Mental Health Ambassadors and Effective Storytelling in Suicide Prevention

Research has shown that personal storytelling plays a crucial role in suicide prevention. Because of this research, a program called Mental Health Ambassadors (MHA) was created. MHA is a grant-funded initiative sponsored by Student Health Services Mental Health Initiatives department. Ambassadors undergo extensive training to receive certification as an ambassador. Each Mental Health Ambassador has a unique personal story about their experiences with mental health and/or mental illness. We share these stories to normalize asking for support when it is needed, promote emotional wellbeing, and reduce the stigma that surrounds mental illness and suicide. Through Ambassador presentations, listeners will walk away with the knowledge of university mental health resources that are available to them, as well as the understanding that they are not alone, they are supported, and there are people who care about their wellbeing.

My experience as a Mental Health Ambassador has allowed me to take the learnings from my mental & behavioral disorders course and apply them into mental health advocacy across the Carolina community. Concepts, such as understanding various mental illnesses, their warning signs, the stigma around them, and storytelling and having open conversations about mental health, that I have learned within the classroom has optimized my abilities to be an effective Mental Health Ambassador and overall mental health advocate.

Research consistently demonstrates that people are most responsive to advice or education when it comes from someone they consider similar to themselves, this is the concept behind having peer advocates (Davidson et al., 2018). As a mental health ambassador, I apply this research in being a relatable figure that educates and promotes mental health across the Carolina campus. In this presentation, I will be going in depth with the research and evidence-based practices that support the creation and implementation of the Mental Health Ambassadors program as well as how my coursework within the classroom has

enhanced my personal experience as a Mental Health Ambassador.

Collins, Maggie

Mentor(s): Mrs. Sarah Matthews

Working as a Veterinary Technician: Gaining Clinical & Professional Skills During COVID-19

During the summer of 2020 at the height of the COVID-19 pandemic, I served as a veterinary technician in training at the Animalife Veterinary Centers of Naples, FL. The Animalife Veterinary Centers are a network of three private veterinary hospitals focused on preventative small animal medicine. Each hospital has multiple doctors with varying areas of expertise who treat cats, dogs, reptiles, and pocket pets including rabbits and guinea pigs. The hospitals also partner with local non-profits, such as the Shy Wolf Sanctuary and Domestic Animal Services, in order to support their mission of nourishing the human-animal bond in the Naples community. During my experience as a technician, I trained in all three clinics for fourteen weeks under the supervision of six different doctors. I became comfortable in client interactions, surgical monitoring, inpatient care, and routine workups. My tasks included obtaining patient histories, administering vaccinations, monitoring surgeries, running laboratory tests (cytologies, blood counts, urinalyses, fecal analyses), and discharging patients. As a biology major, I was able to translate skills I had learned in the laboratory such as microscopy and sterilization directly to a fast-paced work environment. I also employed many of the communication techniques covered in my psychology courses while interacting with clients in highly emotional, often unpredictable scenarios. Due to COVID-19, I further improved my interpersonal skills by adapting to changing intake protocols and communicating with clients via unconventional formats. This work experience was crucial in solidifying my decision to pursue a career as a doctor of veterinary medicine. I gained first-hand insight into the life of a veterinarian and furthered my appreciation for the nurses and technicians that support them daily. Because I worked during an unprecedented global pandemic, I gained a deeper understanding of the support companion animals provide for their owners. The connections I observed between clients and their pets demonstrated one aspect of the value veterinarians have in maintaining community health and human well-being. This experience allowed me to sharpen my clinical skills, improve my adaptability, and serve my community while strengthening my understanding of my future career.

Collison, Carlye

Mentor(s): Ms. Denise Wellman

Applying Public Relations Concepts and Learning What I Value in the Workplace

During the summer between my junior and senior year of college, I was given the opportunity to intern at Ronald McDonald House Charities Columbia (RMHC) as the Events and Marketing Intern. RMHC is a nonprofit organization that assists families with sick or injured children throughout their medical journey through providing a home away from home. As a public relations student at UofSC, I knew I wanted to gain hands-on experience outside of the classroom to apply what I had been learning in my coursework. Before interviewing for my position at RMHC, I did not know what that would look like, as it would be my first internship in the public relations and communications field. However, I loved my time as an intern so much that I returned to RMHC this semester. During my time at RMHC, I have been able to apply what I have learned in my classes through writing press releases, creating social media content, writing newsletters to donors, assisting with maintaining strong relationships with RMHC's publics, and planning events to benefit RMHC. Because of this experience, I have become more adaptable, strengthened my writing skills, learned about communications in a nonprofit setting, and become more confident in my abilities as a public relations practitioner. Not only this, but my positive experience with my coworkers at RMHC has shown me what I value in company culture and what I want to look for in a job after my graduate studies. Upon completion of my internship in May, I know I will feel prepared and confident to pursue my graduate studies and begin my graduate assistantship position because of my time as an intern at RMHC.

Comandur, Samyuktha

Co-Author(s): Vasco Madrid

Mentor(s): Dr. Colin Wilder

Whole Earth Book Catalog: Applying Computational Methods to the History of Publication

The Whole Earth Book Catalog is a digital humanities project that aims to contribute to a growing body of digital humanities scholarship by providing an analysis of the publishing industry over time. We plan to do this through an initial holistic, topological survey of the data followed by specific case studies of particular topics of interest. Our work has focused on a dataset provided by the Online Computer Library Center, which documents historic publishing data from sixteenth to nineteenth century Europe, collected from libraries around the world. Through our presentation, we hope to demonstrate some of the language processing methods that we have used to clean and process this dataset of millions of records. We plan to show people what we have learned about this era of European publishing through data visualizations and statistical analyses. Moreover, given that this type of study has never been conducted on historic publishing data of this scale, we hope to justify why the use of computational methods for analyzing aggregated data in the humanities can provide a new, significant lens for viewing this period of time. This work is supported by a Magellan Grant from the Office of Undergraduate Research.

Conrady, Jonathan

Mentor(s): Dr. Scott Meek

Effects of Anonymity on Deception

The current study attempted to explore if promise of a monetary reward would create organic deceptive behavior in participants, and whether anonymity further influences deceptive behavior. Forty-eight participants individually engaged in a competitive assessment via E-Prime 3.0, believing that an opponent (confederate) is competing against them to achieve a faster completion time to win a \$10 Amazon gift card. Subjects were randomly assigned to either an anonymous (picture or name of confederate is not shown to participant) condition or a non-anonymous (picture and name of confederate is shown; participants believe that the confederate is aware of their name as well) condition. Following the assessment, participants were initially shown to be slower than the opponent. They were then shown an error screen followed by the initial results screen being presented again but with the relevant completion times switched. Participants were given the option to agree to a new, faster time (lie to win) or disagree (remain honest but lose the monetary reward). Response time (RT) was recorded during the decision-making process. A significant effect was found on choice of deception, in that, monetary reward increased choice of deception across all conditions. No observable effect was found regarding RT. Finally, a trend towards non-anonymity appeared, however, no significant effect of anonymity was found. The current paradigm was successful in creating organic deceptive behavior; however, anonymity did not significantly impact deceptive behavior.

Cordero- Romero, Jennifer

Co-Author(s): Anjali Upadhyaya, Shiv Patel

Mentor(s): Dr. Cheryl Armstead

What the 2008 recession teaches us about COVID-19, debt stress, and obesogenic risk factors among Southern African American women

The pending economic recession associated with the COVID-19 pandemic has disturbing health implications for African Americans in South Carolina. In this state, African American women exhibit extreme racial disparities for obesity, even at higher socioeconomic levels. While exercise, diet, and stress are implicated in obesity, indebtedness-related stress has not been addressed by obesity interventions or infectious disease risk control. It was our objective to examine associations between worries about indebt-

edness, perceived stress, and lifestyle among insured African American women, focusing on weight-related behaviors among a cohort of women experiencing the recession of 2008 from the perspective of risk minimization for COVID-19.

A cross-sectional convenience sample of 135 insured women participated in a thirty-minute internet-based lifestyle survey. The current analyses focus on the responses of ninety-six insured African American female participants.

The mean age of the sample was 44.85(SD= 8.04). Their mean body mass index (BMI), in kg/m², was in the obese range at 32.57 kg/m² (SD= 9.38). After adjusting for age, regression modeling indicated that forty-one percent of variance in BMI was predicted by the frequency of worry regarding indebtedness, the magnitude of debt-related stress, concern about paying off total indebtedness, physical inactivity, and depression. Weight gain in the past six months was not associated with debt stress or income. Twenty-eight percent of the variance in six-month weight gain was predicted by increased red meat consumption, stress, decreased consumption of fruits and vegetables, and depression.

During the recession of 2008, obesity among insured African American women was associated with debt stress, depression, 6-month obesogenic dietary choices, and physical inactivity. During the 2020 financial recession and social distancing periods, it is expected that class 3 obesity will increase markedly among Black women. COVID-19 infection mitigation should include obesity prevention efforts targeting stress, financial debt, a healthy lifestyle, and working at home. Class 3 obesity status is a consistent immunological risk factor for viral infections and respiratory distress. Intervention strategies targeting immune system protection among African Americans women with pre-existing obesity and obesity-related risk factors are necessary. They could further enhance earlier COVID-19 infection, mitigation, and control practices.

Corley, Kennedy

Mentor(s): Prof. Elise Lewis

Knowledge is Our Greatest Inheritance

Creating the opportunity for individuals to reimburse their communities with the knowledge and experience gained is crucial to their success and development. As a student in the Moore School of Business, I was informed of the significance the passage of knowledge has on the ability to improve the economic and educational standing of a community through a study abroad experience in Greece. Many areas of the nation were plagued with a lack of educational support and a limited ability to broaden their exposure. After noticing this trend in my surroundings both on campus and hometown, I began serving as a U101 Peer Leader and a local volunteer in the Junior Achievement (JA) program to promote the academic success and personal growth of my students. Through these experiences, I learned how to effectively lead and engage with diverse groups of people while creatively curating and presenting beneficial lessons. Going forward, I plan to use this insight to establish an educational and vocational program that broadens the scope of my community's ability to invest in our future. My presentation will discuss the insights I have gained about the importance of applying the education one has received to uplift and expose the next generation.

Costner, Caitlin

Mentor(s): Ms. Sarah Matthews

Service and Independence in a Partisan Government: My Washington Semester Program

My goal is to live a life of service, and my interests and talents have brought me to law and politics. I was a member of the South Carolina Washington Semester Program during the fall of 2020. Through this program, students from institutions across South Carolina were selected to live and work in Washington, D.C. The Washington Semester Program provided a means of being in the room where it happens. Laws have real, tangible effects on so many people, and I wanted to help our democratic processes in any way I could. I worked with Congressman Jeff Duncan's office, which represents my home district. Due to the

COVID-19 pandemic, the office operated with a skeleton in-person staff of two to four staff members on any given day, which I was a part of. My title was Intern but due to understaffing I filled the role of Staff Assistant. I was the initial point of contact for the office, speaking to hundreds of constituents on the phone and sorting thousands of emails requesting legislative action. I was also a runner, a notetaker, a newsletter writer, a social media contributor, and an extra hand for whoever needed it. I was there to help. My time in Washington allowed me to help serve the people of my home and learn so much about how our government truly operates. I had worried that my own political affiliation would put me at a disadvantage; the world has become increasingly partisan while I stand firmly in independence. My classes have emphasized the interminable nature of the two-party system, and I have been forced to pick a side time and time again. While in Washington I witnessed the countless pitfalls of intense partisanship and admittedly felt quite stunned at times. Despite all this, I stand reinvigorated in my goal. For each moment of despair there was a stronger moment of joy, and I am encouraged in my career path and reminded of the humanity of it all. Government is imperfect because people are imperfect, but no matter how we divide ourselves, there is always hope.

Cox, Kaitlin

Mentor(s): Dr. Nicole Zarrett

The challenges facing underserved youth: The role of afterschool program staff in supporting healthy development

Adolescents are facing major stressors within their communities, especially in underserved areas. These issues include poor family life, violence in school, obesity, exposure to drug use, and poverty which greatly influence a child's academic and psychosocial development. Research has shown afterschool programs (ASPs) have increasingly begun to play a key role in supporting youth development. Specifically, research has proven that ASP staff help mitigate these risks and foster positive development of youth. The positive impact of ASPs likely varies by the quality of the program, but this is understudied. The few studies addressing this, have shown that staff-student relations are key in supporting positive development within an ASP setting. Using data from qualitative interviews of ASP program directors and focus groups with enrolled youth from six programs serving underserved youth (7 staff interviews; 33 youth), the purpose of this study is to (1) identify what challenges children within underserved community's face on a daily basis and (2) examine the positive impact staff may have on children's development. Interview questions to staff and youth included (a) physical and mental health concerns of students, (b) community, family, and peer-related factors and challenges, and (c) ASP support to the youth. Staff were asked about their perception of major youth issues while youth were asked about their specific issues. Four coders established at least 75% reliability before conducting a content analysis of interviews (PDs and FGs) through Dedoose with interrater reliability of 86% average for PDs (76%-94%) and 84% average for FGs (79%-88%). From these analyses, we aim to identify what daily challenges adolescents within our underserved communities face and how ASP staff may serve to hinder or exacerbate these challenges experienced by underserved youth.

Craig, Darrell

Mentor(s): Dr. Santosh Nandi

Trust vs Loyalty

The application of trust and loyalty can be something that sustains a business to thrive for the long run. This derives from customer loyalty, brand loyalty, and a high morality rate within their employees, which also determines if a business is successful or not. The purpose of this study is to identify the steps a business should take for their stakeholders, customers, investors, and employees to trust them and become loyal to their brand for the long run. To achieve this, I have gathered multiple articles from very different sources and different cultures. This will showcase how each of them use strengths to deal with the battles

that come along with “trust vs loyalty” and the operations it takes to succeed. The findings suggest that a business must begin with their employees and imbed positive mindfulness, which they deliver to their customers to spread the positive thoughts to create an everlasting memory. This memory then causes the customer to become a loyal user of the company. This paper contributes to the presentation of understandings within a trust-based enterprise for stakeholder loyalty. Overall, this will cause businesses to see the application of trust-based loyalty can become a positivity within all career paths.

Crane, Jon

Mentor(s): Prof. Jay Pou

Learning about Compassion in Healthcare Abroad

During my time at USC, I embarked in two study abroad experiences. My first one was through the Atlantis Fellowship in which I had the chance to shadow different doctors and surgeons in a public hospital in Spain. This experience was very important to me because I am a biology major with a minor in chemistry. I have known for years that the medical field is where I belong and was pretty determined to pursue dentistry. I wanted to use this time in Spain to see if it were possible that my passion lied in another healthcare profession. I returned home beyond grateful for the hospital experience I got and the people that I met along the way but was even more excited to continue down my path to becoming a dentist. My second experience was embarking in a spring semester of studying abroad at Anglo-American University in Prague. This was something I knew I wanted to do since I was in high school. I have always enjoyed traveling, doing things on my own, and learning new things from and about people and places I had never seen or even heard of. As a dentist, I want everyone to be comfortable from the time they step foot in my office to the time they return. I know that I will be working with people from all walks of life and want to be able to appreciate and understand their wants and needs on a personal basis. Getting to spend time immersed in cultures where I do not speak the language well helps me to step outside of my comfort zone and allows me to learn from people firsthand. Being abroad during the midst of the COVID outbreak helped me see how other countries confront something so serious compared to the U.S. and showed me how important remaining compassionate in the field of healthcare truly is. These experiences helped me to see how I can begin my journey to becoming the best version of myself both in and outside of the office.

Crouse, Kiersten

Mentor(s): Dr. John Eberth, Mr. Colton Kostelnik

Regional Microscopy and Mechanics of Vascular Bypass Grafts

Coronary artery bypass grafting is a widely performed surgical procedure involving attachment of a vascular graft around a blocked artery. In this study, we investigated the biaxial mechanical properties and alterations in cellular content of porcine internal thoracic arteries (ITA), as a human analogue and potential xenograft, through mechanical testing and fluorescence microscopy. Four regions of tissue moving from proximal (closer to the heart) to distal (near the diaphragm) on both the left (LITA) and right (RITA) ITAs were examined with a total of 44 samples. Slices of ITAs were stained with propidium iodide (PI) which binds to the DNA by inserting between bases with minimal sequence preference. PI allows us to visualize smooth muscle cell nuclei while using elastin autofluorescence to observe lamellae. Tissue samples were imaged and examined under an Invitrogen FL EVOS microscope and ImageJ software was used to generate a comprehensive cell count. Mechanical properties of the LITA and RITA were determined via passive inflation-extension testing on a Bose Biodynamic device. Segments were axially stretched to the in vivo stretch ratio and $\pm 10\%$ of that ratio based upon the vessel's undeformed length. The axial force, intramural pressure, and outer diameter values were recorded to formulate and plot the stress-strain relationship. The circumferential stress significantly decreased, while the axial stress significantly increased as the distance from the heart increased. The number of elastic lamellar units significantly decreased in the distal segments of both the LITA and RITA. The smooth muscle count had minimal spatial variation.

The quantified results from this work will help match histomechanical characteristics of graft tissues with their coronary targets and could alter the optimal location a surgeon cuts for a bypass grafting procedure or to be used as a platform for xenograft-based tissue engineering strategies.

Cunningam, Niegel

Mentor(s): Dr. Justin Mogilski

Do Styles of Moral Reasoning Predict Attitudes toward Consensual Non-monogamy?

Consensual non-monogamy (CNM) is a type of romantic relationship where individuals have the consent and approval from their partner(s) to form romantic or sexual partnerships with other people. This type of relationship has been steadily rising in prevalence and yet remains heavily scrutinized. We postulate that stigma against CNM in Western society can be attributed to certain styles of moral reasoning. In this project, we are using online survey software to administer several psychometric measures of moral reasoning alongside measures of peoples' attitudes toward CNM to assess how moral beliefs, ethical decision making, and sexual ethics relate to beliefs about the social acceptability of CNM and a person's willingness to engage in CNM. We will first administer our study to a sample of 600 participants from the U.S. to explore the statistical associations among our survey measures. After, we will revise our study, update its hypotheses, and re-administer it in an international sample. We expect that our research will reveal the causes of stigma against CNM and thereby help the scientific community to better understand why stigma against CNM exists.

Curatolo, Samantha

Co-Author(s): Joshua Pate, Daley Mackey

Mentor(s): Dr. John Gerdes

International Law Dispute Resolution App

Businesspeople and decision-makers around the world rely on commercial mediation and arbitration to resolve disputes between their organizations. These leaders need to calculate accurately and swiftly the cost of using mediation or arbitration to make a tactical business decision. While some organizations offer calculators, they are limited in scope, and there is no central HUB for all these calculators. This project aims to develop a platform that streamlines the process for calculating the cost of these arbitrations. This calculator gives the user the ability to select the institution they would like to figure the dispute through a few necessary input-variables to perform the calculation. The output would include a breakdown of the calculated results.

Curtis, Chandler

Mentor(s): Dr. Jeffery Twiss, Ms. Courtney Buchanan

Functional Interplay between Fubp1 and KHSRP

Axons extend long distances from the neuronal soma and utilize localized mRNA translation in response to extracellular stimuli during development, function and injury responses. Since a single mRNA can be translated into protein many times over, it is critical that mRNA availability be regulated. This is accomplished by interactions with RNA binding proteins (RBPs) that contribute to the transport, stability and local translation of mRNAs. The far-upstream element binding protein (FUBP) family consists of single-stranded DNA and RNA binding proteins including FUBP1, FUBP2 (KHSRP), and FUBP3 that play a role in mRNA splicing, mRNA stability, and translational regulation, but each protein differs functionally. Our lab has shown that KHSRP regulates the levels of several axonally localized mRNAs that are critical for axon growth, and the loss of KHSRP accelerates regeneration of injured axons. Interestingly, we find that Fubp1 mRNA is a target for KHSRP regulation, with FUBP1 levels increasing upon loss of KHSRP. FUBP1 binds to DNA and RNA to regulate transcription, RNA splicing, and mRNA translation, but its po-

tential roles in axon growth as well as localized functions in axons have not been tested. To address this, I used RNA interference (RNAi) strategies to knockdown Fubp1 mRNA in mouse dorsal root ganglia (DRG) neurons and examined axonal outgrowth in culture. I confirmed the successful knockdown of FUBP1 using droplet digital PCR (ddPCR) and Western Blotting techniques and advanced to examine morphological changes in neuron growth including axon length and branching that occur in with depletion of FUBP1 from wild type and KHSRP knockout neurons.

Cushing, Mia

Mentor(s): Dr. Jabari Bodrick

Mia Cushing Professional and Civic Engagement GLD

Throughout my time at the University of South Carolina I have had the opportunity to experience a variety of events that will prepare me for my future career. I held multiple leadership positions in the Carolina Beekeeping Club, became a U101 Peer Leader, and participated in the Operations and Supply Chain Capstone Project. As an operations and supply chain major, I was also able to obtain an internship with Advance Auto Parts that taught me about the importance of advertising, which I learned about in my WGST 112 class. Throughout my classes and experiences, I learned about how to embrace uncertainty, remain confident through conflicts, the important role that advertisements have in society, and overall become a leader in my professional and personal life. Throughout my presentation I will talk about insights I gained through the different experiences I was able to have at the University of South Carolina. These experiences prepared me for my professional career that I will have after I graduate in May of 2021 and start working full time as a Keyot Consultant in June of 2021.

D'Amico, Cassandra

Co-Author(s): Brooke Bennett

Mentor(s): Dr. Kimberly Shorter

L-methylfolate's effects on dendritic spines in SH-SY5Y cells

Following a surge in the cases of Autism Spectrum Disorder (ASD), many of those affected are left with many unanswered questions as to what caused this developmental disorder and how to treat it. Previous studies have suggested a possible link between oversupplementation with pre-natal folic acid (FA) and ASD risk. This is interesting because many ASD patients have a mutation in MTHFR, a gene whose enzyme product metabolizes FA to a 1-carbon methyl group. Other articles suggest the potential benefits of L-methylfolate (L-MTHF), the more bioavailable form of FA, for ASD patients, due to its location in the 1-carbon metabolic pathway. Therefore, we wanted to further investigate whether L-methylfolate has an effect on dendritic spine densities, which are increased in cortical tissue in ASD. In this experiment, we treated cells with FA or L-MTHF with and without a knockdown in MTHFR. We stained for dendritic spines and counted for analysis. The data indicates L-MTHF alone doesn't affect dendritic spine densities; however, in conjunction with the FA treatment, it significantly reduces spine densities.

Daellenbach, Jillian

Mentor(s): Dr. Ambra Hiott

Lead to Serve and it will Lead you to your purpose

Being a part of a Greek Panhellenic organization, whether an executive or general member, provides an individual with the opportunity to find a group of like-minded individuals within a larger university that will help promote personal, academic and professional growth, provide opportunities to expand your network or get further involved in an organization whos values you already align with yours. While in both my roles as Vice President of Panhellenic relations and Vice President of Finance for my sorority, Alpha Delta Pi, I have been able to build meaningful connections with members inside and outside my organi-

zation, further improve my professionalism and emotional intelligence, as well as see the material taught in my Finance and Marketing courses be put into real life application. Both of these roles required their own set of niche skills and competencies in order to be most efficient and successful, helping me become a better-rounded individual and more prepared to take on the challenge in my other work experience such as my internship and consulting fellowship. I believe that more women should be taking advantage of opportunities such as leadership positions in college that come with minimal penalties while providing tremendous experience and growth to an individual that will serve them in the long run. The following presentation will highlight how my experiences within my leadership roles and general membership in my Greek organization, combined with my academic studies have contributed to not only me being successful and detailed in my work bringing meaningful insights, but also how these experiences helped to better understand my strengths, weaknesses, and interests and how to leverage off of this knowledge to better know what will be a fulfilling career path for myself.

Damron, Hunter

Mentor(s): Dr. László Székely

Enumerating Symmetrical Domino Tilings of Rectangles

In 1961, Temperley & Fisher and Kasteleyn independently found a closed form solution for the number of perfect matchings of an $n \times m$ lattice graph, a quantity used in the field of statistical mechanics to solve the 2D Ising problem. However, in the context of domino tilings, which are equivalent to perfect matchings on a lattice graph, two tilings may be considered equivalent if one can be transformed into another by a symmetry action. In this paper, we aim to count the number of orbits (equivalence classes) of domino tilings under symmetry. We begin by providing closed form solutions for the number of orbits of $n \times m$ domino tilings when m is at most 4. Finally, we show how Kasteleyn's 1967 algorithm can be used to count the number of domino tilings invariant under rotational and line symmetry in general.

Dawson, Jared

Mentor(s): Ms. Gina Spence

Black and Abroad Health Culture

Throughout my undergraduate experience, I embarked on a number of life-changing global experiences that forever changed the way I view myself and the world. Not only did my trips abroad deepen my understanding of other societies around the world, but I gained new perspectives about my future professional field: public health. Each country has its own health culture, composed of unique systems of care, social infrastructures, nutrition profiles, and attitudes toward behaviors that ultimately determine people's lifestyles. By immersing myself in different cultures and observing different medical systems, I gained many valuable perspectives about health that propelled me into my career.

de Arellano, Abigail

Mentor(s): Ms. Elizabeth Bodalski, Dr. Kate Flory

The Relation Between Exposure to ACEs and ADHD Symptoms Among Young Adults in College: Perceived Social Support as a Moderator

Adverse childhood experiences (ACEs) refer to exposure to adverse events in individuals' first 18 years of life and often result in long term consequences on wellbeing and health. Prior studies have found an association between higher ACE scores and more severe ADHD symptoms among college students (Windle et al., 2018). The association between ACEs and ADHD may be explained by the diathesis stress model or the presence of specific environmental factors influencing neural development. There may also be protective factors present that diminish the link between ACEs and later ADHD symptoms, such as social support, which is linked believed to be a key resilience factor in protecting individuals from developing ADHD

(Mastoras et al., 2018).

The present study investigated the impact of exposure to ACEs on ADHD symptomatology among college students, a population in which this link has not been widely researched. We also explored the role of perceived social support as a potential moderator of this association. Biological sex and household family income were included as covariates. During Spring 2020, participants (n= 395) completed an online survey on Qualtrics measuring ACE score using the 10 items from the CDC-Kaiser study (1998), the 18 item self-report checklist for ADHD symptoms (APA, 2013), and the Interpersonal Support Evaluation List (ISEL-12) (Cohen et al., 1985).

Participants were 395 college undergraduates from four universities around the U.S. Participants who reported experiencing more ACEs also reported greater current ADHD symptoms, $r(395) = .859, p < .01$. Additionally, students who reported lower interpersonal support reported more ADHD symptoms, $r(395) = -.141, p < .01$. However, interpersonal support was not a significant moderator of the relation between ACEs and ADHD symptoms, $r(395) = -.0006$. Exploratory analyses examined the association between item-level ACEs and ADHD symptoms. This study revealed lower associations between ADHD symptoms and specific ACEs (e.g. parental separation, domestic violence, the incarceration of a household member). This research contributes to the existing body of literature exploring the impacts of stressful early life events on long term outcomes. The findings indicate a need to further explore the relationship and protective factors linking the relationship between ACEs and ADHD.

DeFreitas, Leah

Co-Author(s): Salomon Campos-Rice

Mentor(s): Dr. Kelly Goldberg

Understanding Australopithecus africanus

Studying human origins and our ancestry gives us valuable insight into the process of human evolution and the behavior of early humans. Today, research has yet to acquire conclusive evidence that Australopithecus africanus, the oldest known early human from southern Africa, is actually part of the lineage that resulted in our species, Homo sapiens. By creating a hominin phylogeny detailing the relationships of Australopithecus africanus to other species, incorporating an overall timeline of known Australopithecus africanus activity, and researching Australopithecus africanus behaviors, features, habitat and more, we will be able to create a museum style exhibit to bring us a deeper understanding of this species. Our hope is to conclude that there is compelling evidence depicting a relationship in lineage between Australopithecus africanus and Homo sapiens.

Delaney, Maura

Mentor(s): Prof. Rico Reed

Being a Peer Leader Means Being a Peer Above All

The support system throughout the transition from high school to college is incredibly important, but for students it is something that should be present throughout their four years of undergraduate study. The need at the University of South Carolina exists within students' sophomore year, as many tend to fall through the gaps. As a university with an award winning First Year Experience this model and support system should be carried throughout all four years to ensure students have the opportunity to grow, prosper and make an impact at the University of South Carolina. One of my proudest accomplishments at the University of South Carolina is seeing students at different points during their four years at UofSC, from before they step foot on campus as a University Ambassador, freshman year as a University 101 student to perhaps a role as a University 101 Peer Leader and then in Senior semesters as Education Chairman of Kappa Kappa Gamma. Living in a world of role models and idols can often be hard on a person, growing

up and thinking that you must always strive to be something unattainable can take a toll on your mental health. My main goal as a leader on campus was to be not just a leader but a leader of my peer above all. Key to this has been bringing my past experiences, personality, fears, and insecurities to help create an environment for my fellow students to express themselves, feel seen and supported. This presentation will highlight the importance of well-rounded support for students that can be taught to leaders inside the classroom. As well as explore the responsibility leaders on campus have to bring these initiatives to their own organizations in order for peers to prosper outside the classroom, while emphasizing the need for support for sophomores.

Dempsey, Caroline

Mentor(s): Dr. Titan Paul

Nanoparticles Shape Effect on Stability of Al₂O₃-water Nanofluids

Nanoparticles are incredibly small metallic particles which are becoming more popular in industry such as: high-density magnetic storage material, drug delivery system and medical materials, energy storage, micro-electromechanical system, interface characterization for thermal management, and structural. Nanoparticles can be suspended in typically used coolants to improve the thermophysical properties and thermal performance of the liquid. These nano-sized metallic particles can be made in various shapes such as spherical, hexagonal, block, platelet, and more. A problem with using nanofluids as coolants in heat exchangers is the tendency for the particles to agglomerate over time. It is important to find ways to synthesize nanofluids which remain stable for the longest period of time. In this study, block and platelet shaped nanoparticles are used to synthesize nanofluids. The stability of the nanofluids is investigated by visual inspection and UV-vis spectroscopy for different mixing time and different concentration. Furthermore, viscosity of the nanofluids with different nanoparticles shape is measured.

DeSimone, Sofia

Mentor(s): Dr. Kelly Goldberg

Hominid Phylogeny - *Australopithecus aethiopicus*

Conducting research on human ancestry is essential when trying to understand the evolution of man. By looking further into our past, we are able to make observations and inferences that contribute to our understanding of modern day mankind. In my project, I will be conducting in depth research on the hominin species *Australopithecus aethiopicus*. Specifically, I will research the diet, habitat, distinguishing features, cranial capacity, geographic location, date range, and fossils of *Australopithecus aethiopicus* in order to present a comprehensive summary of what we know about the species. I will rely heavily on scholarly sources from both the library and the internet. In its presentation, my findings will contribute to our understanding of *Australopithecus aethiopicus* and the ancestry and evolution that led to homo sapiens.

Dey, Stephen

Mentor(s): Dr. Derek Zelmer

Asynchrony and Disease Persistence in Centrarchid Fishes

Demonstrating the potential for asynchrony to occur and examining the factors that influence the scale at which it occurs is key in developing our understanding of the factors influencing persistence within an ecosystem. The goal of the present investigation was to examine the expected negative relationship between the degree of synchrony in parasites among centrarchid demes and the distance between those demes. Every month from June 2016 to July 2017, sunfishes (Centrarchidae) were sampled (under approved IACUC protocol 120512-BIO-06) by electroshocking cobble habitats at four sites, located approximately 5 km apart, in Storm Thurmond Reservoir. The fish were frozen until necropsy, during which the parasite abundance was observed and recorded. Pearson's product moment correlation for pairwise abundances

was used as a measure of synchrony for the most abundant parasite species and examined for relationships with among-site distance. We found no correlation with distance, but sites with similar bathymetry tended to have synchronous parasite populations, regardless of distance, providing evidence of a novel link between habitat structure and disease persistence and suggesting a new role for habitat heterogeneity as a determinant of biodiversity through its influence on asynchrony.

Digsby, Kaitlyn

Mentor(s): Dr. Eugenia Broude, Mr. Zachary Mack

Examining the senescence associated secretory phenotype of estrogen receptor-positive breast cancer in response to combined CDK4/6 and CDK8/19 inhibition

Cyclin-dependent kinase (CDK) 4/6 inhibition by Palbociclib halts cell cycle progression in Estrogen receptor-positive (ER+) MCF7 breast cancer cells, but both clinical and laboratory data have shown that long-term treatment of hormone-dependent cancers with CDK4/6 inhibitors leads to drug resistance and an overall decline in drug efficacy and patient prognosis. Senescence, defined as irreversible cell cycle arrest, may contribute to the development of resistance to Palbociclib by way of the Senescence-Associated Secretory Phenotype (SASP). One of the phenotypes associated with Palbociclib-induced senescence is the release of cytokines with paracrine activity that may promote the growth of neighboring cells. Our previous experiments have shown that combination treatment with SNX631, a CDK8/19 inhibitor, prevents the development of some aspects of Palbociclib-induced senescence phenotype and eventually leads to cell death. Thus, CDK8/19 inhibition may prevent Palbociclib resistance through attenuation of SASP. We tested this hypothesis by conditioning the growth medium of MCF7 cells with 500 nM Palbociclib for 3 to 7 days, collecting the resulting media, and observing the effect of the secreted proteins therein by placing it on freshly seeded cells. We conducted viability assays for MCF7 cells grown with 50% conditioned medium+50% fresh medium and MCF7 cells grown with 100% fresh growth medium while under treatment with Palbociclib, SNX631, or both, to observe differences in cell growth. The results of our viability assays show that conditioned media have a broad detrimental effect on the growth of MCF7 cells. However, all single-drug treatment groups with and without conditioned media overgrew their vessels within 15 days, while all combination treatment groups saw no increase in cell number within the same timeframe. Further experimentation is needed to elucidate the role of SASP attenuation in preventing Palbociclib resistance. If SNX631 plays a role in overcoming Palbociclib resistance by dampening SASP, then this drug combination may be more efficacious than Palbociclib alone in the treatment of patients with ER+ breast cancers.

Dijkhoff, Stephanie

Mentor(s): Dr. Marketa Kubickova

Going Paperless in the Human Resources Department

From June until December of last year, I got the opportunity to serve as a Human Resources intern at the Bucuti & Tara Beach Resort in Aruba. The Bucuti & Tara Beach Resort is a Certified Carbon Neutral hotel and has been recently awarded the Global United Nations 2020 Climate Neutral Now Award, the first hotel to ever win this award. Their commitment to sustainability is the main reason why I chose Bucuti & Tara Beach Resort for my internship. During my internship, I was responsible for the Paperless Project which entailed for the Human Resources department to transition from paper to digital, as much as possible. I digitalized various administrative forms, as well as create new ones. These forms facilitated processes such as recruitment, onboarding, assessments, exits, and more. The transition from paper job applications to email applications allowed me to gain experience in screening job applicants before moving them forward. My internship allowed me to put my knowledge in Human Resources Management into practice while also combining this experience with my passion for sustainability. I learned that, upon graduation, I want to work in Human Resources at a company that is committed to sustainability because it allows me

to make a positive impact on employees and the environment. I believe that it is beneficial to complete internships at companies where you see yourself working in the future. I had such a great experience working at Bucuti & Tara Beach Resort Aruba that I hope to work there again in the future.

DiMonda, Melissa

Mentor(s): Dr. Kelly Goldberg

The Species of Australopithecus sediba and its Relationship to Humans Now

The species *Australopithecus sediba* was discovered in 2008 in a cave of Malapa, South Africa. The species is a combination of earlier *Australopithecus* and humans. The history of humans has been a question that scientists have always been searching for. With each discovery of new fossils, this leads to questions about what *Homo sapiens* evolved from. When the right clavicle of this species was found, it was unclear of how this species related to *Homo sapiens*, and it still is. The features of *Australopithecus sediba* include long arms, a narrow upper chest, small premolars and molars, inward feet, and similar facial features to *Homo*. The features show a different type of upward walking as compared to humans now which can show a different evolution path as compared to humans. Using research on this species and the fossils that were found, I will create a presentation showing all information on *Australopithecus sediba* and how it is connected to the evolution of *Homo sapiens*. The research for this paper will bring scientists one step closer to learning about the evolution of humans, what we used to be, and how the findings of these fossils plays a role in us now.

Dinu, Isabella

Mentor(s): Dr. Jane Roberts, Ms. Elizabeth Tillman, Dr. Abigail Hogan, Ms. Jenna Smith

Rates and Physiological Predictors of Anxiety and Shyness in Boys with Fragile X Syndrome, Autism, and Comorbid Fragile X and Autism

Fragile X syndrome (FXS) is an X-linked dominant genetic disorder caused by a mutation in the fragile X mental retardation 1 (FMR1) gene resulting in the reduction or absence of fragile X mental retardation protein (FMRP), which is essential for typical brain development (Center for Disease Control, 2019). FXS has greater incidence in and more severely impacts males than females (Center for Disease Control, 2019). The FXS phenotype often involves intellectual disability and behavior problems such as attentiveness and impulsivity (Ezell et al, 2019). Autism spectrum disorder (ASD) is a neurological disorder characterized by impaired social communication and the presence of restricted and/or repetitive interests and behaviors. Common symptoms of ASD include avoidance of eye contact, difficulty relating to others, and sensory sensitivities. (Center for Disease Control, 2019). The incidence of ASD in the United States is 1 in 59 children and is also more commonly diagnosed in males. Recent work has demonstrated that approximately 61% of preschoolers with FXS meet diagnostic criteria for ASD (Roberts et al., in press). Additionally, children with comorbid FXS+ASD exhibit greater shyness which may be related to difficulties interacting and forming relationships with others (Reisinger and Roberts, 2017). Baseline respiratory sinus arrhythmia (RSA) is an index of heart rate variability that is associated with respiration. RSA has been shown to be linked to psychosocial adjustment in children diagnosed with these disorders (Switzer et al., 2018), thus it can be used as a physiological indicator for characteristics such as anxiety and shyness. The current study will compare boys with FXS-only, FXS+ASD, and idiosyncratic ASD on parent-report measures of anxiety (Anxiety Depression Mood Scale; ADAMS; Ebsensen et al., 2003) and shyness (Children's Behavior Questionnaire; CBQ; Rothbart et al., 2001). Further, this study aims to determine whether baseline respiratory sinus arrhythmia (RSA) differentially predicts anxiety and shyness across groups.

Dippolito, Gia

Co-Author(s): Jillian Brown

Mentor(s): Dr. Katherine (Kelly) Goldberg

Evolutionary Research on Homo Floresiensis

Learning about the biology of humanity's ancestors is critical to better understanding the biology of humanity today. It is vital to study the evolutionary process of hominids to gain a better understanding of the way that changing environments have caused a number of adaptations and speciations. Drawing from a series of scholarly articles as well as excavated fossils, analyzing *Homo floresiensis* allows for a greater understanding of a lesser known species of hominid and the biological as well as cultural implications that can be traced back to the *Homo floresiensis* species.

Doennebrink, Danielle

Mentor(s): Dr. Samuel McQuillin

Effects of Childhood Sexual Abuse on Adult Cardiovascular Health

Childhood sexual abuse is a rampant problem in American society as one in nine girls and one in fifty-three boys will experience sexual assault or abuse by an adult before the age of eighteen (RAINN, n.d.). A few of the long-term effects of this form of abuse are increased likelihood of drug abuse, PTSD, and major depressive episodes into adulthood (RAINN, n.d.). Yet despite the pervasive nature of this problem, research on the range of effects for this form of abuse is relatively limited. Existing research has identified a correlation between childhood abuse (i.e. sexual, physical, emotional, and financial) and adult cardiovascular health.

In my research project, I aimed to extend the work such as that of Thurston, et al. who found that childhood abuse leads to higher carotid intima-media thickness (IMT), a well-known causal factor for cardiovascular disease, and increased carotid plaque in women who experienced childhood abuse (Thurston et al. 2017). My project elaborated on this important work with an explicit focus on childhood sexual abuse and the putative mechanisms through which this abuse influences cardiovascular disease risk factors. As cardiovascular health can be measured by a surplus of biomarkers, for this project we focused on three markers. The three markers used in this project are the JNC7 classification of hypertension in stage 1 or 2, history of health care provider diagnosed high blood pressure, and use of antihypertensive medication used in the last four weeks. No current research has investigated the specific mechanism through which childhood sexual abuse influences cardiovascular risk factors. By understanding these mechanisms, I aimed to inform prevention and intervention work that is tailored to individuals who have survived childhood sexual abuse.

Doll, Lillian

Mentor(s): Dr. W. Joe Jones

Ecological Monitoring of Huntington Beach State Park for Conservation via UAS Survey

Dunes are a critical feature of coastal landscapes, and more specifically, coastal ecosystems. A number of organisms, from coastal grasses to nesting birds and sea turtles depend on these structures in some capacity. The structural and ecosystem support they provide therefore makes them a prime target of study for coastal conservation research. In my research, I studied the geomorphological features of Huntington Beach State Park via drone to understand how dune features related to Loggerhead sea turtle conservation interests. My research focused primarily on how dunes can be mapped using drone technology and how specific dune characteristics like elevation, width, hind dune zone width, and distance from the coastline are related. Data on dune characteristics was collected from computer generated models of the study site built by data from a summer of 2020 via drone survey conducted by my research mentor, Dr. Joe Jones in the Environmental Health Sciences Department. The geomorphological data were tested for

correlation between specific variables and compared with nest data from the study site to reveal trends in nest distribution as they relate to dune features. My investigation found significant correlation between dune elevation and dune distance from shoreline, as well as correlation between dune width and dune distance from shoreline. It was also found that foredune height correlated strongly with hind dune zone width, the area located behind the foredune and in front of the tree line. Additionally, many of the nests of the 2020 breeding season were located on or behind the foredune, indicating that dunes were of importance to the Loggerhead sea turtle reproduction process. The findings of my research indicate that the area immediately in front of the foredune, the dune itself, and the hind dune zone behind it should be shielded from human disturbance. My independent study also contributes to the increasing utility of drones in ecology and the natural sciences, as the use of this technology provides a means to conduct less invasive surveys on a large scale of coastal habitats and their geographic features.

Dorrien, Anna Grace

Mentor(s): Dr. Elise Lewis

Anna Grace Dorrien

Reading is the most fundamental aspect of our education, especially early on. Unfortunately, many young students face many barriers that impact their ability to learn to read, which in turn impacts the rest of their future in education and beyond. I have had the pleasure of working on the Reach Every Reader research project at USC. Reach Every Reader is a program that is developing literacy tools and solutions for underserved schools, families, and individual children. I have been working with the project for 2 years, and I have seen all of what goes on behind the scenes of this project as it has developed. Before the pandemic, I went into Sumter, SC elementary schools at least twice a week to administer gamified literacy tasks to our enrolled student population. I got to see the passion for school and learning that these kids have, which has continued to motivate me throughout my time on this project. I was then promoted to a lead tester position, which meant I now had a group of research assistants that report their progress and updates to me. Since the pandemic, our team has had to shift into communicating online with the schools and parents of our participants to create and schedule online test appointments. The largest barrier we have faced is the socioeconomic difference. Most of our families do not have the same free time or technological resources that are needed to be able to shift into an online format. I plan to continue working with Reach Every Reader post graduation so I can see all of our efforts turn into a success. I have learned that I want to help low socioeconomic populations in my future, because everyone deserves an equal chance to be successful in and beyond their education.

Dosch, Elise

Mentor(s): Dr. Kelly Goldberg

Research on Australopithecus afarensis

Having extensive knowledge on the Australopithecus afarensis species is key to understanding the history and progression of human evolution, since it is one of the best-known early human species. Drawing information on the fossils collected and analyses done by biological anthropologists, this research will develop an understanding of how the Australopithecus afarensis contributed to human evolution. I will be compiling data and discussing information gathered on the species and how it is significant to understanding the overall story of the Homo sapiens. The Australopithecus afarensis species is an important part of our evolutionary history and we would be missing a large part of our story if information wasn't known about the Australopithecus afarensis species. I will be conducting research on the fossils found of this species and gathering information about its geographic location, diet, features, date range, and more by reading analyses from different biological anthropologists and reading the research done by them. By doing this research and compiling the information together, I will have a better understanding of the history of human evolution and how we came to be Homo sapiens.

Douglas, Katarina

Mentor(s): Mx. Caleb Morris

University 101 and its Teaching Applicability to Education

Through my experience as a University 101 Peer Leader I have seen the benefits of the program and how it can better future teachers. I participated in this program to mentor freshman and to gain experience working as a facilitator in the classroom rather than a student. This presentation will show how the Peer Leader position is the perfect learning experience for those who wish to go into secondary education (or any education really) and how the program should be marketed to these future educators. It has given me a bridge between student and facilitator in the classroom which lets me ease into the role nicely and not get thrown into the classroom environment unprepared.

Dressler, Ingram

Co-Author(s): Braden Schar

Mentor(s): Dr. Nicole Zarrett

Examining Sources of Stress Among Underserved Adolescents During the COVID-19 Pandemic

The continued spread of COVID-19 has led to major changes in the day to day life of everyone across the country. This includes younger children and adolescents, who are a demographic that could be particularly vulnerable to increased stress responses associated with this current public health issue. This population is forced to live in a hectic time period while simultaneously dealing with the normal stress of development into adulthood. Pre-existing stressors that are normal in adolescence could potentially be made more salient by these events. The emergence of new and unique stressors due to the COVID-19 pandemic is also likely among underserved youth whose stress may go undetected or undocumented. The undocumented stress can affect them disproportionately. These groups have less social support and less access to many social and monetary resources. It is tantamount that we examine the stress levels of this underrepresented group, as they may be impacted by it for years to come. This impact of stress may come in the form of aberrant psychological development that can lead to permanent damage. The aim of this study is to document the current stress levels of underserved early adolescents (age 8-14) during the COVID-19 pandemic and identify the specific social and environmental factors related to COVID-19 that may be contributing to this increase in stress. Surveys were designed and administered to enrolled youth in two separate after school programs serving underserved youth defined by low-income and/or minority status (N=39; Female = 34%; Minority status = 37%). The survey asked students to report on whether they have experienced increases in stress due to the pandemic. Students were also asked to report on changes related to key daily interactions and activities that have been shown to protect against stress and promote well-being and their primary sources for stress including changes in social isolation (e.g., missing friends), opportunities to participate in sports and other physical activity, increases in screen time/social media use, concerns about their own and their family's health, financial issues (e.g., worry about parent jobs), and academics.

Duggan, Matthew

Mentor(s): Dr. Nathan Senner, Mr. Luke Wilde

Inferring successful breeding of a declining bird with remote tracking data

Breeding success plays a major role in the regulation of animal populations. In shorebirds, assessing breeding success has required large-scale field efforts to detect and monitor fledgling survival due to the inaccessibility and low density of preferred nesting sites. As a result of recent methodological advances, we can now infer behavior in a wide variety of taxa from animal-borne sensor data. In birds with altricial (i.e., dependent on parental feeding) young, these methods have been used to detect probable nest sites

and monitor behaviors at these nest sites (i.e., chick survival). However, no tools exist for monitoring species with precocial (i.e., independent) young, such as shorebirds. In this study, we are building a multi-stage hidden Markov model (HMM) to discern between four behavior states in the Black-tailed Godwit (*Limosa limosa*): nesting, foraging, migrating, and brooding chicks. Utilizing animal-borne sensor measurements (e.g., GPS) from 27 godwits over a 5-year period, we have constructed a three state HMM and are continuing to optimize a second HMM to discern between foraging and brooding behavior. When used with the R packages ‘momentuHMM,’ ‘moveHMM,’ and ‘recurse,’ our model will allow us to determine the length of time a bird exhibited nesting or chick-tending behavior as a means of inferring successful reproduction. Moreover, due to the accelerating agricultural intensification, the preferred godwit nesting habitat of agricultural grasslands in The Netherlands are at risk. The information gained by calculating successful reproduction will help monitor and better protect this key species’ populations across the country. In future studies, we hope to transfer this methodology to other shorebird species that nest in remote and inaccessible areas.

Dunbar, Anna

Mentor(s): Mr. Timothy Lewis

Learning to Lead, My Experience as an Orientation Leader

Not very long after the start of my freshman year I knew that I wanted to incorporate myself more into the culture of this university by becoming more involved. My Orientation Leader sent a text to our group from the summer encouraging anyone interested to apply for this incredibly enriching and fun experience, and I immediately felt drawn to give it a try. I had not thought of becoming an Orientation Leader much before, but suddenly the idea seemed like the perfect opportunity to feel that involvement and connection that I was craving out of my college experience. I applied and was so graciously given the opportunity to work as an Orientation Leader that following summer after freshman year, living on campus, and leading a new group of students into our Carolina community every other day. During this experience I learned so much about UofSC, how to lead and set an example to my peers, and most importantly how to develop and further my passion for mentorship and leadership. It is truly difficult to put into words how much this experience meant to me in terms of what I gained from it. The value of the relationships that grew out of it as well as the confidence that I gained in myself as a leader and as someone who others look up to is immeasurable. I was able to grow my appreciation for the college experience, more specifically the University of South Carolina college experience, and use that passion to guide me throughout the rest of my college career. I want people to know how much fuller life can be once you find a group of people with shared interests, passions, and attitudes as you and how important it is to never stop striving to find your place in college and in this world because it is out there. I will always use my orientation experience as an inspiration to find meaning and purpose in graduate school and in my future career in healthcare administration and remember how valuable leadership and mentorship is in these endeavors.

Duncan, Jonas

Mentor(s): Ms. Denise Wellman

The Importance of Cultural Clubs

Cultural organizations are an integral part of any college campus and promote diversity and cultural awareness, while helping to foster an inclusive climate. One of the most important organizations that I have belonged to at my time at the University of South Carolina has been the German Club. I am half-German, am minoring in the language, and am a dual citizen of the United States and Germany. However, there are few opportunities to interact with German culture and language in Columbia, outside of an academic setting. My membership in the German club, my time on its executive board as Treasurer and President, and the time spent collaborating with other cultural clubs on campus have all impacted me greatly. I have been able to further connect with my heritage, develop leadership skills, and interact with amazing

people that I otherwise would not have had the opportunity to speak with. My presentation today will focus on the importance of cultural clubs on college campuses and the defining role that the German Club has played during my time in college.

Duncan, Taylor

Mentor(s): Dr. John Bernhar

Prevalent Recruitment Methods for African American Adults in NEW Soul Community Study

Authors: Taylor Duncan, Claudia Sentman, John Bernhart

Objectives: This presentation summarizes methods used to recruit participants for the Nutritious Eating with Soul (NEW Soul) study in partnership with Rare Variety Café. This 9-month behavioral intervention, led by a community health worker, examines the reach of a soul food, plant-based healthy eating program for African Americans.

Methods: Participants were recruited in two cohorts. An online screening questionnaire prompted participants to select how they were introduced to the study based on a list of recruitment strategies.

Results: The three most reported recruitment methods were social media (23%), radio (22%), and friends and family members (20%). Other strategies included Rare Variety Café, current study participants and staff, websites, work, newspaper, and church. From 199 completed screener forms, 48 individuals were ineligible based on study restrictions. The three most common reasons for ineligibility consisted of: medication for diabetes, inability to travel to the downtown Columbia area where Rare Variety Café is located, and BMI out of the required study range. Successful contact was made with 100 of the 151 eligible individuals for a follow-up 1-on-1 Zoom conferencing meeting. Of these, 86 individuals were invited to an orientation session. Seventy-one individuals attended orientation and 43 completed baseline assessments and enrolled in the study.

Conclusions: The most popular methods for recruiting African American adults for this nutrition study were social media, radio, and peers. These findings suggest that future nutrition interventions prioritizing participation from the African American community would experience the greatest engagement when applying these recruitment techniques.

Dunican, Peter

Mentor(s): Ms. Ambra Hiott

The uncertainty of studying abroad during a pandemic and the lessons I learned about myself

Spring semester of my Junior year, I was very fortunate to study abroad in Mannheim, Germany at the University of Mannheim. Entering college after having studied 4 years of German in high school, I was set on becoming the best German speaker, writer and reader that I could possibly become. Little did I know, I was entering one of the most uncertain periods of my life that semester, as the COVID-19 pandemic really took over my focus and forced me to adapt to a situation I could never have foreseen. Leading up to the semester, I expected it to be truly life changing experience, but the impact that it had on me turned out to be much more profound than I could have guessed. This was the furthest I had ever been from my family and friends on my own, and I was in an entirely new country that spoke a language I had only heard with an American accent. Once the initial shock of a new country passed, I felt myself grow and learn much more than I ever could here in America. I became confident with my language skills and also with myself, as I navigated one of the most difficult situations of my life, the pandemic, with relative ease. Although I didn't spend the entire semester in Germany, it was still truly a monumental time for me. The many different places I traveled opened my eyes to the world and I am excited to share these experiences and what I have learned with other students.

Dunphy, Kelly

Mentor(s): Ms. Sarah Matthews

How Helping Others Shaped my Career Path

My most significant contributions throughout my time at the University of South Carolina are my extra-curriculars, and work experiences focused on helping and working with others. I have learned that these experiences have gone beyond helping others but have provided me with countless benefits, realizations, and skills for my future career. As an individual pursuing graduation with leadership distinction in Professional and Civic Engagement, I was able to give thought to my experiences over these last four years. I have spent the previous three years as a caregiver to a young boy with Pitt-Hopkins Syndrome, a rare genetic disorder. Through my work, I enjoyed interacting with and learning from individuals in the special needs community. My work has given so much to me; it allowed me to explore job opportunities, specifically through occupational therapy job shadowing, and opened doors for me to create and lead a fundraiser to support the Pitt-Hopkins Research Foundation. Working on this fundraiser for the family I work for prompted me to take a leadership position in my on-campus organizations. I participated in the non-profit organizations, Relay for Life with the American Cancer Society and Dance Marathon throughout my college years. For my senior year, I took a leadership role as fundraising chair with Relay for life to continue taking the lead in fundraising and contribute more. I took part in these organizations and my work to help others where I could; however, looking back, I have realized how much I have gained from these experiences. I learned about what I am passionate about, what brings my joy, and strengthened many of my life skills such as teamwork, leadership, and communication. Through these experiences, I have learned other career paths more catered to what I am passionate about and what I hope to accomplish after college.

Earl, Quintaris

Mentor(s): Dr. Natalia Shustova

Zirconium-Based Metal-Organic Frameworks as a Platform for Nuclear Waste Sequestration

Over the past few decades, there has been a great demand for enhancing the process of nuclear waste administration due to a significant increase in the utilization of nuclear energy. The driving force for proper nuclear waste disposal is evident when considering past nuclear incidents—such as Chernobyl and Fukushima—where radionuclide contamination of large bodies of water sparked public concern. In order to mitigate the management of such radioactive species, synthesis of a new material capable of selectively isolating and separating radionuclides is an ideal solution. One candidate is metal-organic frameworks (MOFs) that are hybrid scaffolds composed of metal nodes connected by organic linkers. Due to their porosity, high surface area, and tunability, MOFs can be considered excellent contenders capable of a high uptake capacity of radionuclides. These properties can be leveraged specifically to sequester radioactive ions in aqueous media, mitigating the issue of radioactive contamination in large bodies of water. In particular, we focused on preparing and characterizing a library of Zr-MOFs for performing initial studies to sequester radionuclides. Comprehensive characterization of Zr-MOFs was carried out using powder X-ray diffraction, thermogravimetric analysis, as well as ^1H nuclear magnetic resonance, photoluminescence, Fourier-transform infrared, and UV-vis spectroscopies. In addition, leaching kinetics of uranium-containing species from the prepared MOFs was studied and inductively coupled plasma mass spectrometry was performed to determine the amount of uranium sequestered in a series of MOFs. These studies can foreshadow the future of MOFs as viable nuclear wasteform materials.

Ebersole, Angelina

Mentor(s): Ms. Brittney Ankrom

Internship

As a tax intern during the busy season with Bauknight, Pietras, and Stormer P.A., I had the opportunity to

dive deep into my desired profession. BPS is a top public accounting firm in South Carolina. As a public accounting firm, the clients I was exposed to have a broad range of lifestyles and experiences preparing their taxes. Being an accounting major at the Darla Moore School of Business, I felt well prepared for anything I saw as an intern. Classes like Strategic Management and Professional Communication gave me skills like delegation, time management, communication skills and more that tied directly into my internship. I got hands on experience preparing tax returns, delivering income statements, learning about accounts, and organizing investment information. The people I had the opportunity to work with taught me about the importance of maintaining work life balance, prioritizing ethics, and valuing clients and professional relationships, amongst many other important lessons. After years of part-time jobs and business classes, I was able to draw from these experiences in order to enhance the time I spent as an intern. Participating in this internship not only solidified my decision to pursue a career in public accounting, but furthered my professional communication skills, tax knowledge and overall growth. My presentation will discuss how specific classes helped prepare me for my role as an intern and other positions I've held.

Edwards, Matthew

Mentor(s): Mrs. Maegan Gudridge

Camp SAY Work Experience: Supporting Children Who Stutter

During the summer of 2019, I worked at Camp SAY, a summer camp that provides life-changing opportunities for young people who stutter in the Pocono Mountains of Pennsylvania. In my role as a camp office staff member, I worked under the office manager and communicated with camp directors, bunk counselors and office staff colleagues to satisfy various camp-wide needs and fulfill all tasks as needed in a behind-the-scenes capacity to maximize the overall experience of each and every camper.

As a person who stutters myself, I face difficulties everyday with my speech, but I also know someone cannot be defined by one attribute about themselves they cannot control. I reached out to get involved at Camp SAY to lend a hand in any way I could to help make the campers' experience at camp the best it could possibly be. Throughout camp, I organized and distributed mail sent from home by the campers' loved ones and caregivers, helped guide campers through various activities, and served as a dependable overnight counselor in the cabins with campers on occasion. All in all, the genuine dedication of every staff member moved me to do my best to support the campers in any way I could. I learned being a person who stutters is not what makes someone different from the majority of everyone else at their school growing up, but it is what makes them unique. People who stutter may take longer to say what they have to say than people who do not stutter, but they also have the ability to teach others how to listen.

Throughout my time at Camp SAY, I met campers and fellow staff members from all over the country and world, and I had ample opportunity at Camp SAY to interact with these extraordinary people. Collectively, we all worked together to support the camp's overall theme that every voice matters and deserves to be heard, even if some people may take more time to speak or sound different than others.

Edwards, Abigail

Mentor(s): Mr. David Deweil

The Value of Leadership in the Greek Community

Throughout my undergraduate experience I have been afforded numerous opportunities to develop my personal and professional skills in leadership roles within the Greek community. During my first semester of freshman year, I joined Delta Zeta Sorority and immediately realized that I wanted to become as involved in the organization as possible, in order to get the most out of my experience. However, I ended up building relationships and developing skills and academic interests that I never anticipated gaining. I was fortunate enough to serve two terms on our Executive Board, first as VP of Programs and lastly as Chapter

President. Throughout these leadership experiences I learned how to think critically and solve complex issues, especially during our operational response the COVID-19 pandemic. I am leaving college with an enhanced understanding of my own skills and a preparedness for my future careers and relationships, all of which I owe to lessons I learned in these leadership roles. My presentation will discuss the impact of my Greek experience on my college years as well as the ways in which it encouraged me to grow and tap into my leadership and professional potential.

Egeli, Allison

Mentor(s): Dr. Holly LaVoie

Left ventricular extracellular matrix protein mRNA levels in Timp4 null mice during pregnancy and lactation

Pregnancy requires remodeling of the maternal heart, which enlarges to accommodate increased blood volume. This remodeling involves changes in the left ventricle (LV) matrix proteins including collagen, proteinases and their inhibitors (ie., TIMP4). Defects in postpartum cardiac remodeling can lead to cardiomyopathy. The goal of this study was to understand the role of TIMP4 in LV remodeling during pregnancy and postpartum by comparing the heart function and matrix protein mRNAs between Timp4 null mice(KO) and wildtype(WT) mice. Mouse LV function was assessed by echocardiography as virgins, pregnancy day(ed) 10, 12, 18, and at postpartum day(ppd) 2, 7, 14, 21, and 28. LV mRNA levels for Timps1-4, Col1a1, Col3a1, Col8a1, and Mmps 2, 3, 9, and 14 were measured by real-time PCR on specific days. Heart weight(HW)/body weight showed no differences between genotypes; HW/tibia length was higher in KO virgin, ed18 and ppd28 mice than WTs. End systolic and diastolic volumes (ESV & EDV) were increased at ed18 and on some postpartum days in both genotypes. Virgin, ed10, ed18, ppd2, ppd14-ppd28 ESV means were lower in KO animals than WT mice; EDV were lower in KO mice than WTs at virgin, ed18, ppd2 and ppd28. Ejection Fraction and Fractional Shortening were higher in KO than WT mice at all days except ppd7. Stroke Volume was higher only in virgin and ppd14 KOs than WTs. Within WT mice, LV mRNA levels of Col3a1 and Col8a1 differed with reproductive status. In KO mice, Timp1, Col8a1, and Mmp3 LV mRNA levels differed with reproductive status. Minimal expression of Timp4 mRNA was confirmed for KO mice. When comparing WT and KO genotypes, Timp2, Col3a1, Mmp2, Mmp3, and Mmp9 mRNA levels differed at specific reproductive states. In summary, both WT and KO mice showed increased LV volumes at ed18 and ppd28 indicating persistent enlargement of the heart through the first postpartum month. Specific matrix protein mRNA levels were altered in the Timp4 KO mice by reproductive state; the KO mice had heavier hearts with smaller internal heart diameters, but these differences minimally affected Stroke Volume.

Ellis, Claire

Co-Author(s): Irene Drikakis

Mentor(s): Dr. Kelly Goldberg

Homo habilis and the Timeline of Humanity: An Exploration of Human Ancestors

Historically, human society has cited biological differences related to race as justification for discriminatory practices and ideologies, the effects of which are still prevalent today. It is crucial, for the sake of social progress, that there be significant effort directed toward the unlearning of prejudiced beliefs which have arisen from the misguided separation of humankind into racial groups. To do so, it is imperative we examine human origin and ancestry to demonstrate that race in modern humans is nonexistent in the biological sense. Our poster looks to discover more about the different ancestors of Homo sapiens and how our current species emerged from and relates to the ones that come before. We will review reports and data regarding the physical structure, lifestyle, migration, and taxonomy of Homo habilis in order to learn more about where our species came from and how we evolved into the current, singular human race.

Evans, Anna

Mentor(s): Mrs. Sara Reinhardt

The Power of Legal Defense

During my sophomore year of college, I became a legal runner for a small defense law firm here in Columbia, South Carolina. The firm deals with civil litigation, criminal defense, professional licensing issues, and sport and entertainment law. Because of all of the areas of concentration, I was able to experience broad range of legal cases. My favorite thing that I was able to do through the position was being able to work with the Palmetto Innocence Project. The Palmetto Innocence Project is a non-profit that works to prevent and reverse the conviction of wrongly convicted people in South Carolina. My role in the process was opening letters from these incarcerated individuals and reading their stories. One similarity that I saw across all of the letters was that all of the convicted individuals requested another chance at a trial and explained how dedicated representation could give them the opportunity for a new life. These people had limited resources, so the ability to obtain free legal services could mean the difference between a new life or remaining in jail. Through the program, I was able to witness the correlation between a defendant's financial condition and the effect it has on their legal standing. I was shown the power of remedying inequities through pro bono legal defense.

By interacting with these clients and their cases, it illuminated an issue that is widely known about the U.S. justice system - the ability to pay for an effective legal defense is often key to a legal determination of a person's guilt or innocence and there to maintain a criminal record. Through this job, it affirmed my decision to attend law school after graduation. I want to attend so that I can further explore this correlation and determine the role that I can play in affecting this issue within the United States legal system. I am hoping to study criminal law and work for a non-profit to provide pro bono legal defense for underrepresented individuals.

Ewers, Abigail

Mentor(s): Ms. Lauren Epps

Professional and Civic Engagement

During the summer, I worked at Alexandra Madison Weddings which is a boutique wedding company that services clients in Columbia, Charleston, and the great South Carolina and Charlotte area. The role I was given as an assistant coordinator meant I was in charge of planning and coordinating with not only our clients, but multiple other businesses along with our team at AMW to pull together every aspect of our clients rehearsal dinner, wedding day, and everything in between. From helping to choose something as large as the venue to as detailed as the napkin fabric, I was there to ensure everything about the event was spot on and ran smoothly. As a Sport and Entertainment Management major at the University of South Carolina, my internship provided me with first-hand experience into the teamwork, leadership, and time management needed when managing and planning events. Participating in this internship for my SPTE 295 reaffirmed my decision to pursue a career within event planning and expanded my understanding on how to create and obtain strong business relationships and how beneficial they truly are. I hope to take what I have learned and apply this to my next job in the entertainment industry.

Fadel, Tina

Mentor(s): Dr. Kimberly Shorter

Vitamin B12 Affects Gene Expression in a Human Neuronal Cell Line

Vitamin B12 consumption has increased via energy drinks, vitamin waters, and supplements. Little research is dedicated to high levels of Vitamin B12; research has centered on low Vitamin B12 and associated neurotoxic homocysteine levels. Interestingly, as Vitamin B12 consumption increased, neurological diseases such as Autism Spectrum Disorders (ASD) increased exponentially. Currently, 1 in 59 children is

diagnosed with ASD. ASD is a disorder that involves epigenetics, genetics, and neurobiology changes that lead to behavioral patterns like decreased sociability and increased repetitive behaviors. These behavioral changes are rooted in neuronal communications involving vesicle trafficking along microtubules that are stabilized by Tau using dynein and kinesin as molecular motors. Vitamin B12 has the potential to affect gene expression since it assists with the one carbon metabolic pathway where a methyl group is added to DNA and histones. Therefore, we investigated whether excess Vitamin B12 affects gene expression and vesicle trafficking in a neurobiological model, the SHSY5Y cell. High Vitamin B12 does affect gene expression in SHSY5Y cells, and more research is needed to understand the physiological changes that may occur with high Vitamin B12 exposure in a full organism.

Faherty, Taylor

Mentor(s): Dr. David Reisman

An Analysis of novel lncRNAp53int1 Expression Levels during differentiation of leukemic cells

Each year it is expected that 60,000 individuals will be diagnosed with some form of leukemia. While the goal of this project is not to find a direct cure cancer, it aims to achieve a better understanding of how long non-coding RNAs (lncRNAs) can impact the development of leukemia. Additionally, this project is designed to develop a better understanding of how specific targeted treatments alter cellular proliferation or even prevent it all together. By gaining knowledge of an individual aspect, like lncRNA's role in cancer development, it is our (mine and Dr. Reisman's) hope that we can contribute a piece to the puzzle and that could potentially identify new targets for therapy. I will be working to gain an understanding of the role of lncRNAp53int1 in the block of differentiation observed in many leukemias. Treatment of human myeloid leukemia cells such as HL-60 and U937 with the drug phorbol 12-myristate 13-acetate (PMA) results in terminal differentiation and inhibition of cell division. By treating cells with agents known to induce differentiation such as PMA, I will monitor the expression levels of this lncRNA. Blocking expression of this lncRNA is proposed to induce these cells to differentiate. It is our hope that by blocking expression of these cell types we will be able to understand how to better prevent proliferation and uncontrolled growth of leukemia cells. I have found that PMA does help to stop the proliferation of cells and halted growth in a variety of HL-60 cell lines. This means that further research can be done on the effects of the specific treatment of leukemia cells with PMA in order to prevent uncontrolled cell growth.

Falk, Olivia

Mentor(s): Mr. David Deweil

Catalytic passion for change

Throughout my undergraduate career, I have strived to expand my learning beyond the boundaries of the traditional classroom. This personal goal has allowed me to gain invaluable knowledge from around the world, consequently inspiring my passion for human rights and justice. My Freshman year, this passion took me to Amsterdam where I learned about the marginalization of different social groups under the education department of the Anne Frank house. My Junior year, this passion drove me to apply and ultimately receive the Benjamin A. Gilman International Scholarship, which funded my spring semester abroad in Spain, where I dove into a culture foreign to me. If it wasn't for this motivating passion, I wouldn't have realized my real aspiration in life: to help underrepresented populations while promoting justice and equality. From this I found a leadership ability within myself, which led me to present money management workshops in collaboration with the study abroad office and serve as a Senior Fellowship Peer Mentor with the National Fellowships and Scholars Office.

Falls, Aaron

Mentor(s): Prof. Denise McGill

Eyewitness Photojournalism: Showcasing Work from Future Photojournalists

During the Summer and Fall of 2020 I have worked with Associate Professor Denise McGill to create and design a website to showcase work completed by her photojournalism students. As a research assistant, I have been responsible for brainstorming potential layouts for the website, using WordPress to manage content, and writing CSS to create the visual design. Throughout this experience, I have learned more about the process of creating a website, expanding my skills in HTML, CSS, and Content Management Systems. I have had the opportunity to see how different parts of web development all can collaborate efficiently to produce content and designs for Eyewitness. This website showcases work by photojournalism students, which creates a record of important people, places, and events in the local community. Many stories on Eyewitness focus on stories relating to lesser-known communities in the local area, so it is vital to demonstrate how important these groups are to the greater Columbia community. The website has become a medium through which future photojournalists can share their work showcasing local stories with people all over the world.

Farrell, Caroline

Mentor(s): Ms. Julie Hutt

Discovering Innovation Policy: A Semester at a Think Tank in Washington

The Fall of 2019, I worked as an Innovation Policy Intern for the Council on Competitiveness. As part of the South Carolina Washington Semester Program, I was able to live and work in Washington, DC for an entire semester. As an Innovation Policy Intern, I had to become familiar with a large variety of subject areas. I was required to manage multiple complex projects at one time and be prepared to speak on those subject areas to multiple audiences. In one week I would research and craft policy recommendations on the bioeconomy for the White House Office of Science and Technology Policy, while simultaneously briefing staff on Artificial Intelligence and Federal R&D spending. The culmination of my internship experience was the National Competitiveness Forum. All semester I identified potential speakers, crafted specific messaging and drafted speaker notes for leaders in government, industry and academia. Due to my in-depth knowledge of the speakers and the Council's platform, I was asked to run the social media accounts for the event and greet important attendees. My International Business classes prepared me to create and interpret complex webs of ideas that involve many players. This enabled me to develop thoughtful strategic frameworks that satisfied the needs of conflicting parties. Throughout my college experience, I went on to take multiple innovation and strategy classes here and abroad. My experiences have led me to stay at the Darla Moore School of Business and pursue a Masters in International Business, with an emphasis on strategic development.

Faulkner, Madisen

Co-Author(s): Meagan Lauber

Mentor(s): Dr. Lauren Fowler, Dr. Matthew Tucker, Dr. Julie Mobley

Identifying the Relationship Between Fatigue and Alertness in Medical Students

Despite the poor physiological and cognitive function caused by fatigue, medical students must remain responsible for their education and patient care. The identification and management of fatigue is vital to personal wellbeing, clinical outcomes, and school or work-related success. For students who have to get up early for school, but have the biological tendency to sleep later, sleep restriction often leads to falling asleep in class, poor attention, and mood disorders. However, research demonstrates that there are cognitive and physiological effects of fatigue, but because physiological fatigue is rarely studied, it is unclear whether these effects are related to either perceived fatigue, physiological fatigue, or both. Indeed, fatigue

in healthcare professionals has been studied extensively, but has most commonly been measured by self-report questionnaires. However, the reliability of these questionnaires poses a challenge, as they are subjective and unidimensional in nature. The current study is designed to assess perceived and physiological fatigue in medical students at different times of day. Thirty medical students recruited from UofSC-SOMG were assessed twice, 12 hours apart. Students self-reported their perceived fatigue via the Epworth and Karolinska Sleepiness Scales (both self-report measures), and we collected pupillometry data as a non-invasive, objective measure of physiological fatigue. The pupilometer measures pupillary response to light to determine fatigue. Data collection is ongoing, but results are expected to show that participants who report perceived fatigue will exhibit increased pupillary constriction as well as decreased amplitude of constriction, indicating decreased alertness. Furthermore, we expect students to be more alert in the morning, compared to the evening session. Overall, we hope to demonstrate that physiological measures of fatigue provide a more accurate representation of the magnitude of fatigue, in comparison to subjective measures, which may allow medical professionals to better appreciate the effects of fatigue on performance and general wellbeing.

Fedel, Gabi

Mentor(s): Ms. Tiffany Conde

Global Learning

In Spring of 2019, I studied abroad and attended the University of Costa Rica in San Ramon, Costa Rica. I was assigned to live with a wonderful Tico (native Costa Rican) host family. I traveled to almost every corner of the small country and gained insight on social norms, both in my new home and through my travels. Growing up in Milton, a suburb North of Atlanta, I always had a strong desire to live in an environment where every experience is unfamiliar. I spent my entire life constructing my reality based on the American experiences that I had encountered. Studying abroad provided me with the opportunity to expand my perspectives on the world and test my personal viewpoints. Through countless discussions over meals with my host family, studying new topics within the university, and busing around the country, I found appreciation for differences and a love for the majority of new social norms. From America to Costa Rica, there are variances in what is socially acceptable. I found some of the Costa Rican norms, one of which being the consumption of cow tongue, extremely uncomfortable. However, I found myself enjoying my newly shifted lifestyle in the majority of the experiences. I never expected the difficulties that came during my time in Costa Rica; breaking almost every single habit or routine I was familiar with in my lifetime proved to be challenging, to say the least. As humans we are creatures of habit. Far too often, we fall into the trance of routine and fail to question our daily choices. As a woman who has always had strong beliefs, studying abroad allowed me to reform and reorder the beliefs that I hold closest to my heart. It is of immeasurable importance that we question the impact of our daily decisions. Together, we co-exist on this diverse planet. Together, we are socially diverse. The more often each of us takes the time to create new stories with different people, the more empathy we are able to give each day.

Felton, O'lvia

Co-Author(s): Savanna Ray

Mentor(s): Dr. Mary Mills

Mosquito Vector and Viral Populations in Aiken, SC

Female mosquitoes require blood meals in order to produce eggs and are able to transmit an assortment of pathogens while blood feeding, which leads to millions of deaths annually. Currently in South Carolina, *Aedes*, *Culex*, and *Culiseta* are vectors of medically important viruses such as eastern equine encephalitis virus (EEEV), West Nile virus (WNV), St. Louis virus (SLV), and La Crosse virus (LACV). Due to their devastating impact, it is critical to know the vector and virus populations present in Aiken, South Carolina.

To assess these populations, mosquitoes from Aiken, South Carolina were trapped in 2019-2020. Mosqui-

tos were captured every two weeks using CO₂-baited, CDC UV light traps and identified to genus using a dichotomous key. To determine potential viral populations in Aiken, SC we optimized a viral detection protocol using RNA extraction of mosquito pools, reverse transcription, and RT-qPCR amplification for viral transcripts. was optimized in order to process sample collected in 2019 and 2020. During optimization, we determined the optimal sample size for processing and amplification of viral transcripts from EEEV, WNV, LACV, SLV, Dengue virus, and Zika virus. Throughout 2019-2020 The most abundant genera of mosquitos found in Aiken, SC in our samples was Aedes and Culex. Viral populations were only identified in Aedes mosquitoes, which varied by month/year and consisted of SLV and/or LACV. Overall, methodologies have been optimized for the efficient identification of potential pathogens from mosquito samples, which is crucial in order to assess risks and prevent future outbreaks our area.

Feng, Miriam

Mentor(s): Mrs. Gina Spence

Real-world experience before in class knowledge

The year before transferring into University of South Carolina, I spent 7 months completing my internship as a Casino Finance Auditor and Anti-Money Laundering Officer at The Ritz-Carlton, Aruba. The internship then led to the opportunity of a part-time position for 6 months as a Casino Finance Auditor before moving to Columbia, South Carolina. While working at The Ritz-Carlton, Aruba, I got to work with various people with different backgrounds as compared to mine, which I was not prepared for and was a culture shock to me. I experienced situations regarding diversity in the workplace, before learning how to approach those situations in a classroom. Even though I was born on the island of Aruba, I grew up with Chinese values and customs, which sometimes can be an obstacle when it comes to communication. An example of a situation where I experienced a cultural difference is when it comes to meeting times. I grew up learning that being early to any events is important as it shows professionalism and respect to the host. Whereas my co-workers were more used to being either right on-time, or a couple of minutes late, which is also known as the "Aruban time". With the combination of this experience and what I learned in the classroom regarding approaching workplace diversity, I feel more prepared to enter the workforce in the future.

Ferate, Kalan

Mentor(s): Ms. Tiffany Conde

Similarities Between the Accessibility of Healthcare in Belize and Disadvantaged Communities in America

Days before COVID-19 caused a pandemic that shut down the world for some time, I traveled to Belize for a medical mission trip. I wanted to gain first-hand experience with assisting in the treatment of patients who come from underserved communities. This was an excellent way for me to gain clinical experience and have a better understanding of healthcare systems in countries other than my own. While interacting with patients in Belize, I took vitals, family history, personal history, assessed their current health state, and learned medical Spanish so that I could have more efficient interactions. I was able to interact with patients who came from different neighborhoods of Nuevo San Juan and San Lazaro Village, Belize. My biggest take-away from this experience is that as a medical professional, you can significantly improve a person's quality of life in one appointment slot. I found that in these underserved communities, you can make a large impact by simply providing people with common over-the-counter medicine and vitamins. While Belize has universal healthcare, much of the country's funding is directed towards Belize City, similar to how the highest quality hospitals and physicians are found in populous cities in America. Finding this similarity between a developing country and my own, I was inspired to work in medically disadvantaged communities in the future during my medical career. These communities commonly also represent minority populations that are oppressed by systemic and institutional racism, impacting them

now and until these issues are resolved. Although I felt that I wasn't able to make a significant impact on the healthcare system in Belize, this experience inspired me to help people in America. I can do this by understanding the hardships of those living in disadvantaged communities who do not have equal access to healthcare and make a conscious effort to assist these communities once I am trained to do so. It is my goal to make a similar impact to the one I made in Belize, but throughout my entire career in America.

Ferrante, Annabella

Mentor(s): Prof. Gina Spence

Learning to be a Leader

The Greek organizations at the University of South Carolina (UofSC) provide students a door into involvement in the community and the opportunity for leadership. My time as an Executive Officer for my sorority Zeta Tau Alpha (ZTA) challenged me as a student and a leader. When I first joined ZTA I felt like I had an opportunity to enhance my experience at UofSC. In my position as Historian and in managing the media for my sorority, I gained experience in my major of public relations while also enhancing my personal knowledge of the subject. At this same time, I was enrolled in a Speech 140 class at UofSC. The combined experience of a public speech class, while speaking in front of the chapter and working on my leadership skills, helped propel me into the position of Historian. The speech class taught me how to present professionally while also focusing on anxiety-management tips. The things that I learned in this class applied outside of the classroom in the ways that I spoke to my sorority and to others. I had my first real leadership role while learning and using speech skills that I will use for the rest of my life. These experiences allowed me to grow as a person, learn to communicate effectively, and meet the people who shaped my college career. My presentation will discuss the things I learned about myself as a leader, as a student, and the ways that Greek life allowed me to expand my experience in many positive ways.

Finnerty, Turner

Mentor(s): Ms. Sarah Matthews

The Role of the Ambassador to Empower

Proper representation of our university is instrumental in the long-term success and reputation of the school. Both the internal and external perception of the students, faculty and staff play a crucial role in the success of our alumni and recruitment of top-performing perspective students. My most significant contribution to the University of South Carolina has been my time as a Darla Moore School of Business Ambassador. My commitment to representing the university well has allowed me to interact one-on-one with students, alumni and donors including our university's largest benefactor, Darla Moore. This experience has given me the skills of leadership, effective communication which I further developed through my Professional Communication course and forced me to think critically to solve complex issues as well as provide clear and concise information without prior preparation. My time as an ambassador has not only prepared me for success in the business world but has given me a platform to leave my mark on the university and empower to future leaders of my alma mater.

Fisher, Kirsten

Mentor(s): Dr. Johannes Stratmann

Perception of Green Leaf Volatiles

Green leaf volatiles (GLVs) are a class of compounds containing six carbon atoms and either an alcohol, aldehyde, or ester functional group. Upon attack from herbivores, plants release GLVs which can be recognized by other parts of the plant or neighboring plants to prepare them for a defense response. However, it is not yet known how GLVs are perceived by plants. Most stress signals released from plants are known to bind to a membrane bound receptor and activate defense signaling resulting in membrane depolar-

ization, change in extracellular pH, fluxes of Ca²⁺, MAPK signaling, and generation of reactive oxidative species. Since GLVs activate the same signaling network, GLVs should also bind to a membrane-bound receptor. In the present study, the effects of three GLVs, trans-2-hexenol, cis-3-hexenol, and cis-3-hexenyl acetate on the extracellular pH of *Solanum peruvianum* suspension cells were determined. All three GLVs caused a concentration dependent pH response in the SP cultures, but the dynamics of the pH changes were specific for each GLV. To determine where the GLVs are binding, click chemistry will be used to label mini-tagged GLV derivatives with a fluorescent probe which can be visualized by fluorescent microscopy. In order to do this, the bioactivity of the GLV derivatives must first be determined by comparing the pH response of the derivatives to its parent molecules. In this study, the bioactivities of bromide-tagged cis-3-hexenyl acetate derivatives were tested by comparing their pH response to the parent molecule, cis-3-hexenyl acetate. It was found that the bromide derivatives did induce a pH response and were thus bioactive. These results will help in developing bioactive mini-tagged GLVs that can be used in click chemistry to determine where GLVs bind in the cell and to isolate GLV receptor proteins.

Fishman, Elyssa

Mentor(s): Dr. Stephanie Milling, Ms. Lindy Beaver

The New Perspectives Found Through Travel

During the spring semester of 2020, I traveled the world by ship with Semester at Sea (SAS). I waited my entire life to take this voyage because my father sailed with SAS in 1980. He frequently talked about his incredible global adventures, so I could not wait for my journey. The itinerary was scheduled to visit 14 countries, but due to COVID-19, we went to four—Japan, Vietnam, Mauritius, and South Africa. I studied war journalism, culture, geography, and the environment. I grew so much through these few months; I developed stronger teamwork skills and resilience while living in close quarters with students and faculty from across the globe during the difficult and uncertain times that a pandemic brings.

Traveling while studying these subjects gave me the real-world experience that I could not have gotten without comparative learning. Travel enables deeper empathy. Surrounding myself with diverse people enabled me to develop a greater understanding of the world and other cultures. I hope to use my new insights to connect people from all walks of life because I found that we are more similar than we are different.

Flanagan, Erin

Mentor(s):

Using Relationships to Extend Knowledge

As an early childhood education major, I have had the opportunity to partake in many conversations about educational practices and theories and then had the opportunity to try these theories firsthand in classrooms. In the Fall of 2020, I was a student teacher at Satchel Ford Elementary School in a kindergarten classroom and then in the Spring semester I was moved to a first grade classroom. Being in a school as it transitioned from virtual to in person has heightened my realization of a belief that has become the cornerstone of who I am as an educator. Every child comes to school with knowledge and it is the teachers job to find that knowledge, tap into it and help them grow it, the best way to do this is by creating relationships with your students and their families.

A defining moment that taught me this was when I was at recess with the students. A young girl in my class who is below grade level in both math and reading began talking to me about the bugs she was seeing and the trees. From our conversation I could tell she knew a lot about these things and decided to use it as a teaching moment. In writing, the students were learning how to write nonfiction and were asked to choose a topic they could create an “All About” book on. The student and I agree she should write “All About Bugs”. Since then she has been very engaged in writing class and I can see her developing phonemic awareness to help her create her book.

In my final year of school before I join the professional field, I have spent a lot of time reflecting on the kind of teacher I want to be. I want to be the teacher whose students know she believes in them and values what they know. Building relationships and not looking at students, or people, from a deficit perspective will allow me and them to reach our goals.

Flannery, Thomas

Mentor(s): Ms. Gina Spence

Educational Unorthodoxy and the Value of Disruption.

My poster will be about my experiences as a University 101 Peer Leader, my experience teaching, and how educational unorthodoxy helped me during my two years teaching. I will first talk about how this experience helped shape me into an educator, which I am attending grad school for in the fall, and how it helped me find my passion for educating in an environment far more unique than other student teaching opportunities. This will allow me to transition into talking about the University 101 program, why it is so important to both me and USC as a whole, and how it differs from other classes via factors such as check-ins, study days, etc. Finally, this will allow me to talk about how, as an educator, I can translate my skills learned from this BTC experience into my future career and teaching pedagogy.

Fleischmann, Brianna

Mentor(s): Dr. Tracy Skipper

Catering to Multiple Learning Styles

During the previous two summers, I worked with a small software development company called CadmiumCD that develops event planning software. As a training management intern, I worked with project managers to create training documents for clients that outlined the common processes and questions. As a peer leader here at the University of South Carolina, I have had to take multiple different learning styles and activities into account when communicating processes. I learned multiple different approaches for incorporating information in informative ways for multiple individuals. Through both of these experiences, I was able to experience the applications of learning accommodations across several different media platforms. Participating in this internship has reaffirmed my decision to help people through clear communication and utilization of multiple different resources. My presentation will discuss the insights I gained about communication and learning as well as the impact that my internship had on my college experience and shaping me for my future career.

Flores, Christine

Mentor(s): Dr. Alice Holland

HealthCare Safe Zone Ally Training Pilot

Members of the LGBTQ+ community have unique health needs that differ and vary from their cis-gender and heterosexual counterparts. A history of systemic marginalization, exclusion, and discrimination in healthcare exists today and affects access to care for LGBTQ+ individuals. Numerous health disparities stemming from a lack of culturally competent care affect this minority population. Consequently, this can predispose members of the LGBTQ+ community to multiple health risks due to fear of stigmatization. Many health care providers do not receive formal training, adding discomfort and reluctance of this marginalized group in sharing sexual orientation, behavior, or gender identity with members of the health care system. To address the lack of training, a pilot Health Care Safe Zone Ally training was developed as an honor's component and was presented to a cohort of students majoring in Nursing and Public Health on the USCB campus. The training introduced and provided application for use of terminology and concepts related to gender identity, gender expression, and sexual orientation. The training applied common LGBTQ+ language, utilized invitation counseling theory, listed health disparities, and developed strategies

for allyship. The purpose of the training is to create a deeper understanding and increased awareness of concepts and language regarding LGBTQ+ communities. After each session, attendees completed a post training questionnaire. The pilot included a total of 35 participants. Participants found the session to be enlightening as many were not consciously aware of their own privileges. The overarching themes among the responses were to provide education and spread awareness. These training sessions introduced new concepts of which can be later brought into the workforce.

Fowler, Olivia

Mentor(s): Dr. Kelly Goldberg

Evolutionary Research of *Australopithecus anamensis*

New discoveries made in 2019 suggest that *Australopithecus anamensis*, a species who lived about 4.2 to 3.8 million years ago, has the potential to change how anthropologists view a critical point in early human evolution. Thus, it is crucial to have a complete survey of the current knowledge available in relation to *Australopithecus anamensis*. Through thorough review of the significant fossil findings and the analyses conducted by biological anthropologists, I will gather and summarize the existing information surrounding *Australopithecus anamensis*. These findings will provide overall understanding on primate evolution and the story of *Homo sapiens*.

Franklin, Brandon

Mentor(s): Dr. Robert Moore

Examining recovery trajectories for Patients with & without convergence insufficiency

Patients who have experienced a concussion, often require post-recovery assistance for improving vision, balance and proper binocular functioning. For my Discovery Day project, I will be presenting an overview of my research topic that involves examining the recovery trajectories for patients with and without convergence insufficiency. My research topic, Convergence Insufficiency simply means, the inability a patient has towards maintaining both eyes to work effectively together, while looking at a near distance object along with one eye often experiencing intermittent exotropia (turning oppositely outward toward an object).

Within my presentation I plan to discuss my major significant findings according to the statistical data used for examining patients with convergence insufficiency and also those who do not have it. I also plan to use my third key insight which plays a role towards this research project. My third key insight focused on the use of networking, towards achieving a set number of goals. During my within the classroom experience I was required to work with a group of fellow classmates on a class critique project. Similarly, to working on group project with my classmates, I also had to work with my fellow research team members in order to access the statistical data that involved patients with and without convergence insufficiency. I remember during research, I had to discuss why some statistical data were present and also if it was significant or not. My beyond the classroom experience for my third key insight, taught me the importance of how networking allows for proficient collaboration skills, effective communication and also how to use these skills towards working with others in a team.

As I conducted my research project, the skills learnt from within the classroom along with beyond the classroom, prepared me for becoming better at networking, communicating and working together with others for examining the trajectories within patients that do have convergence insufficiency versus those who do not.

Overall, the use of these skills and experiences learnt from within the classroom along with beyond the classroom allowed for a more meaningful research project.

Freglette, Cameryn

Co-Author(s): Natalie Long, Benjamin Leslie

Mentor(s): Dr. Svetlana Shinkareva, Dr. Doug Wedell, Ms. Sewon Oh

Sounds to chew on: A stimulus development study

Misophonia is a behavioral phenomenon that manifests itself as an exaggerated negative response to certain sounds. The aim of this project was to generate a set of stimuli for future research. The stimuli consisted of typical misophonia triggers (e.g. chewing), aversive (e.g. singing off tune) and non-aversive (e.g. pleasant singing) audiovisual stimuli. Each stimulus was 5 seconds in length and had clearly identifiable auditory and visual components. Misophonia triggers include eating sounds such as biting an apple, breathing sounds such as snoring and coughing, and sounds of repetitive tapping, such as clicking a pen. Three researchers generated the stimuli. These stimuli will be validated in a behavioral experiment where participants will rate auditory and visual components and audiovisual stimuli on how aversive or non-aversive they are. The stimuli set will be used for future research on misophonia.

Freitas, Alison

Mentor(s): Ms. Theresa Harrison

Learning About Culture Through Travel

In Spring 2019 I was a student on the Business in Central Europe Maymester through the Darla Moore School of Business. It was an 11-day trip throughout Austria, Hungary, Slovakia, and the Czech Republic visiting cultural sights and businesses such as Raiffeisen Bank, Johnson & Johnson, GE, OPEC, and the UN. I decided to go on a Maymester because I wanted to gain experience traveling outside the United States without family or friends before going on my semester abroad in spring 2020. Since the Maymester counted for one of my International Business course requirements, it was a natural fit. While on the trip I learned a lot about the culture of central Europe and developed an appreciation for the local food and history. Additionally, the business environment is much more relaxed in this area of the world compared to businesses in the US. This experience helped me learn how to navigate unfamiliar situations and a country where I do not speak the language. Everything I learned made me more understanding of the general and business culture of this area. For example, Austria cares more about family and home life than work so stores close down much earlier than stores in the US even in major cities. Very few things are open Sundays or later in the evening which came as a surprise to me. Because of this trip, I am now more comfortable and capable of traveling in unfamiliar areas. I want to show others the importance of understanding a place and not being afraid to go somewhere new. The next step for me is to begin a career in international business and this trip has helped prepare me.

Frick, Marla

Mentor(s): Dr. Jim Fadel, Ms. Brandy Somera

Changes in microglial activation following orexin loss

The basal forebrain (BF) is comprised of several nuclei including the substantia innominata, medial septum, nucleus basalis and diagonal band of Broca which are involved in cognitive functions including attention, motivation, and arousal. BF neurons are particularly vulnerable to dysfunction and degeneration in aged humans and, more dramatically, in diseases such as Alzheimer's disease (AD). Age-related BF dysfunction may reflect diminished neuronal regulation as well as an altered local glial environment. We have previously shown reduced orexin/hypocretin innervation of BF in aging, a phenomenon that may link afferent dysfunction with altered microglial homeostasis. There is little research examining these relationships involving afferent neuronal and glial cell populations in the BF as it relates to aging. The purpose of this study is to compare specific neuronal and glial populations to identify anatomical factors susceptible to age-related homeostatic dysfunction in the BF. To show that loss of orexin afferents

affects inflammation in the BF via microglial dysregulation, we administered a miRNA-expressing lentivirus designed to knock down orexin expression (LV-prepro-OX) in the BF in young and aged rats. We then analyzed phenotypic changes in microglia using immunohistochemistry and ELISA against a panel of pro- and anti-inflammatory cytokines. Our results indicate changes in morphological and cytokine correlates of microglial activation. Together, these studies compare specific neuronal and glial populations of young and aged rats to identify anatomical factors susceptible to age-related dysfunction.

Gambardella, Kristen

Co-Author(s): Julia Budiongan, Emily Loud

Mentor(s): Dr. Sayward Harrison

“HPV, never heard of it!” : A Systematic Review of Human Papillomavirus (HPV) Perception, Awareness, Knowledge and Associated Characteristics of South Africans

Background: This systematic review synthesizes the results of various studies conducted in South Africa regarding HPV awareness, knowledge, attitude, belief, or practice as it relates to the virus itself along with its risk factors, prevention, and HPV-related cancers.

Method: Using a systematic approach, the authors reviewed all literature published between January 2009 and February 2019 using five electronic databases (PubMed, CINAHL, PsycINFO, Web of Science, and Embase). Inclusion criteria required that articles be published in English, be peer reviewed, and discuss HPV knowledge, awareness, beliefs, acceptability, or practice in South Africa. Analysis is on-going.

Results: Nineteen articles met the inclusion criteria for this review. Characteristics of age, gender, setting, and education levels were considered significant in terms of awareness of HPV. By looking at the associations between HPV-related knowledge and demographic characteristics, we found that those with certain characteristics found in different sub-populations of South Africans are less knowledgeable about HPV compared to others.

Conclusion: There are many gaps in HPV-related knowledge among South Africans of all demographics, and it is essential that future interventions target all people living in South Africa. More specifically, the involvement of men in HPV prevention efforts is pivotal.

Garcia, Catherine

Mentor(s): Prof. Joanna Casey, Dr. Karen Smith

An Analysis of Ceramic Vessel Form and Function at the Pockoy Island Shell Rings

Four thousand years ago, Late Archaic peoples along the coasts of South Carolina and Georgia accumulated mollusk shells into enormous, circular structures known as shell rings. The purpose of these rings has been a subject of archaeological debate for decades, with no clear consensus as to whether they are accidental accumulations of domestic refuse, or intentionally constructed landscape markers with ceremonial or symbolic meaning. This paper presents the results of a morphological and functional analysis of ceramic vessels excavated from the Pockoy Island Shell Rings, a double shell ring site located on the shore of Edisto Island, South Carolina, in order to understand the social activities that took place there, as well as to compare these results to ceramic assemblages from similar shell ring sites. Digital modeling software was used to identify vessels and their potential functions, in order to expand our understanding of Late Archaic ceramics and what they can tell us about the social activities that took place at the site. The results suggest an assemblage of vessels of generally greater size than those normally found at coastal Late Archaic sites, as well as the presence of previously undescribed vessel forms. From a social perspective, the results also suggest that Pockoy Island was much more than just a habitation site.

Garcia-Civita, Andres

Mentor(s): Mr. Rico Reed

An International Education Drives Harmonious Living

Technology is bringing people closer together than ever before. The human experience is becoming intrinsically cross cultural. History is overwhelming filled by destructive events driven by the outdated human desire to dominate. Internationally guided educations rewrites the human script by teaching individuals to value of pursuing and living amongst diversity. The future is in the hands of leaders who seek to embrace and learn from others. In this reflection, I have analyzed how my education has prepared me to be a forerunning leader in this transformation through my journey with effective communication, a transnational mindset, and development of soft powers. Growing up in an international household, I have always seen the power of cultures building on the strengths of one another. The world is flattening and people are joining hand. Are you in?

Garland, Whitney

Mentor(s): Dr. Casey Goldston Giraudy

Enacting Positive Change on Multiple Levels Through Leadership with a Social Work Lens

Social workers are involved in a range of roles, from direct practice to national advocacy. In my four years at Carolina, I have been involved in leadership in a number of student organizations. I have learned so much about motivating others, communication, and my capability for leadership in these positions. However, I have also learned that there are many ways in which creating positive and lasting change is difficult. To truly have an impact on others, you cannot focus on only the group as a whole or only on individual people involved. My social work education has focused on the importance of work with individuals, groups, and communities. It has been emphasized that you cannot help a person to the best of your ability if the larger systems in place are working against them. Through leadership, I have coupled my knowledge of social work systems with my leadership experiences to help my peers, our campus, and our community. I was able to apply this knowledge when I created and subsequently filled the position of Mental Health Chair in my sorority, Delta Zeta. On an individual level, I created ways to reach out to chapter members and provide help, on a group level, I facilitated small groups for mental health discussions, and on a larger scale, I was able to share about relevant mental health topics with the whole chapter. I found that creating programming and support on each of these levels increased the effectiveness of the work and fostered relevant discussion of mental health both within and outside of the chapter. Not only was I helping those within my chapter, but I was able to equip them with the skills to share their knowledge on these topics with our greater campus community. My presentation will discuss the lessons I have been able to take from inside my social work classes, how I have applied them to my work with student organizations, and how my pursuit of making a difference has made me a more well-rounded leader.

Garvin, Catherine

Mentor(s): Dr. Chris DeWitt, Ms. Gillian Quinn

BMI Relationship to Forced Vital Capacity (FVC), Forced Expiratory Volume (FEV1), and Forced Expiratory Flow (FEF) in University Students

There are two specific types of pulmonary disease that Pulmonary Function Tests (PFT) spirometry can detect: restrictive and obstructive. Three PFTs were performed for this study, Forced Vital Capacity (FVC), Forced Expiratory Volume (FEV1), and Forced Expiratory Flow (FEF). The purpose of this study is to determine a body mass index (BMI) relationship to Forced Vital Capacity (FVC), Forced Expiratory Volume (FEV1), and Forced Expiratory Flow (FEF) in University Students. It is hypothesized that as body mass increases, pulmonary function decreases. Obesity reduces lung volume capacity which can reduce functional residual capacity of an individual. It was found that there is a slight correlation between BMI and

FVC, FEV1, and FEF with a definite trend.

Purpose: To determine the effect of BMI on Pulmonary Function in University Students.

Methods: Body mass index, age and gender were collected from 100 subjects. Lung function was measured using a digital spirometer. The recordings of the spirometry test were recorded, averaged and extrapolated into a linear graph.

Results: There is a moderate yet not statically significant relationship between BMI and FVC ($r = -0.46$), a moderate to weak relationship between BMI and FEV1 ($r = -0.39$) and FEF ($r = -0.33$). Lung function decreases as the BMI increases as measured by FVC, FEV1 and FEF.

Conclusions: While not statistically significant, we found that FVC, FEV1, FEF all decrease as BMI increases. The strongest trend was the inverse relationship between BMI and FVC.

Gaskins, Emma

Co-Author(s): Sierra Staton, Jayme Banfield, Magdalena Moskal

Mentor(s): Dr. Mariah Kornbluh

Youth Empowered Solutions to COVID-19 (YES CV19)

Community psychology provides a needed perspective in understanding the impact of natural or public health disasters on individual's health and well-being (Dittmer & Reimer, 2012; Glass et al., 2009; Kilmer & Gil-Rivas, 2009; Reimer & Reich, 2011). Adolescent mental health needs are often overlooked during public health crises and are disproportionately affected by COVID-19 (Power et al., 2020). During this time of stress, isolation, and stagnation, adolescents have experienced a loss in support networks from the closing of schools, restricted contact with family and friends, and disruption of access to healthcare services (Fegert et al., 2020; Rhodes, 2020). The importance of cognitive, social, and emotional development in adolescents is heightened with a need for social connectedness and social identity (Power et al., 2020). Adolescents who are vulnerable or marginalized are at even higher risk as COVID-19 has exacerbated social disadvantages and mental health disparities. A recent study found that 25.5% of participants aged 18-24 reported suicidal considerations during the COVID-19 pandemic; 33.7% of whom were minority racial/ethnic groups (Czeisler et al., 2020). Traumatic loss combined with resource inequity during COVID-19 could be risk factors for long term health outcomes, especially for adolescents with multiple identities tied to systems of oppression (e.g., the closing of academic, social, and health support programs for LGBTQ youth). Applying an intersectional lens to learn from these diverse experiences will help further the understanding of the impact of COVID-19 and inform different forms of action for adolescents in terms of their intersecting social identities (Ryan & Ayadi, 2020).

This presentation explores the impact of COVID-19 on adolescent health and well-being. This presentation will consist of applying an intersectional lens: 1) reviewing literature surrounding public health crises in relation to adolescent health, 2) presenting preliminary findings from qualitative interviews and surveys, 3) and highlighting implications surrounding community intervention design and support regarding future natural or public health disasters.

Gately, Natalie

Mentor(s): Mrs. Gina Spence

The Value of Relationships in High-Context Cultures

As a Marketing major with a concentration in Business Data Analytics and a minor in Spanish, my decision to study abroad in Salamanca, Spain enabled me to apply what I had learned in a theoretical context in my past three years at the University of South Carolina in a more hands on and interactive environ-

ment in Spain. I had always wanted to find a way to incorporate the two dimensions of my studies at UofSC, both business and Spanish, and in the Spring 2020 semester I was able to make this a reality by enrolling in a mixture of both these classes at the Universidad de Salamanca as well as choosing to live in a homestay. I was even more excited to reside in a Spanish homestay when I recalled the concept of high and low-context cultures from a Consumer Behavior marketing class I took at UofSC. Living in the low-context culture of the United States for all my life, I was excited to not only venture out to Europe for the first time, but also to live in Spain and experience its high-context culture that was so different from back home. The semester of living with my host abuela and taking classes with Spanish locals taught me the value of relationships in high-context cultures. I hope to one day continue my postgraduate education abroad, and knowing the importance of relationships in high-context cultures and how to navigate them will be useful in providing a seamless transition and positive experience.

Gatton, Kellen

Mentor(s): Mr. David DeWeil

Understanding is Belonging: The Path to Call Carolina Home

The transition from high school to college can be hard. When I began attending the University of South Carolina four years ago, I had a really difficult time adjusting to my new life in Columbia and I wish that I had someone to help me along the way. During the fall semester of my junior and senior year, I had the distinct privilege of serving as a University 101 (U101) Peer Leader where I got to be this someone for another group of students. A U101 Peer Leader works with a university faculty member to co-instruct a class of 19 incoming students. In my role, I specifically helped create weekly lesson plans, facilitate classroom community builders, and offer an upperclassmen's perspective to classroom conversations. However, one of the unsaid benefits of being a Peer Leader revolves around the individual relationships built with each student in and out of the classroom through shared vulnerability, mutual respect, and empathy. Through these relationships, I was able to help our big university feel a little smaller and ensure that my students knew that they had a place that they belonged. I like to think that my time spent as a Peer Leader left a big impact on my students' lives, but I think it's more accurate to say that they left a bigger impact on mine. My time as a Peer Leader not only allowed me to further develop and improve my confidence, public speaking, facilitation skills, and ability to work with different personality and leadership types, but I was able to establish lasting relationships with 38 new peers that are now making their way to call Carolina home through their own involvements. Through my experience in this role, I know that I want to be able to continue impacting positive change in other's lives and will use my transferable skills from this role in my future career.

Gergick, Lauren

Mentor(s): Dr. Andrew Gross

3D Printed Ceramics Compatibility to ASTM Standards

Ceramic materials have a variety of useful properties such as chemical resistance, a high dielectric constant, scratch resistance, and excellent thermal stability. Unfortunately, many applications which could use such features are unable to take advantage of them due to the brittle nature of ceramics. As researchers look for ways to overcome ceramic brittleness, it is firstly important to understand properties at the root of potential failure: fracturing. This project aimed to analyze the fracture toughness of 3D printed ceramics, as printing could be a viable means of manufacturing. However, through attempts to assess fracture toughness of 3D printed specimens following American Society for Testing and Materials (ASTM) standards, it was found that printing fracture specimens is complicated by the delicacy of the specimens before firing, warping and shrinkage that occur while firing, and high porosity after firing.

Giandana, Rose

Mentor(s): Mr. David Deweil

Organizational Effectiveness At Its Core

For the past four semesters, I have worked as a Peer Tutor at the Student Success Center (SSC). My time working at the SSC has by far been the most rewarding experience of my college career here at the University of South Carolina. In my role as a Peer Tutor, I facilitate student learning by clarifying specific course content, modeling the use of appropriate study strategies, and assisting students in becoming independent learners. I support several academic courses that I have already taken and received an A in and I aim to get my tutee's closer to achieving their goals for academic success. Also, I was recently promoted to a Tutoring Program Assistant and Mentor position (also known as a PAM). In this role, I continue to be a Peer Tutor for 9 academic courses while also organizing tutoring resources, co-facilitating staff meetings, observing and providing constructive feedback to tutors, and training and supporting Peer Tutors who are new to the role. Through my experience as a Peer Tutor and PAM, I have learned to think critically to solve problems, interact with a diverse range of students, and communicate effectively. Most importantly, I have been able to contribute to a vision much bigger than myself; The Student Success Center's vision is to empower students to achieve their academic and personal goals via opportunities for enhanced learning, interpersonal development, personal responsibility and leadership. It is truly an honor to be a part of achieving this meaningful goal. Some of my job as a Peer Tutor and PAM in particular involves important aspects of human resources, especially training and development. My experience working in these roles at the SSC has reaffirmed my passion for helping people and my decision to pursue human resources as a career. My presentation will discuss the insights I have gained about my leadership abilities, the positive impact my time at the SSC has had on myself and my college career, as well as how I applied what I learned in my Talent Management (MGMT 405) class to my tutoring roles.

Gikiri, Wanjiru

Mentor(s): Ms. Ambra Hiott

The Importance of Understanding Organizational Structure Prior to Entering the Business Industry

In the summer of 2019, I had the opportunity to work at The Masquerade, a small music venue in Atlanta. During this internship, I was tasked with several managerial tasks one of which included creating several spreadsheets organizing the artists coming to the venue. In addition, I was in charge of handling the social media pages for the venue and creating target market groups for promotional purposes. Being a Sports and Entertainment Management major, this experience introduced me firsthand to the entertainment industry specifically the business sector of the industry. I was able to learn how the entertainment industry handles artists, marketing, and all business activities. Throughout my internship, I was able to use the concept of organizational structure that I learned throughout my college career. The concept of organizational structure and understanding the culture of business environments affected my ability to succeed throughout my internship. In addition, I was able to learn how to effectively communicate in a business setting. I also learned how to create work that can be utilized throughout the whole company. Most of my work encompassed creating target markets to be utilized by my boss in order to market to the right people. This was done by searching up similar artists to the ones coming to the venue then indicating which people like those artists. My boss was then able to direct certain advertisements to those people. I also was allowed to work on more managerial tasks. I was given the opportunity to create spreadsheets that organized the information about each artist coming to the venue. These spreadsheets had all the information easily displayed about any artist coming to the venue. This internship provided me with a plethora of skills that I will be able to utilize throughout my whole career; solidifying my interest to work within the entertainment industry.

Gilbert, Rachel

Mentor(s): Prof. Elise Lewis

The Spark of Education

I believe that education is the most important and fundamental aspect of our lives. Wherever we are, whomever we are with, and whatever we may do - there is always an opportunity to learn something new. I have built this perspective from my experiences as a Supplemental Instructor for PHIL 114 (Introduction to Formal Logic I) and working as an intern for Historic Columbia. In studying and teaching formal logic through peer-learning techniques, I was helping my peers succeed and seeing growth in myself. In each study session, I saw how reasoning and analytical processes are translated to real life situations for learning. My time as a Supplemental Instructor taught me not only how to manage a job and be a college student - but how to tutor, engage people, communicate, and work for a larger goal of fostering education. Working for Historic Columbia showed me how education functions outside of a traditional classroom. I was using my techniques and new understanding to create purposeful change in students in the Columbia community. My simple appreciation for teachers and educators grew into a deeper understanding of the impact that valuable and productive experiences have for students of all kinds. A little engagement, encouragement, and spark of interest can produce excitement in learning that lasts for a lifetime. I hope to make positive impacts in education through my continuation of my education in attending law school. I want to be able to understand more about myself, policy, and education so that I can be a mover and shaker in the world of education policy.

Gill, Aideen

Mentor(s): Dr. Roozbeh Behroozmand

Evaluating Clinical Applications of Neurostimulation as a Treatment for Disorder Through Analysis of Speech and EEG Data

Neurological disorders commonly impact sensorimotor integration processes and result in impairments to mechanisms of speech output and motor control. Non-invasive neurostimulation techniques such as tDCS are beneficial treatment options for many patients as they provide targeted modulation of cortical brain regions linked to disease pathology. This directed current can apply excitatory or inhibitory stimulation to facilitate the affected sensorimotor responses and provide insight into the pathophysiology of these conditions. The efficacy of this technique in treating disorders of speech and motor control can be assessed through behavioral and neurological studies conducted with patients to extract data sets of RT and cortical signal measures that can be modified and analyzed. A MATLAB software toolbox designed to filter and analyze EEG sets can be employed to pre-process and visualize electrode channel data over time domains of interest. ICA allows for components containing artifacts to be detected by an algorithm given recordings of spatial and temporal features for each channel and removal can be manually confirmed. A summation of this ERP data for all subject trials at a particular stimulus can then be plotted and visualized through 2D head-maps. The power of neural oscillatory signals throughout stimulus onset corresponding to the activity of alpha and beta bands is also assessed through TF analysis as they are believed to play a role in motor control. These ERP, TF and RT measurements can be condensed across subjects for a specific task to enable comparisons between groups and statistical analysis of independent components. Tests of significant differences (ANOVA) can be conducted to investigate the influence of stimulation methods on performance and correlation and linear regression analysis can indicate relationships between RT and ERP amplitudes or the power of neural oscillations. The conclusions of these statistical analyses can provide potential insight into the optimal direction of current flow, stimulation intensity and target brain locations for effective modulation of motor mechanisms. These methods are a promising means of evaluating the application of neurostimulation as a clinical treatment and identifying the underlying sensorimotor integration mechanisms related to these neurological disorders.

Glover, Kaitlin

Mentor(s): Dr. Matt Kimball

Juvenile brown and white shrimp seasonal occurrence and growth in a warm-temperate estuary over the last 35 years

Brown (*Farfantapenaeus aztecus*) and white (*Litopenaeus setiferus*) shrimp are two ecologically and economically important species in estuaries and coastal waters of the Southeast US Atlantic and Gulf coasts. Both species are abundant, omnivorous consumers, and support large commercial fisheries across their range. Adults reproduce in nearshore waters and their larvae are transported into estuaries by tides. In South Carolina, young shrimp arrive in estuaries in spring (brown) and summer (white), where they remain until late summer (brown) and fall (white), at which point they migrate back offshore, entering the harvested population. Their time spent in the estuary is a critical period where individuals grow and develop, but few studies have examined long-term patterns of occurrence and population dynamics for these species in the shallow, tidal estuarine nursery habitats. Therefore the goal of this project was to use a 35-year record (1984-2018) of juvenile brown and white shrimp, catch and length from the Oyster Landing intertidal creek basin in the North Inlet estuary to examine changes in juvenile shrimp phenology (timing of occurrence), catch, size, and growth. In addition, the association between observed patterns in these shrimp populations and environmental conditions (e.g., water temperature and salinity fluctuations, storm events, etc.) throughout the 35-year study period was examined. This long standing date and avenue of research will help us better understand the function of this important estuarine nursery habitat for brown and white shrimp, as well as other fish and invertebrate species that rely on these estuarine habitats in this region and throughout the US Atlantic and Gulf coasts.

Glovins, Maura

Mentor(s): Dr. Katherine Ryker

Understanding undergraduate perceptions of learning in the geosciences the Student Perceptions of Earth Sciences Survey (SPESS)

A major goal of undergraduate courses is to transform students from novice thinking to thinking that reflects experts in their field. This change in perception not only focuses on how content is learned, but how it is applied to real-world settings. The Student Perceptions of Earth Sciences Survey (SPESS), created by Jolley et al., evaluates student perceptions of learning in the geosciences, and assigns a quantitative measure to student thinking on the novice-expert continuum. The SPESS survey is composed of 29 statements in different 7 categories. These categories measure memorization, science and society, mathematical problem solving, personal interest, skeptical reasoning, conceptual problem solving, and human-science interaction. The survey was distributed to UofSC undergraduate students taking MSCI 101, MSCI 102, and GEOL 101 in the Fall 2020 and Spring 2021 semesters. Student perceptions of geoscience learning were tracked linearly to observe how perceptions changed throughout the beginning, middle, and end of the course, and from semester to semester. Comparisons were also made across gender, instruction method (face-to-face vs. online synchronous vs. online asynchronous), and major. A trend that appeared in the Fall 2020 semester data was the face-to-face GEOL 101 class scored higher (i.e. more expert-like responses) than the GEOL 101 online class in every category except for Conceptual Problem Solving. Exploring this trend is important in understanding the impact online learning has on moving students to expert-like thinking, especially with the increase in online courses due to the COVID-19 pandemic. Focus groups will be conducted after the midpoint of the Spring 2021 semester to help understand this difference in learning perceptions between instruction methods, and paint a clearer picture of student SPESS responses, in general.

Golden, Kennedy

Mentor(s): Dr. Phyllis Raynor

Impact of Cultural Mental Health Stigma on Undergraduate African American College Students and Methods of Coping

The stigmatized cultural perception of mental health disorders/illnesses is deeply engrained into African American culture and society. This stigma may negatively impact African American college students' emotional and psychological well-being and pose a significant barrier to help-seeking behaviors for African American college students. Studies have shown that African Americans view mental illness as highly stigmatizing, resulting in low treatment-seeking (Ward, Wiltshire, & Detry, 2013). This study will gather data from enrolled African American college students to exploring coping styles, cultural mental health stigma, and help-seeking behaviors. The goal of the project is to further understand the impact of mental health stigma on the mental health of African American college students, and how it influences their coping styles. It is crucial to understand the relationship between cultural mental health stigma and coping as it relates to the mental health and help-seeking behaviors of African American college students.

Goldsmith, Andrew

Mentor(s): Dr. Kelly Goldberg

The Flores Man: findings on the "little" known human relative, *Homo floresiensis*

The purpose of this study is to highlight the history and anatomical features of the *Homo floresiensis*, while also bolstering the argument for variation in human evolution. Nearly 20% of all Americans do not believe in evolution of any kind. This widespread denial has spurred many schools to prohibit its teaching, despite the overwhelming evidence for its role in biological variation amongst all species. Thus, studies like this, which acquaint audiences with ancient human relatives, are essential in reducing the stigma of evolution and normalizing the concept of human evolution. This study will identify *Homo floresiensis*' place in the phylogenic development of humans and will utilize the most current research available to create a comprehensive understanding of the species. The information acquired in this study will reveal a species with mild, but important variations from current human beings, while further supporting evolutionary theory.

Gordon, Samantha

Mentor(s): Dr. Hannah Rule

Investigating secondary educators' perceptions of social media literacy and its classroom integration: a qualitative survey inquiry

Social media literacy is an emerging field that overlaps with the better established fields of media literacy, critical media literacy, multimodal literacy, and information literacy, yet remains distinct from them. Acknowledging the need for social media literacy appears to be rising within the educational community, both due to students' increasing use of social media as well as heightened public and political discourse discussing social media's effects. Yet, minimal research exists regarding the views of social media literacy within the educational community. This study aims to survey a group of secondary educators within a relatively affluent, metropolitan, mid-atlantic school district regarding their perceptions of social media literacy and its integration into classrooms. Currently within this district, social media literacy may be integrated at an educator's discretion, but is not a standard requirement. The goal of the study is to analyze trends as to whether secondary educators view social media literacy as an interdisciplinary or content-specific literacy; whether they believe it currently exists as such in their secondary classrooms; whether they believe it has potential to; and to identify the demographics of the participants that may inform how they perceive these questions on social media literacy. The results of this study offers insight into how trends emerge amongst educators regarding perceptions of social media literacy, and how these

trends relate to their demographics. In particular, this study has the potential to provide context as to the relationship between the current state of social media literacy and how educators envision its potential in the classroom. Their responses provide context as to the practicality to reach this potential from an educator's viewpoint, if they view it to be of value at all.

Granger, Allison

Mentor(s): Prof. Anne Bezuidenhout

Appositive Relative Clauses and Their Prominence in Discourse

Appositive relative clauses (ARCs), such as the italicized clause in 'My friend Sophie, who is a classical violinist, played a piece by Mozart,' provide information about the thing denoted by the relative pronoun ('who' in the example above). It is often assumed that ARC information is background information. However, we have found that the type of ARC can alter the prominence of the information it contains. In particular, whether the clause is a continuative ARC or a relevance ARC has an effect on what is taken to be the prominent or "at issue" content in the conversation. A continuative ARC continues the narrative with the next event while a relevance ARC provides contextual information to the reader. We will be building off of this idea, expressed by K. Syrett and T. Koev, 2015, in regards to their work with the shifting information status of appositives. This new experiment evaluated the prominence of ARC information by using the denial test. Speaker A states a lead-in sentence followed by a main clause and an ARC, the ARC either being continuative or relevance. Speaker B then says "No, that's not true." This is followed by the question "What is Speaker B trying to deny?" The participant viewed two options in a forced-choice paradigm, one that targets the main clause and the other that targets the ARC. In this way, we were able to test whether the type of ARC (continuative versus relevance) has an influence on what information readers consider to be the "at issue" content.

Greer, Avery

Mentor(s): Prof. Ambra Hiott

Peer Leader Experience

During the Fall semester of 2020, I was a peer leader for a freshman university 101 class. To be able to be a peer leader, I had to take EDLP 520. This class teaches you how to be a mentor/friend to these younger students, while keeping it professional. This experience provided me with the opportunity to not only learn how to work in a more professional setting, but also how to become more civically engaged in my community (being a peer leader is a civic duty) since we are ultimately guiding the freshman students towards a path of success. I had the opportunity to not only be a mentor to these students, but I also gained many mentors from the experience myself. I learned many new skills from the experience as well and taught many topics to the students including safety, alcohol education, civic engagement, and advisement and registration. This opportunity really helped me understand the importance of being civically active in my school and community and for that I am thankful.

Gregory, Caroline

Mentor(s): Dr. Hilary Lichterman

Learning Intercultural Competency in Japan

When I entered the University of South Carolina, I knew I wanted to major in International Studies with a minor in Japanese. I have always been interested in other countries and cultures, especially Japan. Living in the International House at Maxcy and participating in the English Program for Internationals (EPI) Conversation Partners Program and Japanese Language Table initiatives intensified my interest in other countries and languages. Traveling to Europe with Dr. Randazzo's POLI 391: Foundations of Law and Government class was a life-changing experience, since I had never traveled outside the U.S. and certainly

not traveled by myself. That experience gave me the courage to study at Kansai University in Osaka, Japan, for a full academic year. My career goal is to either be a translator for the U.S. Embassy and Consulate Office or serve as an English teacher in Japan. My experience in Japan, despite the restrictions of the global Coronavirus pandemic, taught me that I can thrive in a foreign culture while maintaining my connections to my home country. I also broadened my cross-cultural competency through being fully immersed in a new culture and advancing in my Japanese language proficiency. I feel confident that I can communicate effectively and teach successfully in Japan.

Griffith, Kathleen

Mentor(s): Mrs. Maureen Grewe

Advocating for Hope

During my sophomore year, I took a leap of faith and went on a mission trip with the University of South Carolina Greek Impact, a subset of Campus Crusade for Christ (CRU) focused specifically on members of the Greek community. We traveled to the Dominican Republic through a nonprofit called Filter of Hope (FOH). FOH's mission is to end the Global Water Crisis and spread hope by distributing water filters and the message of living water found through Jesus Christ. I was pushed out of my comfort zone and called to share my faith in ways I had never done before. During my junior year, I was asked to co-lead a FOH trip to Guatemala. I recruited 13 other students to come along.

That semester, I took 'Public Relations for Nonprofit' and created a detailed organization review and analysis of the nonprofit Filter of Hope. Outside the classroom, I was working with Filter of Hope employees to plan the details of my trip. I was learning more about the organization from a public relations perspective and a student leader lens.

I knew while I was in America, I was advocating for people to support FOH's mission of clean water and access to the Word. It wasn't until I got back from Guatemala that I made the connection that while I was in Guatemala, I was advocating for God. I was going into people's homes and giving them a filter that would change their physical lives, but I was also sharing a message of hope and grace found in the Lord in hopes of changing their spiritual lives. Similar to how advocacy calls attention to an organization to help increase things such as volunteers, I was calling people's attention to God in hopes that He would move their hearts and they would come to know and follow Him. These experiences taught me how to be bold in my faith and how to advocate for things I am passionate about, which is something I will take with me in my future career and workplace.

Guess, Hannah

Mentor(s): Dr. Molly Dawes

Preliminary results of a systematic review regarding teachers' attitudes toward bullying and intervention responses

Teachers are central to reducing bullying in the classroom (Veenstra, Lindenberg, Huitsing, Sainio, & Salmivalli, 2014) and have a key role in intervention efforts. Classrooms in which teachers are effective at handling bullying have less peer victimization occur, which suggests that teacher intervention decreases the numbers of youth subjected to the consequences of bullying (Novick & Isaacs, 2010; Veenstra et al., 2014). Despite this, not all teachers intervene in bullying (Yoon & Kerber, 2003). Whether or not teachers intervene in instances of bullying can be influenced by several factors, one of which is their attitudes and beliefs towards bullying and victimization. This is outlined in the Theory of Planned Behavior (TPB; Ajzen, 1991,2012) which asserts that intentions guide behavior. Uncovering teachers' intentions to intervene will allow us to increase the likelihood that they will intervene. For instance, teachers would be expected to intervene in bullying if they have a negative attitude about bullying (Ajzen, 2012). However, there are no comprehensive systematic reviews that examine patterns in the relationship between teachers' attitudes and beliefs about bullying and their intervention responses. Having knowledge of the teach-

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er factors that affect their interventions will allow researchers to create bullying intervention programs that address these factors and are therefore more effective at increasing teachers' intervention responses. This systematic review will attempt to fill this gap in literature by focusing specifically on teachers' attitudes towards bullying and victimization and synthesizing evidence of an association between attitudes and intervention responses. This presentation will present preliminary results of a systematic review, outlining the systematic review methods (i.e. key term development, creating protocol and inclusion and exclusion criteria, key term search across databases, removing duplicates, screening 3990 titles and abstracts, and screening 103 full texts) and initial findings. This will include an overview of teachers' beliefs and attitudes about bullying, an overview of teachers' intervention responses, and preliminary evidence of the association between attitudes and intervention responses.

Gupta, Annika

Mentor(s): Dr. Melissa Duffy

Sculpting Organs: Development of an Arts-Based Educational Activity for Anatomy Learning

As an integral component of healthcare, a comprehensive understanding of anatomy is necessary for accurate clinical diagnosing and medical procedures. Training of healthcare professionals begins in undergraduate classrooms (premedical students), yet there is a need to explore new ways of teaching and learning anatomy. The traditional method of attending a lecture and reading a textbook may not be the most effective method to learn about anatomical structures—or to engage learners. However, more recent studies have reported promising results in enhancing anatomy learning using arts-based approaches (e.g., (Bell & Evans, 2014; Carlson et al., 2019; Noland et al., 2016)). Of these, clay sculpting can provide an opportunity for students to participate in an active, engaging learning experience, while developing a deeper appreciation of the complexity of anatomical structures (Carlson et al., 2019). Thus, the goal of this project was to develop an educational protocol for a clay sculpting tactile-learning activity of the human heart to be considered for integration into anatomy curriculum to enhance attention, positive emotions, and learning. Designed to align with several educational theory principles (e.g., (Han & Bhattacharya, 2001; Issa et al., 2011; Pekrun, 2006)), a multimedia slideshow, instructor-led clay sculpting tutorial video, and instructional guide manual were developed. The 20-minute video tutorial features an instructor illustrating each basic sculpting technique, as well as the key structures of the heart that learners needed to be model the heart. The activity is designed to take approximately 40-60 minutes to complete, although learners may choose to spend additional time to improve the quality of their model or technique. Before and after the activity, learners can complete a short anatomy quiz (structures of the human heart) and Likert-style questionnaire (feedback on emotions and engagement) designed for this activity. The educational protocol and curriculum created in this project provides an example of integrating arts-based methods into medical education. If used by educators in their classroom, this research can provide a better understanding of the possible benefits of incorporating a tactile-kinesthetic activity as a part of a multimodal and hands-on approach to aid pre-medical students understanding of anatomy curriculum.

Gynn, Caroline

Mentor(s): Prof. Jay Pou

Taking Advice from Someone in a Coma: How a Rehab Hospital Internship Helped Me Find My Why

With the COVID-19 pandemic raging in the summer of 2020, it felt like the perfect time to join the healthcare world as a nurse. One year away from graduation with my BSN and RN, I landed the opportunity to work at Shepherd Center, a specialized rehabilitation hospital for brain and spinal cord injuries, in Atlanta, GA. Throughout the summer months, I learned more about human perseverance and inspiration than I did nursing skills. The patients, family members, staff of doctors, nurses, techs and therapists all took part in shaping the foundation of my career and helped me find my "why."

Hailat, Dania

Mentor(s): Dr. Nathan Hancock, Dr. Priscilla Redd

Does the Nuclear Export Signal Affect Harbinger Transposition in Human Cells?

Transposable elements are sequences of DNA that can jump from one site in the genome to another through a “cut-and-paste” mechanism. The transposase protein (TNP) binds the element, cuts it out, and reinserts it elsewhere in the genome. If the element reinserts itself into a gene, it may cause a mutation or an inactivation. Thus, our goal is to develop efficient strategies for human cell mutagenesis. The Harbinger3n_DR transposable element, found in zebrafish, is known to transpose in human cells. Interestingly, the Harbinger TNP protein that mobilizes Harbinger3n_DR contains a nuclear export signal (NES) that potentially limits its access to the genome. We predicted that Harbinger’s transposition rate would be increased by removing its NES. To create this altered version of the Harbinger transposase plasmid, the region of the plasmid containing the transposase was removed by restriction digest and InFusion cloning was used to replace it with a synthesized gBlock fragment containing a mutated transposase lacking the NES (TNP-NES). Both the TNP and TNP-NES versions were transfected into human HeLa cells with a Harbinger3n_DR/Neo reporter construct. Insertion of the Harbinger3n_DR/Neo construct into the genome allows cells to survive in the presence of G418; so, the version of TNP that induces more mobilization, or transposition, will result in more living cells. We observed that the TNP-NES was not statistically different than TNP. However, TNP-NES induced significantly more transposition than the negative control, while TNP did not. Although these results are consistent with the hypothesis, additional experiments are needed to confirm if this alteration increases mutagenesis efficiency.

Hall, Hayley

Mentor(s): Dr. R. Michael Gower

Resveratrol Releasing Scaffolds and Healthy Dietary Changes as a Treatment Strategy for Type 2 Diabetes

Within the past decade the percentage of Americans that are affected by obesity has steadily increased. Often the treatment prescribed by doctors to help patients lose weight involves pharmacological intervention, which includes oral drug administration that often leads to systemic side effects and can still be hindered by poor patient compliance. Therefore, the goal is to develop a local drug delivery treatment strategy that would synergize with healthy dietary changes. Resveratrol is a promising anti-obesity drug, but has low bioavailability and is metabolized quickly, hindering its effectiveness. Delivering resveratrol locally to the adipose tissue could enhance its efficacy.

We hypothesized that the implant of resveratrol loaded scaffolds into the epididymal fat combined with a healthy change in diet would treat obesity and obesity related glucose intolerance by increasing fatty acid oxidation and glucose metabolism. To test this hypothesis an animal study was conducted where mice were fed a high fat diet for two weeks to induce an obese, glucose intolerant state. At this point, mice were separated into three treatment groups; one receiving a sham surgery, one receiving a biomaterial scaffold, and one receiving a resveratrol loaded scaffold.

Western blotting was used to measure proteins involved in glucose uptake in the fat, which is regulated by insulin dependent and independent pathways. Insulin dependent glucose uptake is facilitated through Glut4 which is promoted by phosphorylated Akt (pAkt). Insulin independent glucose uptake is measured through Glut1. Glut4 and pAkt did not have significant changes within the fat, while levels of Glut1 were significantly elevated in the scaffold treatment groups. This suggests that the implantation of the scaffold causes an increase of glucose uptake rather than resveratrol administration. Upon analyzing the fat pads, the weight and average adipocyte sizes decreased. Analysis of the rate limiting enzymes for lipolysis and fatty acid oxidation, ATGL and CPT1 respectively, showed no significant changes observed in the epididymal fat when analyzed. This suggests that the decrease in fat pad mass and adipocyte size is due to a decrease in lipid content within the adipocytes, however this is independent of CPT1 and ATGL within the

tissue.

Hall, Brittni

Mentor(s): Dr. Mary-Katherine Mills

Egg Development in the insect vector, *Stomoxys calcitrans*

Stable flies are a hematophagous dipteran that blood feed to get the proper nutrients needed for vitellogenesis, or egg development. Since egg development is directly related to blood feeding, it is important that this understudied vector becomes a main topic of research because they transmit pathogens while they blood feed. Stable flies can transmit pathogens to both humans and animals causing disease and livestock economic loss. By taking a physiological approach, we used immunohistochemistry to characterize the follicular egg development into the five Christophers' stages in *S. calcitrans* females. The flies would blood feed once a day for five days and ovaries were dissected 24 hours post each blood meal. Ovaries were stained to observe actin, lipids, and DNA structural composition, which were quantified using Fiji and compared to previous reports. We observed that stable flies required multiple blood meals to complete egg development, with follicular development arresting at each stage until the next blood meal stimulated progression to the subsequent stage. The data show how vitellogenesis is directly related to blood feeding and be used in future work to understand the underlying mechanism of vitellogenesis, providing the first step in finding a way to stop pathogen transmission.

Hals, Stephanie

Mentor(s): Dr. Hilary Lichterman

I May Have Left Uganda, But Uganda Will Never Leave Me

In the spring break of my sophomore year at the University of South Carolina as others were enjoying their time of relaxation at the beach, I spent my time giving back to deprived communities in Uganda. I joined together with health professionals from varying professions to volunteer with OneWorld Health to provide health care at popup clinics in rural areas of Uganda. I spent my days under the hot Uganda sun volunteering approximately 10 hours per day for 5 days at the popup medical clinics either shadowing professions or assisting patient care. I aided in the setup and cleanup of the popup clinics, assisted translators in distributing prescribed medications to patients, distracted children with games while their parents received healthcare, and observed the health professionals as they treated their patients. For as long as I can remember I have always been interested in entering the medical field. When I heard of this opportunity to give back to these communities while gaining a wide range of shadowing experience I jumped at the chance. I knew the experience I would gain from this opportunity would aid me in my future, not only in my future career in medicine but also when interacting with others unlike myself. My time in Uganda allowed me to gain insight to medical conditions not heavily prevalent in the U.S, opening my eyes to health disparity prevalent worldwide. While this experience reinforced my desire to become a physician to give back to others it was difficult to see how little these communities had. It was refreshing to get out of my college bubble. This experience allowed me to take a step back from my miniscule problems to appreciate what I have. Although the people of Uganda had little, they were some of the kindest and most generous take for granted what I have. I may have left Uganda but, Uganda will never leave me.

Hamilton, Sara

Mentor(s): Dr. Orgul Ozturk

An Alarming Ascent: Understanding the Economic Indicators of Exploitation Under the H-2A Temporary Agricultural Program

From 2010 to 2020, the H-2A Temporary Agricultural Program saw a 280 percent increase in visa issuances to fill demand for workers in an increasingly tight U.S. agricultural labor market. This rise has

magnified the incredible opportunity for exploitation of H-2A workers, driven by the unusual amount of employer market power that the H-2A program affords. This paper seeks to understand the implications of this market power as it translates to the exploitation of workers. With data from various Department of Labor subsidiaries, we study market conditions and trends in both the broader market for agricultural labor and the market for H-2A labor, and we analyze economic indicators of exploitation within the latter market. From this analysis, a comprehensive review of strategies and solutions is given as they pertain to both H-2A program reform and other agricultural labor demand solutions.

Hampton, Sabrina

Co-Author(s): Aaron Falls

Mentor(s): Prof. Denise McGill

Gullah Gone: Preserving the Land, Water and Culture of the Sea Islands

Since October 2019 I have worked with Associate Professor Denise McGill to create an hour-long documentary for National PBS about the land, water, and Gullah people of St. Helena Island, South Carolina. As a research assistant, I have been responsible for transcribing and organizing film clips, which creates a written record to be used later for editing purposes. Additionally, I have worked on organizing photos taken throughout the production process, while also helping promote the documentary on social media. Throughout this experience, I have learned the process of creating a feature length film, while also learning that even though I have a small part in the process, it will be of great help in the editing process and overall production of the film. This film explores generations of Gullah culture, which is important as the Gullah people are critical to American history. Gullah Gone also examines how the residents of St. Helena Island blend their traditional methods with modern ways to create something truly unique. As the descendants of plantation slaves, they tell a remarkable story of survival, and through the use of multimedia storytelling those stories can be shared across America.

Hampton, Sydney

Mentor(s): Dr. Elise Lewis

Teaching and Encouraging Others

Being in a student organization that enhances your knowledge, provides you with leadership and professional development skills, and introduces you to novel ideas is a crucial aspect of becoming a well-rounded student and member of society. This is why I chose to be an EcoRep. During my sophomore year of college at the University of South Carolina, I along with other EcoReps taught and promoted the topic of sustainability to students living in residence halls through interactive conversations, events, and activities. This may have included games to test your knowledge on sustainability, introducing environmentally friendly dietary options, or DIY projects that could be implemented inside a dorm room. We were also able to spread and introduce the topic of sustainability to the greater campus through larger events and fundraisers that could benefit the Columbia community. One of these events included Give It Up for Good, in which students could donate items from their dorm at the end of the semester. After being collected, EcoReps sort and sell the items, and all profits are donated to Habitat for Humanity and other local businesses. Through this experience I was able to share my love for the environment with others, while learning from like-minded individuals about what more I could do in my daily life to live more greenly. In the future I hope to have a career focusing on Marine Conservation, so participating in an organization like EcoReps has allowed me to foster my knowledge on the subject as well as positively influenced my desire to be an advocate in this field.

Hanna, Camryn

Mentor(s): Ms. Lauren Epps

The birth of a Professional

As a future sports world professional, I know everything is a competition. The sports world is full of competitors, not only on the game side- but in the business side too. In order to become an attractive candidate for my future career, I have taken every opportunity throughout my 4 years as a student at the University of South Carolina to experience several different internships and leadership roles within the University and external from the University. Through the encouragement from my peers and professors, I found myself wanting to achieve more and become more experienced. I spent a year interning in the Department of Student Life, a summer interning at the Amateur Athletic Union and participated in Student Government all while being a member of the nationally ranked University of South Carolina All Girl Cheer-leading team. All of these roles have allowed me to grow as a person and a future sports world professional to secure my future goals. I was able to combine my skills learned from activities within the classroom in order to be successful in my internships and leadership positions which in turn will allow me to become an attractive candidate for my future aspirations. As a wide-eyed freshman in the fall of 2017, I never would have thought in just four short years the University of South Carolina would have played a major role in me being able to present myself as an exceptional candidate in the sports business world.

Hartz, Carina

Mentor(s): Mr. Timothy Lewis

Learning while Leading: Carina Hart

While the application to apply for a position as a new student orientation leader was originally filled out on a whim, this decision ended up being the single moment that aided in my immense growth as a student, a peer, a friend, a leader and an advocate for change. The most influential part of my experience at the University of South Carolina were the two years that I spent as a member of our new student orientation staff. As a freshman in college I was unaware of the possibilities at my fingertips and all of the things that I had yet to understand, I had never been exposed to working alongside and subsequently leading such a diverse group of people. The roles of an orientation leader involve a plethora of logistical aspects in the new students integration, but beyond administering the curriculum of the sessions our most important role was to cultivate an environment that was positive and welcome for every incoming student. In order to be a beneficial coworker and an influential leader, I had to learn how to effectively communicate with people who differed in personality types and essentially differed from me. I was able to successfully be both a friend and leader due to the tools and training that the office provided our staff. Additionally, having the exposure and ability to learn from others and their experiences enhanced the foundation that had been built. With each training session, experience, and student, my view of the world altered and were each a factor in finding my passion for understanding others and my commitment to advocate for the inclusion and equitable treatment of others.

Hassan, Danielle

Mentor(s): Prof. Maegan Gudridge

Understanding a Customer

I have had the pleasure of interning with a wedding planner, Alexis Doktor, during my college experience. Through this position I work directly with customers before and during weddings to map and manage their experience. I assist Alexis in day of execution of events by coordinating customers, vendors, and other stakeholders towards common goal of a successful event. This position showed me how important customer service is. To be successful in business, your clients' wants and needs should be delivered. Working with brides has elucidated to me that I want my future career to be customer oriented. It makes me happy

and feel successful when I can exceed someone's expectations.

Haugh, Patrick

Mentor(s): Dr. Susan Vanderborg

Onliest Dispatches: A Metamodern Magazine

Onliest Dispatches is a magazine composed of poetry, photography, and narrative that synthesizes the styles and methods of romanticism, symbolism, surrealism, modernism, and postmodernism to realize Luke Turner's definition of metamodernism as "the mercurial condition between irony and sincerity, naivety and knowingness, relativism and truth, optimism and doubt, in pursuit of a plurality of disparate and elusive horizons." In particular, a reinvigoration of the spirit is posited as vital in our age of digital pervasiveness, rampant consumerism, and obdurate, factious political ideology. The spirit, in the sense of an eternal connection to Nature, is essential and inherent to every individual, transcends rationalist truth-value in its ethereality, and also challenges concepts of race, sex, culture, age into their originary formlessness.

This vision shirks the dangers of the entrancing yet unfathomable hallucinations of surrealism and the pleasant but naive spiritualism of romanticism, when it is coupled with the pioneering, futuristic designs of modernism, and the deconstruction and cynicism of postmodernism. The fusion of such contrary positions is certainly a model for the "pragmatic neo-romanticism unhindered by ideological anchorage" as outlined by Turner. Obviously, Onliest Magazine does not pretend to resolve these issues--there is no alchemical resolution—but rather to exemplify the fresh and exciting metamodern position.

The first poem, "Muse", uses surrealist non-sequiturs, dreamlike language, and syntactic breaks to eloquent both the potency and limitations of artistic expression. "ACME MODE", the second poem, utilizes symbolism's indirect treatment of images to develop a base and luxurious euphoria, and is infused with postmodern irony to illustrate the hollowness of this fixation. Next, "Rana", a short story, expands on this theme with surrealist absurdity, reigned in by metamodern sincerity to timeless themes like nostalgia and youthful passion. The subsequent prose poem is a reconciling of Nietzsche's concept of Amor Fati with Rimbaud's external source of identity and expression, and seeks to advance the conflict between the spiritual and material spheres, by exploring the discord of truth and beauty. The closing poem "Las Perlas de Vida" exhibits the eternal spirit with a childlike naivety, through a symbolist labyrinth of images and feelings.

Heck, Katherine

Mentor(s): Dr. Michael Gavin, Dr. Stan Dubinsky

Being Kurdish on Twitter: A Case Study in Ethnolinguistic Conflict

On October 9th, 2019, the Turkish Armed Forces launched a military offensive against the Syrian Kurds in northern Syria, resulting in the displacement of over 300,000 people and the deaths of more than 90 civilians in both countries by its conclusion. Ceasefire operations commenced in mid-October, yet tensions ran high with protests, car bombings, and smaller offensives throughout November. While one can certainly read news articles to learn about these events in broad understanding, one must wonder how individual citizens have been impacted and express their opinions on this conflict. In this project, we aim to investigate how ethnolinguistic conflict and social media impact the individual and the construction of his or her identity, employing the specific study of the Kurdish people and their reflection of identity online to view this phenomenon. Following our qualitative analysis of written texts for historical and linguistic context of modern developments, we explore case studies of popular Kurdish users on Twitter as they discuss a variety of subjects, ranging from continual tension in aftermath of the main combat phase in Operation Peace Spring, opinions on American politics, to events in their daily lives in November 2019. By the conclusion, we will illustrate how social media shapes public discourse on widespread conflict and how political developments are represented through online conversation between users, ultimately exploring

the lens of individuals embedded in this clash.

Heckman, Max

Mentor(s): Dr. Kelly Goldberg

Homo Erectus

One of the most pressing questions that scholars across a diverse cast of professions grapple with is, quite simply, what does it mean to be human? As one of the first members of the genus homo, Homo erectus is where we first see some of what we would call modern man's defining features. Among them are the control of fire, the ability to travel long distances, and the increasingly sophisticated use of tools. This constitutes a very large step on the path to where we are today and better understanding why that came to be, how they acted, and what allowed them to survive the longest of species of Homo can inspire a more comprehensive grasp on the development and behaviors of Homo sapiens. I will review the fossil records of Homo erectus available, the traits that scholars have inferred from them, and the cause of the wide diaspora of the species on its journey outside of Africa. This research will contribute to a more nuanced link between its observable traits and understood behavior to better define the traits that separate them from their predecessors, what we don't know yet, and what makes us distinct.

Hefner, Lindsey

Mentor(s): Mx. Caleb Morris

Community Service and the Experience of a Lifetime

During my four years at the University of South Carolina, I have engaged in over 300 hours of community service through non-profitable volunteer work, community events, and experiential learning opportunities in health care. I have devoted time to my community to gain authentic experience, engage with my community beyond the student population I am most familiar with. I have ventured beyond the familiarity of campus's parameters to the diverse community around me, exploring volunteer opportunities while interacting with vast socio-cultural backgrounds. My involvement in the community has given me experiences that professors can't teach and research can't provide. I have found that first-hand involvement with my community has given me a new viewpoint that is empathetic and judgment-free. Learning something new and meeting individuals with each encounter has made me appreciate all of the little things that make my community unique and recognizing where change is needed most. Giving back to my community has been such a wonderful gift.

Hegde, Esha

Mentor(s): Dr. Alissa Armstrong

Drosophila Melanogaster as an In Vivo model to Determine the Effectiveness of Botanical Dietary Supplements on Obesity-like Phenotypes

In the United States alone, over 60% of adults have been categorized as overweight or obese. Obesity is often linked with an increased risk for multiple cancer types, diabetes, chronic inflammation and other illnesses. The molecular relationship between inflammation and obesity induced fat cell dysfunction are not completely understood. Having a better understanding would allow development of methods to break the link. This study aims to utilize Drosophila melanogaster, commonly known as the fruit fly, as an in vivo model to test the effectiveness of botanical dietary supplements on obesity associated inflammation. By feeding flies diets with varying amounts of sugar content, observing their immune response, and then subsequently feeding them plant-based compounds such as resveratrol, the Armstrong Laboratory hopes to test the effectiveness of botanical dietary supplements on ameliorating obesity-related inflammation. The Armstrong Laboratory will support or refute the effectiveness of these dietary supplements in reducing inflammation and do our part in easing the obesity epidemic taking hold of the United States

Hendrix, Andrew

Mentor(s): Dr. Mark Sarzynsk

Does global methylation relate to bodyweight changes in children?

This study seeks to determine the association between participants' global methylation and their BMI/weight trajectory during the transition from middle school to high school. Additionally, this study will also examine the effect of physical activity in mediating or moderating this association. The data used in this experiment comes from the Transitions and Activity Changes in Kids (TRACK) study conducted by Dr. Russ Pate. DNA extraction from buccal swabs will be completed using the mini Genomic DNA kit from IBI Scientific. Upon extraction, global DNA methylation will be accessed using Epigentek methylflash DNA Colorimetric ELISA kit. This kit quantifies DNA methylation status by measuring levels of 5-methylcytosine in a simplified, one-step ELISA-like reaction. Data Analysis for each student will then be conducted by composing a BMI/weight trajectory that considers each participant's change in body weight from 5th grade to 11th grade. These trajectories will then be grouped into similar trends. Statistical models will examine whether global DNA methylation differs between bodyweight trajectory groups.

Henninger, Erica

Mentor(s): Dr. Jane Roberts, Ms. Erin Hunt, Ms. Kayla Smith, Dr. Abigail Hogan

ASD Diagnostic Disparities between Males and Females

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by social communication impairment as well as restricted and repetitive behaviors and interests. Current prevalence rates from the CDC indicate that 1 in 54 children in the United States are diagnosed with ASD, with males being four times as likely to be diagnosed than females. Additionally, females with ASD tend to be diagnosed later compared to males, which has negative consequences on mental health and self-esteem. The present study will compare the age of parental concern, age of diagnosis, and age of intervention for girls (n=15) and boys (n=61) with ASD. Ages of concern, diagnosis, and intervention were measured via general information forms, the Autism Diagnostic Interview (ADI), or the Preschool Age Psychiatric Assessment (PAPA). One-tailed t-tests assuming unequal variances will be run to examine group differences, and correlations will be run to analyze the relationship between variables. Additional descriptive analyses comparing sample participant's age of diagnosis to the national average will be run for both sexes. Based on extant research and current diagnostic rates, we hypothesize that ages of concern, diagnosis, and intervention will be later in females compared to males with ASD. This research aims to replicate findings of later diagnosis of ASD in females compared to males, and to determine whether related factors such as concern and intervention also occur later in childhood for females with ASD. Implications of later diagnosis and intervention for females with ASD will be discussed.

Hensing, Caroline

Mentor(s): Dr. Glenn Weaver, Ms. Chantal LaFlamme

Seasonal Variability in Children's 24-Hour Movement Behaviors: A Systematic Review

Background

Physical activity and sleep in children aged 5-12 may vary throughout the year due to seasonal factors such as weather, daylight, and climate. The purpose of this systematic review is to summarize existing literature on the seasonal variation in physical activity and sleep in elementary-aged school children.

Methods

PubMed, PsycInfo, Web of Science and Embase were searched through February 2021 for relevant studies. The seasonality search terms included season, fall, winter, summer, spring, solstice, photoperiod,

daylength, day-length and day length. The physical activity search terms included physical activity, exercise, energy expenditure, sedentary and screen time. The sleep search terms consisted of sleep, nap, circadian and diurnal. To be included studies had to (1) measure elementary aged children and (2) include outcomes related to sleep and/or physical activity during at least two meteorological seasons (spring March 1st – May 31st, summer June 1st – August 31st, fall September 1st – November 30th and winter December 1st – February 28th).

Results

A total 18,542 records were identified after database searching and 5 additional records were collected through other sources. After duplicates were removed 8,565 articles were screened. After screening, physical activity data was then extracted from 41 studies and included 29,498 participants from 12 countries. When compared to fall and winter, spring and summer had higher total physical activity, step counts and MVPA. Winter had higher weekday sedentary time overall, and fall had a higher step count than winter. Insufficient evidence existed to draw conclusions about the differences between spring and summer as well as fall and winter. Sleep data was extracted from five studies and included 4,163 participants from 5 countries. When compared to other seasons, total sleep time was greatest in winter while children napped more in the summer.

Conclusions

These findings are important may help to identify optimal timing for physical activity and sleep intervention in children. The lack of data on seasonal variation in sleep indicates a need for further research in this area.

Hilt, Lauren

Mentor(s): Mr. Jay Pou

Leadership in Uncertain Times: Being a Swim Team Captain and University 101 Peer Leader in a Global Pandemic

Leadership can be difficult. Leading in a time of uncertainty and angst was certainly challenging in all regards, but also instrumental to my own growth as a leader. When elected captain of the University of South Carolina's swim team for the 2020-2021 season in April, there was hope of a normal year. Soon after arriving on campus, hopes of "normal" were quickly dashed away. This was also the case for my peer leadership role in University 101. The task of carrying out the missions for both programs with the tight restrictions that a global pandemic demanded had never been done before. Critical thinking of new and creative solutions became paramount. Experimentation with these new ideas often required feedback on their effectiveness. Communication and collaboration were essential to adapt to the changing needs of both groups that I was leading. Through these experiences, I learned that leadership is dynamic, constantly requiring one to grow. It pushes you to seek new opportunities to improve and reflect on what you have learned. Leadership is also knowing what you do not know. It is the understanding that to be an effective leader, you must rely on others for help, feedback, and support. I am walking away from these experience as a better version of myself from embracing growth in my leadership positions.

Hobbs, William

Mentor(s): Dr. Jijun Tang, Mr. William Hoskins

Using Neural Networks to Reinforce Absence of Gender Bias in Dyslexia Screenings

This study explores the potential of neural networks to detect the gender of a student given a student's score on the Carolina Automated Reading Evaluation (CARE), a collection of thirteen assessments of reading disabilities created by researchers at the University of South Carolina. Data from prior administrations of the CARE at two elementary schools in South Carolina was parsed and read into dictionaries

that contained a randomly created ID number, the student's gender and grade level, and their scores on the individual assessments they were administered. A neural network was created in Python using prominent machine learning libraries, taking test scores as inputs and attempting to train gender as an output. Since not every student was administered every assessment, only assessments that had been taken by more than 60% of the students were used in the neural network. These assessments were used to train the neural network to detect gender. After repeated attempts to train the network to this data set failed, a data set of similar size from the University of California, Irvine machine learning repository was used to test the network built to determine if there was a structural defect in its construction. The constructed network was able to train to an appropriate degree on the data set from UC Irvine but despite repeated attempts was unable to train on the data with respect to gender from the CARE administrations. From this, it was interpreted that the CARE data follows similar patterns to previous studies of other tests of reading disabilities, which concluded that students in lower grades show insignificant differences in reading ability by gender.

Hodges, Benjamin

Co-Author(s): Max Wile

Mentor(s): Dr. Kelly Goldberg

Paranthropus boisei: Chewing Master

Studying human origins and the ancestry of our species is incredibly important for all of us because by examining these past species we can learn about issues that impact our current society, whether genetic or social. One of these important ancestral species is the *Paranthropus boisei*. *Paranthropus boisei* is known for its big teeth and strong chewing muscles. Analyzing the chewing capabilities of this species is critical for understanding the diets of the different lineages of humans as they evolved over time. Given our lack of direct access to the few *Paranthropus boisei* fossils in circulation, our research will be conducted by referencing many sources, including scientific journals and online museums. More specifically, our research will be based mainly upon the analysis of the skull and its importance because there is only one fossil of another bodily region. We know that the *Paranthropus boisei* did not directly contribute to human evolution because it went extinct before any influence, but it did live alongside the *Homo* genus. Still, studying this species is important to provide a basis of comparison with human evolution.

Hoffert, Bailey

Mentor(s): Dr. Casey Giraudy

The Impact of Inadequate Public Health on Rural Communities

In January of 2020, I was part of a service-learning trip to Lima, Peru sponsored by a non-profit organization called MedLife. This trip entailed bringing medical services and supplies to the most marginalized community in Peru. As a public health student at the University of South Carolina, experiencing the conditions that the people of this community were living in firsthand was disheartening. The lack of accessible care is the greatest culprit of the poor health in the community, along with the lack of access to clean water, transportation, and a secure food source. Seeing the way these people had to struggle to have clean drinking water made me appreciate the way public health is valued in America, despite its shortcomings. A government which underfunds public health displays a lack of care for their citizens, which stems from the massive corruption in the Peruvian government. Interacting with the people in Peru allowed me to experience their living conditions firsthand and understand their way of life. My presentation will take a deeper look at the public health crisis in Peru and how this experience impacted me as a student and person, and led me to pursue Graduation with Leadership Distinction in Professional and Civic Engagement.

Hoffman, Caitlin

Mentor(s): Dr. Hilary Lichterman

Leading Beyond Borders

During the 2020-2021 academic year, I have been working with the United States Department of State in the Bureau of Educational and Cultural Affairs as a teacher for the English Access Microscholarship Program in Russia. The Access Program provides a foundation of English language skills to bright but economically disadvantaged students in their home countries, leading them to better educational and job opportunities. The program also provides students with American teachers to help with their language acquisition, which is an invaluable diplomatic asset between the United States and the participating countries. As a political science and Russian major at the University of South Carolina, my internship has provided me with first-hand experience in the field of public service and diplomacy. I have had the opportunity to communicate with people all over the world and discuss current issues, learn more about Russia, and create long-lasting friendships that extend over 5000 miles. This internship reaffirmed my professional goals while also expanding important leadership skills such as effective communication and solving complex problems in a diverse environment. Through this experience, I plan to pursue a career in the foreign service to build stronger bridges between America and Russia.

Holmberg, Richard

Mentor(s): Dr. Kelly Goldberg

The Role of Diet in the Evolution of the *Paranthropus boisei*

“Tell me what you eat, and I will tell you what you are,” French lawyer Anthelme Brillat-Savarin wrote. He applied this phrase to the study of modern humans; I will apply it to an earlier hominin, *Paranthropus boisei*. Utilizing fossil records and relevant research on food sources, I will analyze the role of diet on the evolution of *Paranthropus boisei*--who is colloquially referred to as “Nutcracker Man.” By understanding the diet of human ancestors, we may better understand the factors of evolution. I hope to display how the *Paranthropus boisei* took advantage of food sources and the ways the food impacted its evolutionary process.

Honan, Lauren

Mentor(s): Dr. Parastoo Hashemi

Optimization of Serotonin Detection: Efforts Towards Improved *in vivo* Analysis

The serotonergic system is commonly studied due to its altered levels in mood disorders, including depression. The release and reuptake of serotonin (5-HT) have been extensively studied via fast-scan cyclic voltammetry (FSCV), but little is known about ambient levels of 5-HT in the extracellular space. Preliminary data using fast-scan controlled adsorption voltammetry (FSCAV) revealed distinct oscillatory patterns in ambient 5-HT. It has been shown that 5-HT levels are tightly regulated in the central nervous system making measurements of this analyte difficult to perform. Therefore to better understand these oscillatory patterns and to improve the general quality of detection of 5-HT, a two-fold approach was applied: 1) The time parameters of FSCAV (background collection, controlled adsorption, redox, and inter-file time) were optimized to improve temporal resolution and surpass the Nyquist limit, 2) Various biologically relevant amino acids were included in buffer solutions to better understand how the *in vivo* environment influences sensitivity to 5-HT. Combined, these efforts will allow us to filter out technical noise, better visualize the biologically relevant oscillations of ambient 5-HT levels, and ultimately lead to a better understanding of the serotonergic system.

Hooks, Timothy**Mentor(s): Dr. Sanjib Sur, Mr. Hem Regmi****VisualMM: Visual Data & Learning Aided 5G Picocell Placement**

As 5G technologies become increasingly common and widely utilized, their revolutionary potential becomes likewise increasingly apparent. The very nature of 5G does, however, present many challenges when attempting to leverage this potential; one of the foremost of these challenges is deciding how to most effectively deploy 5G network infrastructure. Most current approaches to this problem, such as exhaustive site surveys or propagation simulations, are either slow, expensive, imprecise, or some combination of the three. As a potential solution to this issue, we propose VisualMM. Our proposal is a machine learning based model that, using a quickly obtainable set of visual and 5G data gathered from the site in question, can then reconstruct 5G picocell behavior for any arbitrary point in the site. This model can then be used to solve any desired optimization problem regarding picocell deployment, thus solving the aforementioned problem and helping overcome one of the barriers to preventing ubiquitous 5G networks.

Hopler, Sam**Mentor(s): Ms. Maureen Grewe****The Show Goes On (Safely)**

The Show Goes On (Safely)

In March of 2020, the entire University of South Carolina campus came to a halt. The campus was silent, gatherings were banned, and classes were happening through a screen. Everyone was just hoping for a return to normal. Gamecock Entertainment was preparing for the new reality.

The question I get most often when I tell people where I work is, "There are still events?" I do not blame them for their disbelief, I was once in their same shoes. I joined the Gamecock Entertainment team in August 2020 and it has been a wild ride since. We have had our ups and downs, but most importantly we have never stopped. Through the pandemic we have continued putting on fun and free events for students.

One other intern and I have led the charge as we continue to push the limits of what many think can be done during COVID times, all while complying with the required safety measures. During this ever-changing environment, we have managed to put on goat yoga, haunted houses, comedy shows, and much more. I have used a four-step process to do all of this, and I hope to share what I learned in using that that process with the USC community.

Horton, Kaitlynn**Mentor(s): Prof. Anna Oswald-Hensley****Community Service**

Throughout my time in school and church, I have been in multiple different community service organizations. I have gone to children's homes, volunteered at food pantries, and helped restore a porch for a women's shelter in manning with my church. I have also held many different positions such as student body president of my high school and vice president of the National Technical Society. I was previously a Community Assistant for the University of South Carolina Housing Department. Currently I am a full-time sales associate for Kay Jewelers in the Sumter Mall. I have enjoyed every position that I held and the positions that I currently hold. I have learned a lot from these positions and I am excited to use this knowledge for my future career.

Howe, Melanie

Mentor(s): Dr. Titan Paul

Radiative properties of Al₂O₃ Nanoparticles Enhanced Ionic Liquids (NEILs) for direct absorption solar collectors

Nanoparticle Enhanced Ionic Liquids (NEILs) are the new heat transfer fluid for direct absorption solar collectors that comprise of small volume/weight percentage of nanoparticles in base ionic liquids (ILs). NEILs were synthesized by dispersing Al₂O₃ nanoparticles in 1-butyl-3-methylimidazolium bis{(trifluoromethyl)sulfonyl}imide ([C₄mim][NTf₂]) ILs and radiative properties of NEILs are investigated with different size (10nm, 30nm, 60nm, and 90nm. Rod-shaped) of Al₂O₃ nanoparticles. Five different concentration (0.1%, 0.08%, 0.06%, 0.04%, and 0.02% (wt%)) NEILs were synthesized to investigate the concentration effect on radiative properties. The addition of Al₂O₃ nanoparticles greatly increased the light absorption capabilities of the ionic liquid [C₄mim][NTf₂]. Several sizes of nanoparticles were tested for %transmittance. Differences in UV-vis absorption were more apparent in smaller concentrations than in larger concentrations. Nanofluids made of rod-shaped nanoparticles typically generated higher %transmittance values and were therefore less able to absorb light. Nanofluids made of 10nm spherical nanoparticles yielded smaller %transmittance values at higher concentrations and were therefore better able to absorb light. After completing the nanoparticle studies, three NEILs were created from the ideal nanoparticle size and concentration in [C₂mim][NTf₂], [C₇mim][NTf₂], and [C₁₀mim][NTf₂] ILs. This investigation revealed an increase in %transmittance with increasing carbon chain length, with [C₂mim][NTf₂] as the best-absorbing NEILs.

Howell, Savannah

Mentor(s): Dr. Jochen Lauterbach, Mr. Michael Royko

Investigation of Wash-Coatless Stainless-Steel Mesh Catalysts for High Temperature CO Oxidation

Carbon monoxide (CO) is a toxic, odorless gas produced during the combustion of fossil fuels, natural gas, or other carbonaceous fuel sources. Common sources of CO include automobiles, power plants, generators, and gas furnaces/heaters/water heaters. This project specifically focused on developing catalysts for the oxidation of CO in the exhaust of industrial furnaces, residential gas furnaces, and generators alike. All these applications experience large temperature swings due to frequent cycling of the device, putting large amounts of thermal stress on the catalyst material. The majority of high-temperature pollutant remediation catalysts rely on washcoated monoliths to provide a high-surface area support for the active metal nanoparticles, commonly utilized in catalytic converters in cars. However, there are some disadvantages to using the traditional washcoat techniques, such as washcoat loss, particularly when exposed to vibration, high flow gases, or rapid temperature changes, which can induce changes in crystal structure or loss of surface area due to sintering.

This project focuses on anodically oxidized stainless steel as a washcoat-free catalyst support with excellent thermal properties while remaining a cheap alternative to traditional emissions catalysts. Anodic oxidation is a technique used to roughen metal surfaces, commonly used to improve wear performance, adhesion of materials to metal, or to create suitable catalysts. However, to the best of the author's knowledge, washcoat free stainless steel-based catalysts have not been previously tested for high-temperature CO oxidation or for CO oxidation with the presence of high amounts of steam encountered in combustion applications. The influence of various synthesis parameters, such as anodization and sonication time-span, and stainless steel composition effect on the resulting overall catalyst will also be optimized. The development of an alternative catalyst could reduce the amount of carbon monoxide emissions to a value below the accepted U.S. limits for extended periods of time while also producing a more thermally stable catalyst for higher temperature application.

Huff, Haley

Mentor(s): Mrs. Gina Spence

Bridging the Passion to the Profession

During the summer before my senior year, I worked at the South Carolina Department of Veterans' Affairs (SCDVA). SCDVA aims to assist Veterans and their families with all the benefits they rightly deserve. I was the Public Information Assistant for the department and gained a lot of valuable skills in this position. This position gave me first-hand experience to help give me the tools for a career following my graduation. I was able to learn social media skills, event planning, crisis communication and how to manage a website. This experience helped push my passion into my profession.

Hunter, Yaunna

Mentor(s): Ms. Sarah Matthews

The dynamics between Leadership and Professional & Civic Engagement

Student organizations can play a big role in your college experience especially if you hold a leadership position. During my time at UofSC, I became the founder and president of the Association of Transfer Students. This organization supports transfer students academically, socially, and emotionally through their transition to the University of South Carolina. While I was president of the organization, I created events, assisted individuals one-on-one, and connected transfer students to resources that supported them through their transfer experience. I learned and developed professional and personal skills as a leader. From learning how to be adaptable and inclusive of diverse group members through communication as well as creating opportunities for others, I decided to further my leadership in communities that I am a part of. I hope to progress my knowledge of diversity, equity, and inclusivity in my professional life by working for the Economic Development Administration. In my future career I plan to develop jobs for the unemployed, create diverse jobs for more states, and financially support the underprivileged.

Hutchens, Lilian

Mentor(s): Dr. John Kupfer

Improving Conservation Planning for the Congaree Biosphere Reserve

The Congaree Biosphere Reserve (CBR), which is located in the South Carolina Midlands, is recognized by UNESCO's Man and the Biosphere Programme for its extraordinary biodiversity. Intended to demonstrate a balanced relationship between people and nature, biosphere reserves endeavor to conserve the landscape and ensure the success of the species within, promote sustainable practices in the surrounding communities, and educate the public on the importance of conservation and sustainable development. The area encompassed by the CBR is highly diverse in terms of habitat types, land use, and conservation protection status. Habitat loss, degradation, and fragmentation pose significant threats to biodiversity in the CBR by increasing extinction rates for area-sensitive species and reducing the ability of organisms to move across a landscape and respond to stresses such as anthropogenic climate change. The goal of this research is to quantify and map spatial variation in habitat composition and connectivity within the CBR and identify appropriate conservation goals and expectations. To derive the most useful information for local managers, the CBR was divided into subregions using GIS-based clustering of land cover types. Geospatial analyses then provided useful data on a range of landscape properties for each of the subregions, including ecosystem coverage, connectivity, protected status, and potential biodiversity. A subsequent survey, designed to identify conservation management opportunities within each of the subregions, was distributed to local conservation experts. Results from the geospatial analyses and the survey are used here to develop a series of preliminary conservation goals and plans for each subregion.

Iaccarino, Cameron

Mentor(s): Dr. Toni Torres-McGehee, Ms. Allison Smith

Energy Deficiency: Relative Energy Deficiency in Sports (RED-S) Tool Assessment for Collegiate and Recreational Female Athlete

Background: Relative Energy Deficiency in Sports (RED-S) is an expansion of the Female Athlete Triad (Triad) that includes impaired physiological functions caused by relative energy deficiency. RED-S includes, but is not limited to, impairments in metabolic rate, menstrual function, bone health, immunity, protein synthesis, and cardiovascular health. What separates RED-S from the Triad is the suggestion that Low Energy Availability (LEA can occur even when dietary intake (EI) and total daily energy expenditure (daily calories burned) are balanced, meaning there is no overall energy deficit. Despite their differences, the RED-S Clinical Assessment Tool (RED-S CAT)) stresses the importance of examining Triad components, specifically, LEA with or without an ED/disordered eating risk. However, the RED-S CAT model is relatively new to the scientific community, and there has been limited research conducted to compare the two risk assessment tools among both collegiate and recreational female athletes. This study is a part of a larger study aimed towards providing clinicians more evidence on the outcome of the Triad and RED-S assessment tools. The purpose of this study is to determine whether RED-S is stricter than Triad when assessing risk of injury to keep female athletes safer while training.

Methods: After IRB approval, the participants' medical records were reviewed from the electronic system Athena in order to obtain their medical history and injury information, including type and frequency. The data was then analyzed using the RED-S CAT criteria. The athletes were placed in green (full clearance), yellow (provisional clearance), or red (not cleared for sporting activities) lights to determine whether the athlete is safe to return to play.

Results: The results will be presented at Discovery Day USC. Data is currently being analyzed.

Conclusions: TBD

Iftime, Matthew

Mentor(s): Mrs. Sara Reinhardt

Revealing Millions at Bell Helicopter

Thanks to University of South Carolina, I've had the opportunity to intern with a Fortune 500 company, Textron. As a Finance/Account Leadership Development Intern, I was part of a selective class dedicated to impact Textron with a path management shortly after graduation. I was staffed at Bell Helicopter on the V-22 Osprey military program and was responsible for supporting the business operations team for many of their current projects. Close to the end of my internship, an enterprise-wide initiative led by senior management called for a deeper dive into program-specific costs which might be eligible for tax-credit. The director of the group believed I had the capabilities to complete this project in the short time-span and viewed it as a perfect opportunity to see the history of the V-22 Osprey program. When I sat down to take a deeper look into the project, I realized I might've bit more than I can chew. Recent historical contracts and costs were relatively easy to find, decipher, and allocate. However, when my focus shifted to the older eligible contracts, the costs were messy. Through long hours and many questions, I concocted an algorithm that allowed me to search through the contract, extrapolate relevant information, and allocate it in a easy-to-use excel spreadsheet. Once I finished up understanding the millions of costs from thousands of eligible contracts, I was able to reveal ~\$22.9M eligible for a tax-credit, an astounding amount which would translate to ~\$2.3M in savings for Bell Helicopter. After an extensive discussion with my director on the V-22 Osprey program and the hundreds of contracts he's negotiated, he was elated to see the eligible costs. Overall, this was one of the numerous projects that I've been able to complete throughout my

various internships largely due to my studies at USC, and the amazing professors within both finance and computer science.

Ikahihifo-Bender, Jade

Mentor(s): Dr. Caryn Outten, Mrs. Evan Talib

Expression and Purification of Iron Regulatory Proteins Bol2 and Grx4 from *C. glabrata*

Due to 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, oxygen binding, and vitamin synthesis. Iron is also a key factor during fungal infections as the human host and invading pathogens battle over limited iron pools. The primary iron-responsive transcription factor Aft1 in the opportunistic pathogenic yeast *Candida glabrata* responds to iron deficiency by activating expression of iron acquisition genes. However, the mechanisms for sensing intracellular iron levels and regulating Aft1 activity in response to iron are unknown. The *C. glabrata* iron regulation system shares close homology to a similar system in the non-pathogenic yeast *Saccharomyces cerevisiae*, in which the monothiol glutaredoxins Grx3/4 and the BolA-like protein Bol2 form [2Fe-2S] binding complexes that deactivate Aft1 under iron replete conditions. To determine whether a similar mechanism controls *C. glabrata* Aft1 activity, we sought to analyze the *in vitro* interactions between Grx4 and Bol2 from this yeast pathogen. For this project, we successfully subcloned the GRX4 and BOL2 genes from *C. glabrata* into *Escherichia coli* overexpression vectors allowing for expression of recombinant Grx4 and Bol2 alone or in complex with each other as presumed binding partners. The overexpression conditions identified here will be used in future experiments to purify and characterize the structure and iron regulation function of Grx4 and Bol2 alone or in a complex. Future experiments will use these conditions to purify Grx4 and Bol2 in the presence or absence of Aft1 in order to characterize their molecular interactions via structural and spectroscopic approaches. This information may have implications for the development of prophylactic or therapeutic treatments for fungal infections.

Isaacs, David

Mentor(s): Mrs. Ambra Hiott

Correctly Identifying and Understanding Problems within Society

Throughout my years at the University of South Carolina, one of the most important roles I played was being a founding member of Chabad as a student organization on campus and getting to serve as the organization's first student president. Both within my role as student president and within my role as a public health student I got to grow so much personally and learn what it means to lead a community and foster positive relationships, identify problems and miscommunications, and learn how solve them effectively and efficiently. Throughout my four years here, I learned just as much inside the classroom as I did in some of my other experiences founding and managing a student organization, and beyond. My presentation will shed a light into the abilities and skills I gained throughout my time at U of SC as a student and a leader as well as why I believe it can be beneficial to all students to join an organization on campus.

Ivey, James D.

Mentor(s): Dr. Michael Beets, Mrs. Lauren Von Klinggraeff

Feasibility of Weight Training Programs for Overweight and Obese Youth

Obesity among youth and adolescents is a prevalent issue in our society as seen by several research studies conducted by various authors. According to the CDC, approximately 1 in 5 children aged 6-19 are classified as obese. Resistance training is an important training program because it can help strengthen muscles and help children lose fat. The purpose of this study was to determine the feasibility and acceptability of weight training programs for overweight and obese youth. In order to find the studies that focused on

promoting the weight training program, they were screened for key words such as “adolescents,” “youth,” “obesity,” “resistance training,” and other words applicable to the research study. The studies were extracted and categorized into HIIT, RT, and RT + AT studies. Several hypotheses were posed throughout the research studies that focused on promoting a certain weight training program with a certain type of diet or exercise program to see the overall effects. In addition, these studies showed how practical it was for these weight training programs to help improve youth and adolescent obesity as well as how accepted it was among these groups of people.

A resistance training program was implemented throughout the studies for youth and adolescents of varying ages. Most of the programs consisted of a diet, behavior, and exercise component.

Jackson, Caden

Mentor(s): Dr. Randy Lowell

Meditation as a Means of Reducing Aggression and Racial Implicit Bias within an Eyetracking Shoot/No-Shoot Task

Unprecedented violence against African Americans by police officers in the United States has drawn national attention, highlighted by recent cases like Eric Garner, Philando Castille, and George Floyd. The death of African Americans at the hands of police has created a need to address what can be done to prevent more of these tragedies, such as interventions to mitigate the effects of racial implicit bias. Recently, mindful meditation has become a subject of discussion in reducing implicit bias (Lueke & Gibson, 2014; Sun, 2015), but no one has tested to see if meditation reduces the particular form of aggression present during the aforementioned police encounters; they also have not looked at the attentional processes unfolding during this type of encounter (i.e. eye movements). The current study will serve as a starting point in assessing the viability of mindful meditation to reduce both racial implicit bias and racially disproportionate aggressive reactions within this type of computer-generated scenario among a civilian sample of participants. During their first lab visit, USC Union students will complete surveys regarding mindfulness and personality, and will be randomly assigned to meditation, control attention, or control condition. The meditation group will undergo brief mindful meditation training and, in between visits, will practice this meditation daily. The control attention group will hear a story and listen for a target word. Finally, the control group will listen to a story, but not attend in any particular way. Next, eye-tracking will be used during a computer-generated shoot/no-shoot task, including a male character who is 1) holding a weapon or non-weapon, 2) is African American or Caucasian, and 3) has a fearful or angry expression. The participant will press a key as quickly as possible to “shoot” if a weapon is present or “not shoot” if no weapon is present. Then participants will take a race Implicit Association Test. During the second lab visit a week later, participants will repeat these tasks. If mindful meditation succeeds in reducing racial implicit bias, our findings will shed light on how much that spills over into participants’ accuracy and attention on our shoot/no-shoot task.

Jacobik, Jenna

Mentor(s): Dr. Kent Germany

Public History in a Pandemic

Throughout history we study and research not only notable events that have taken place, but also the location where they occurred. These locations are often memorialized in some way to showcase their significance throughout history to those who live there or happen to travel through them. Montgomery, Alabama is one such place whose efforts to recall its rich history have yielded a scenery reminiscent of another time. While one can drive through the city and see major historical sites, there is a difference in learning, significance, and understanding when people can fully immerse themselves in the history of a place on foot. What happens, however, when these locations shut down and physical immersion is no longer possible? There are two contrasting themes that have been memorialized in Montgomery and explor-

ing the layout in which they are set is just as important to understanding their significance as researching the speeches and decisions that took place there. Exploring the city of Montgomery allows a person to dig further into the history and spirit of both the Confederacy and the Civil Rights Movement that seem to still be alive and influencing this culture.

Jacobs, Jamaal

Mentor(s): Dr. Joshua Stone

Cyclic Fluctuations of Zooplankton Dynamics in an Intertidal Salt-Marsh Basin

Zooplankton populations change constantly due to cyclic and irregular changes in their environment. These changes affect both the abundance and composition of zooplankton. This is especially interesting in intertidal areas because their water column is in constant flux. Understanding these cycles are very important for knowing how zooplankton might be affected by things such as climate change and pollution. By knowing these cycles and what the distributions should be, we can know if and how much zooplankton are being affected by sources outside these cycles. In this study, samples collected by Dr. Joshua Stone and Imani Hanley last summer from North Inlet Estuary were examined to see if these changes could be observed. The samples themselves were collected every thirty minutes from 9:17 a.m. to 4:17 p.m. As expected, these samples had sometimes drastic changes in both abundance and composition. This data was then further analyzed by comparing it to similar work done by Dennis Allen, in hopes of finding out which trends were due to cyclic changes in the environment and which were due to irregularities.

Jacobson, Abby

Co-Author(s): Nicole Kent

Mentor(s): Dr. Steve McAnally

Sustainable Water Systems in Ecuador - Engineers Without Borders at UofSC

Engineers Without Borders is a nonprofit organization with collegiate and professional chapters across the United States. Our chapter at UofSC has been established for 10 years and our community partners are in El Cedro, Ecuador. Our multi-faceted project there includes maintenance of a water pipeline, additional water storage construction, and water treatment assessment.

When communicating with the community in El Cedro, they informed us of their need for an additional central storage tank within the community. From the pipeline, the water flows into a concrete cistern that is about 1 km from the center of the village. There is another connecting pipeline from the cistern to an existing storage tank. When the central tank is full and additional water is not able to flow, the cistern has a tendency to overflow, especially during the rainy season. This causes significant water loss, justifying the need for additional storage. We are currently working with the community to prepare a design and construct both the foundation and the metal structure for the new tank to be placed on, as well as a drainage system for behind the water storage tanks to stabilize the ground around their foundations.

The final element of our El Cedro project is the research and implementation of point-of-use filtration systems. Research began with Slow Sand Filtration systems adapted from Dr. Jafvert from Purdue University. These filters were constructed and tested to compare the turbidity, bacteria and other pollutants between influent and effluent water samples. To explore alternative filtration methods for the community, lab research was extended with the testing of Sawyer Point One Micron Bucket Adapter Filters. Through our research in the lab as well as through comparing maintenance, sustainability, and input from the community, we chose to implement the Sawyer Filters. Our poster for DiscoverUSC will highlight the preliminary research as well as plans and designs from each element of our international project, as well as field results from the organization's annual Ecuador trip.

James, Mary

Mentor(s): Dr. Nicole Hair

Evaluating State Collaborative and Legislative Policies Limiting Early-Term Elective Delivery

The American College of Obstetricians and Gynecologists has denounced the common practice of early-term elective delivery (EED) i.e., the medically unnecessary induction and/or caesarean delivery between 37 and 39 weeks for numerous decades. Current research presents extensive negative risk factors associated with EEDs such as: increasing the risk for a range of maternal and neonatal complications and significant additional costs within the US health care system both privately and publicly funded. Reducing EED is becoming a priority for Medicaid directors due to the fact that they finance approximately half of deliveries annually and have made efforts through various organizations calling for the reduction/elimination of EEDs. Legislation held in the hands of individual states allow them to pursue numerous different policies to impact the limitation EEDs, or neglect to do so.

With the continued use of EED procedures, high risks are still an issue for both maternal and neonatal aspects, as well as healthcare costs, which pushes for the question of how we can have the opportunity to improve birth outcomes while saving costs. With this question, the specific aim of our study is to analyze the evolution of elective early term delivery initiatives and policies throughout the different levels of national, regional, state, and local policy efforts, that specifically targets reducing EED rates. The research shows that there is a specific time period for how these policies were disseminated across the nation, along with the templates and recommendations they used to do so. Initiatives and the establishment of quality measures regarding the reduction of elective deliveries, stemmed from various national organizations such as the March of Dimes, ACOG, CMS, and the Joint Commission which caused this ripple effect of policies at the state, and hospital level around the country. Since then, the data shows variations in the progress made by each state, as well as the types of policies they decided to enact, such as “hard” versus “soft” stop policies.

Jamison, Victoria

Mentor(s): Dr. Casey Giraudy

The Power of Connection: Fostering Relationships in New Environments and Unprecedented Times

The Power of Connection:

Fostering Relationships in New Environments and Unprecedented Times

Graduation with Leadership Distinction in Professional and Civic Engagement- Victoria Jamison

As a student in the Darla Moore School of Business, we are taught about the power of connection. Whether you're starting a new job, going to a professor's office hours, or talking to a stranger on the street, there is a benefit in building a connection and forming a bond. Throughout my four years at the University of South Carolina, I've made meaningful connections both in and out of the classroom that enhanced my college experience and aided in my development as a young professional. Three opportunities provided me with my most impactful connections: working as a student assistant in the Office of Career Management in the Darla Moore School of Business, serving as Hero Relations co-director for USC Dance Marathon, and interning in Fifth Third Bank's Commercial and Credit Leadership Program for the Summer of 2020. Through these experiences, I've learned the value of peer-to-peer leadership, the importance of effective communication through unprecedented times, and the need for mentorship in professional environments. COVID-19 has changed how we connect in a way that has never been done before. The pandemic has forced change and adaptation in every area of our lives. My presentation will focus on the insights I have gained about building connections to foster leadership in new environments and through uncertainty.

Jaroma, Stephanie

Mentor(s): Mrs. Lauren Epps

Breaking Down Barriers

Student health services plays a crucial role in helping college students to maintain and manage mental health issues. As a Changing Carolina Peer Leader, it is my responsibility to help create, plan, and work events with the goal of helping students with many problems such as stress management. Joining this organization helped me to understand the importance of taking care of one's mental health and allowed me to help both my friends and peers in the process. I also had the opportunity to present to University 101 students about other things that could influence their mental health such as, healthy relationships, time management, and body positivity. Working with this organization taught me how to communicate effectively with a group to design, budget, and create events with the highest rates of success through trial and error. I learned how to build off other ideas and incorporate my own to produce an engaging and educational experience. The work that I did in this organization has reinforced my confidence and expanded my knowledge, providing me with several skills that I will be able to use in the future. As of right now, my dream job is to become a physician that works with kids dealing with mental health issues. Back when I first joined CCPL, I was unsure of what I wanted to do with my life and decided to push myself into trying something new. Soon after I began to realize that I had a passion for helping people, especially about serious topics that many still have trouble discussing. There is still a huge stigma surrounding mental health and I aspire to help others break down those barriers and realize the importance of seeking out help.

Jefferson, Meoshay

Mentor(s): Dr. Denise Wellman

Empathy, Development, Peace: My Takeaways from the Middle East

January 19, 2020: I landed in Queen Alia International Airport in Amman, Jordan. I went to the bathroom after 21 hours of travelling. As I finished washing my hands, the cleaning lady reached for paper towels to hand me. La' Maalish shurkun! No! Don't worry Thank you! I said to her before she completed her gesture, but she said no you are my guest. My first interaction in Jordan set the tone for my entire experience. My journey abroad was more than I could ever imagine. I committed myself to seeking opportunities to grow, learn, and expose myself to issues greater than me. In Amman, I was able to experience and learn issues firsthand that I have spent reading in the news for the last couple years. I was able to see directly the effect of United States' Foreign Policy decisions in the Middle East. I was able to practice my Arabic that I had been studying for the last 2 years ago. I saw the authentic Middle East that got lost in the wicked narrative of the West. The Middle East with the nicest, most hospitable people willing to help you at their every move. But, ultimately over everything else, I was able to experience the interconnectivity of the world itself. My experiences heightened my level of empathy and quenched my thirst for knowledge. Every day when I woke up to the sounds of the morning prayers, I knew that the day was mine to make.

Jenkins, Aliyah

Mentor(s): Prof. Jay Pou

Equity Versus Equality: What Raising Funds for Women's Health in Ghana and Sierra Leone Taught me About Leadership

I believe that education is a right that every person should have access to regardless of any accommodations that need to be made. One of my greatest and most notable accomplishments in my college career would be the philanthropy project I researched, designed, developed, as well as implemented in my sorority, Zeta Phi Beta Sorority, Incorporated, where we raised over \$200. Wo Ye Bra is an organization that provides sanitary pads for women in Ghana and Sierra Leone while also assisting in the development of entrepreneurial skills by providing women with sewing machines and items to help them sell sanitary

pads for profit. This organization is fundamental because without it, many women in these regions fail to benefit from necessary educational opportunities due to their menstrual cycle and their inability to afford sanitary pads. After realizing this was a national initiative of my sorority that was often overlooked, I began to do research to educate my sorority sisters as well as my peers about its importance and developed a plan to fundraise. The plan to fundraise was slightly intricate due to the financial strain and restrictions COVID-19 has placed on many Americans, but I became adaptable to these changes and developed two separate fundraisers which opened the opportunity for various donors to be able to donate to the project. This project was extremely impactful to me because education is vital, especially when women are missing school due to reasons that are avoidable when the adequate resources are available. This is where equity and equality are important in advocacy services because it is vital to realize the variations of needs across communities. My initial goal for monetary donations were set at \$100 and I was extremely joyful to have raised more than double of what was desired. Raising money for this cause allowed to me increase the development of how I develop and conduct service projects which I found to be impactful while also enhancing knowledge and understanding in equity.

Jenkins, Tyreek

Mentor(s): Dr. Hainan Lang

Immune cell dysfunction and blood vessel atrophy in age-related hearing loss

Age-related hearing loss (ARHL) affects approximately one in three adults between the ages of 65 and 74 and almost half who are 75 years or older in the United States. ARHL is generally defined as a progressive sensorineural hearing loss due to the dysfunction and loss of cochlear cells and structures. Degeneration of the stria vascularis (SV) in the cochlear lateral wall, marked by an increase in laminin expression and infiltration of immune cells (such as macrophages) is strongly associated with ARHL. It has been shown in pathogenic conditions that laminin expression alters the biological activity of immune cells; however, the relationship between laminin expression, macrophage activation, and strial microvessel atrophy in ARHL has yet to be determined. We hypothesize that age-related cellular degeneration causes an increase in macrophage number and laminin expressing microvessels in the cochlear lateral wall. Auditory brainstem response measurement, confocal microscopy, and quantitative immunohistochemical analyses were performed in young adult and aged CBA/CaJ mice. We found that macrophage number decreased and laminin expressing microvessels increased with age in the apical and middle turns. Contrarily, the inverse relationship between macrophage presence and laminin accumulation was shown in the basal turn. For the SV in all three turns, laminin expression around the microvessels increased with age, while macrophage presence decreased. Moreover, we observed that blood vessels do not completely degenerate during aging but undergo structural remodeling. Our study suggests a causal relationship between age-related changes in macrophage activity and laminin expression level within the cochlear lateral wall. Future studies are needed to identify the regulatory roles of laminins in age-related macrophage dysfunction, strial microvessel atrophy, and hearing loss.

Johnson, Bailey

Mentor(s): Dr. Jabari Bodrick

All About the Tempo

During the spring semester, I worked at a program called Tempo Music and Arts. Tempo is a supplemental music education program formed in order to create musical opportunities to kids during the COVID pandemic. As an instructor, I created lessons to teach two classes: one for kids under the age of four and one for kids from ages five to ten. I decided to take on this position as a way to supplement my education in elementary music. I found that many theories of how children learn music are apparent when I teach. It has been incredible to watch the musical development of kids who come to class regularly and produce accurate tonal noises and rhythm movements in their bodies. This experience has shown how effective

Gordon's Music Learning Theory is when practiced on a regular basis. Overall, I have learned planning skills when creating lessons and how to be flexible when a lesson does not go as planned. It also has taught me the importance of improvising in order to create more musical experiences. My presentation will discuss my insights about Music Learning Theory from a first-person point of view and how this has impacted me to continue my journey in music education.

Johnson, Shelby

Mentor(s): Dr. Casey Goldston-Giruady

Dress to Respect: A Journey through Multimedia Journalism, Sustainable Fashion & Self-Transformation

In May of 2019, I studied abroad in Munich and Berlin, Germany. For three weeks, I traveled with a class full of Journalism and Mass Communications students. Before even leaving, I knew my heart had a soft spot for Europe from my enriching travel experiences in the past. As a Visual Communications major and a Retail minor, I have always been incredibly interested in the visual appeal of all things fashion. The class was designed for students to learn the art of storytelling through creative multimedia projects on topics specific to Germany. Our professor's vision was to allow every student to learn by immersing themselves in German culture and getting a better taste of the world. In my group, we decided to dig deeper into the sustainable fashion industry in Germany for our multimedia project. We did an abundance of research on the topic and planned interviews with boutique shop owners, upcycling designers, and a social media fashion influencer to learn all about the sustainable fashion industry from the people who know it best. After multiple interviews, we gained way more insight on how badly fast fashion affects the planet and how important it is for us as consumers to be more intentional when we shop. With these findings, we completed our multimedia project with an informational video and magazine layout all about the beauty of ethical shopping. Before this endeavor, I never would have dreamed that my entire idea of what fashion was would be transformed. I implement the memories and treasures I took away from this trip in my everyday life, specifically in shopping more ethically and taking better care of the beautiful planet that we share. I had such an incredible experience in Europe that I also decided to study abroad in Florence, Italy for the second semester of my Junior year. I believe travel is the ultimate teacher. Jumping out of your comfort zone, like I found myself doing on this trip, lead me to the monumental transformations that I have carried with me in everything that I do.

Johnson, Samantha

Mentor(s): Dr. Emily Mann

Are First-Time Mothers of 'Advanced Maternal Age' Actually 'High Risk'? A Systematic Examination of Clinical Research

Pregnancies among women of 'advanced maternal age' – or age 35 and older – are widely regarded by biomedical experts to be 'high risk.' This labeling results in obstetricians using heightened medical monitoring of women of advanced maternal age during pregnancy and medicalized interventions to facilitate childbirth at or near 39 weeks gestation. At the same time that all pregnant women of advanced maternal age are regarded as high risk for certain pregnancy complications and adverse pregnancy outcomes, first-time mothers of advanced maternal age are more likely to be White, have a high socioeconomic status (SES), and have a higher level of educational attainment than parous and multiparous mothers of advanced maternal age. High SES, educational attainment, and racial privilege are significant social determinants of health that provide important protective benefits and reduce the adverse impact of health-related problems in part by reducing the 'risk of risks.' Given that adverse pregnancy outcomes are more likely to occur among Black and indigenous women and economically marginalized women, the circumstances of first-time mothers of advanced maternal age appear to constitute a paradox—they are labeled 'high risk' because of their age, but they are protected from pregnancy complications and adverse pregnancy

outcomes because of their racial and economic privilege. This study sought to interrogate the validity and utility of labeling first-time mothers of advanced maternal age ‘high risk’ by systematically examining the clinical research on advanced maternal age as a risk factor for pregnancy complications and adverse pregnancy outcomes in the United States. We find that (a) few studies exist that exclusively use data from the United States; (b) among these studies, most do not disaggregate by parity; and (c) the existing evidence regarding some biomedical risks for this population in the United States and comparable industrialized Western countries is equivocal. These findings suggest that in the absence of more focused biomedical research on nulliparous pregnant women of advanced maternal age, a revised approach to the biomedical management of the pregnancies and births of first-time mothers of advanced is warranted to reduce unnecessary interventions and improve women’s birth experiences in the United States.

Johnstone, Cary

Mentor(s): Dr. Mark Weist, Ms. Darien Collins

Undergraduate Perceptions of Mental Health in Relation to COVID-19

College presents a unique opportunity for students to face new challenges that facilitate mental, personal, and emotional growth. However, these changes can also bring increased levels of stress and pressure, potentially resulting in mental distress. The development of mental health concerns affects students in many ways such as in individual and interpersonal functioning, adjustment to college life, and academic performance (Kitzrow, 2003). The coronavirus pandemic poses a significant threat to the mental health of students, who are considered a vulnerable population due to the disruption of school and daily life (Holmes, et al., 2020). As universities began the 2020 fall semester operating under strict safety measures and social distancing, students returned to a “new normal” that greatly altered peer and professor interactions, living arrangements and access to community opportunities. The long-term effects of this change on students’ mental health and wellbeing is not yet known. This study seeks to investigate the impact that COVID-19 has had on UofSC undergraduates’ mental health during the Fall 2020 semester. The UofSC Center for Health and Well-Being surveyed students, faculty, and staff related to mental wellbeing, ability to cope with stressors, and COVID-19’s impact on life. For this study, we utilized disaggregated data to capture the undergraduate experience separately. Participants included UofSC faculty, staff, graduate, and undergraduate students. Implications of these research findings may provide support for increased University support for current mental health resources or offer insight to areas that could be improved.

Jones, Blake

Mentor(s): Dr. Jeffrey Twiss

Elucidating Functions of ATF4 in Neurons and Glia

The neuron is a main functional unit of the brain, spinal cord, and peripheral nervous system (PNS), and is responsible for conducting electrical impulses across the body. Axons are the long, signal-carrying projections of neurons that extend from the cell body and innervate other neurons and target tissues. Despite their vital role, neurons have a limited capacity to regenerate axons after they are severed. Previous data from the Twiss lab has suggested that Activating Transcription Factor 4 (ATF4) overexpression increases axonal growth in dorsal root ganglia (DRG) neurons, while it simultaneously triggers death of Schwann cells. RNA-seq and subsequent RT-ddPCR validation studies show that ATF4 overexpression changes gene expression in cultures of both DRG (neurons + Schwann/Satellite cells) and isolated Schwann cells. Differential regulation of gene expression is seen in the cultures, suggesting that ATF4’s pro-growth effects in neurons and pro-death effects in Schwann cells can be controlled by ATF4-driven gene expression. Further, these studies indicate that the outcome of ATF4 overexpression is cell context-specific. We identified candidate genes by methodically sorting RNA-seq data and then validated these results through quantitative RT-ddPCR analysis. We then conducted siRNA knockdown and overexpression assays in DRGs and Schwann cells in order to determine the target gene(s) responsible for ATF4’s effects in vivo. We hope

that these data will bring new insight into cell context-specific effects of the stress signaling ATF4 protein and uncover new therapeutic directions for improving neural regeneration after traumatic injury.

Jones, Megan

Mentor(s): Dr. Marj Pena

The Effects of a High Fat Diet and Long-Term Exposure to Low-Dose Penicillin on Intestinal Tumor Development in a Mouse Model of Colorectal Cancer

Colorectal cancer (CR) is the third most common cancer and the second leading cause of cancer deaths in the United States. Around 80% of sporadic CRC is caused by a mutation in the adenomatous polyposis coli (Apc) gene which is similar to that found in the inherited form of CRC, familial adenomatous polyposis. Loss of Apc, a tumor suppressor gene, leads to polyp formation and uncontrolled cell growth, and additional mutations lead to progression into a cancerous lesion. The gut microbiota, housed in the gastrointestinal (GI) tract, has been shown to play a role in tumor initiation and progression. A high fat diet is often associated with inflammation that can alter the gut microbiome and favor a different set of microorganisms. Previous studies showed that ApcMin/+ mice, a genetic model of CRC with a truncation mutation in the Apc gene, when fed a high fat diet, modeled obesity which is a risk factor for CRC and caused an increase in tumor burden. When exposed to low dose penicillin, female mice developed a higher tumor burden and larger tumors as compared to male mice. Our goal in this study is to determine if feeding mice a high fat diet while they are undergoing antibiotic treatment has any effect on the gut microbiome composition and tumor burden. In this experiment ApcMin/+ mice were fed a high fat diet and divided into two groups, the control and the antibiotic group that would receive low dose penicillin in their water following weaning. Male mice in the antibiotic group had significantly larger body mass at sacrifice and liver weight when compared to the female mice in the antibiotic-treated group. Mice in the antibiotic group also consumed less water on average than the control group and their hematopoietic parameters dropped below the healthy range as compared to the control group starting around 10-12 weeks. In conclusion, although altering the gut microbiota by antibiotic treatment caused an increase in tumor burden in a gender-dependent manner, combining the altered microbiota with a high fat diet did not further alter tumor development in these mice.

Jones, Rachyl

Mentor(s): Dr. Denise Wellman

How Being President of My Sorority Will Make Me a Better Journalist

I joined a sorority at the University of South Carolina because of the philanthropy, networking abilities, and to surround myself with likeminded individuals. Over four years, I found so much more. My Greek organization has played an essential role in my personal and professional growth, specifically in my confidence, ambition, and leadership capabilities. Before joining Kappa Kappa Gamma, I was afraid to be a leader. Kappa not only gave me the tools to succeed in leadership, but its members also acted as my support system, waiting to catch me if I fell and encouraging me to get back up. Serving as president during the 2019 calendar year, I made it my goal to have a larger focus on philanthropy and sisterhood, bringing our chapter closer to its founding values. On a personal level, I learned to lead every situation with kindness and that I am stronger than I give myself credit for. Professionally, I learned how to separate business and friendships, how to make quick and decisive decisions, and how to communicate effectively with people I disagree with. This Greek leadership role has been the largest growth experience in my college years, giving me the foundation to be successful in the workplace. The skills I'll need in my intended career, journalism, uniquely align with the lessons I learned during my time as president. In my presentation, I'll discuss how my insights in this role both shaped the person I am today and prepared me for a career in journalism.

Jordan, William

Mentor(s): Mrs. Theresa Harrison

Understanding the Interconnectedness of Business and the Community

As a Business and Community Leadership Fellow, I was able to engage in meaningful, extensive community service throughout my college career. I believe businesses have a social responsibility to improve their communities, and community service, especially in the non-profit setting, should be a life-long commitment of businesses and people. Through this GLD and BCLF Process, I began to understand the interconnectedness of businesses and their communities, and I was able to make positive changes through my volunteering. I learned a great deal about the importance of data, the importance of being professional, and the importance of always being a leader.

Joudeh, Liza

Co-Author(s): Kennedy Griffin

Mentor(s): Dr. Alan Waldman, Ms. Maegan Gudridge

Progerin and the Fidelity of DNA Double-Strand Break Repair

Hutchinson-Gilford Progeria Syndrome (HGPS) is a rare genetic disorder involving premature aging and an average life expectancy of fourteen years. The cause of HGPS is most commonly a point mutation in the LMNA gene that normally produces the protein lamin A, an essential component of the nuclear lamina. The mutated form of lamin A is known as progerin. Interestingly, small amounts of progerin are produced in healthy individuals by alternative splicing of RNA and these low levels of progerin have been implicated in the normal aging process. The aging process is believed to involve changes in DNA repair, and previous studies by others have indicated that progerin impedes the repair of DNA double-strand breaks (DSBs). It has indeed been shown that the genomes of HGPS patients accumulate DSBs. Repair of DSBs normally occurs via either homologous recombination (HR), an accurate, templated form of repair; non-homologous end joining (NHEJ), an error-prone nontemplated rejoining of DNA ends leading to deletion or insertion mutations; or precise ligation (PL), an accurate, nontemplated rejoining of DNA ends. Our lab has developed model systems that enable the study, at the nucleotide level, of HR, NHEJ, and PL events recovered from cultured mouse cells following artificial induction of a genomic DSB. In this project, we expressed progerin in cells to learn how progerin might corrupt DSB repair pathways. Earlier work in our lab suggested that progerin shifts DSB repair away from HR and toward the less accurate pathway of NHEJ. In our current work, we investigated whether progerin may shift the balance between NHEJ and PL. Our work indicates that transient expression of progerin does not alter the balance between NHEJ and PL, while ongoing work suggests the possibility that long-term progerin expression promotes error-prone NHEJ at the expense of accurate PL. These exciting findings are consistent with a progerin-provoked induction of genomic instability that may contribute to aging. We report on our latest progress on these studies which are aimed at better understanding the biology of premature and normal aging.

Kahler, Sophie

Mentor(s): Dr. Conor Harrison

The Evolution of Columbia's Neighborhoods: 1937 to Present

The residential area in which someone lives can determine their lifestyle — from with whom they interact to where they shop, eat, and visit — as well as their life outcome, through factors such as school zoning and mortgage availability. Historically, American cities have developed along racial and socioeconomic lines as a result of federal, state, and local policies, lending practices, and explicit social pressures. No more is this clear than through the creation and use of the Home Owners' Loan Corporation redlining data, a set of maps produced by the federal government that divided cities into neighborhoods, rated

those areas based on factors of desirability, and encouraged lenders not to provide mortgage loans to residents of low-rated neighborhoods. In this project, I study the socio-geographic evolution of Columbia's neighborhoods by documenting how neighborhoods were created, maintained, and transformed throughout the twentieth century with a focus on racial and socioeconomic segregation. I find that racially discriminatory policies of redlining and urban renewal profoundly shaped the residential neighborhoods in Columbia and the lasting impacts are seen in today's landscape.

The urban landscape is a reflection of what society considers important, historic, and worth investing in, and the physical environment reinforces social norms and attitudes. Yet typical public history initiatives focus on select areas and landmarks – often spaces of privilege and whiteness – which erase the history of marginalized communities. This project seeks to recognize the Columbia community as a whole, including traditional “historic” neighborhoods as well as overlooked neighborhoods, by producing an interactive online map and accompanying research article that illuminates the processes that created physical and racial divisions in the city.

Kappel, Jonathan

Mentor(s): Dr. Thomas Crawford

Single Particle Magnetic Particle Spectroscopy

Based on Magnetic Particle Imaging, Magnetic Particle Spectroscopy (MPS) is a tool that uses Superparamagnetic Iron-Oxide Nanoparticles (SPIONs) for applications in medical imaging, biosensing, and for characterizing and understanding the properties of magnetic particles. MPS isolates the magnetic response of SPIONs by utilizing the nonlinearity of SPIONs, which can be employed to understand the SPION and its local environment. However, typical MPS setups require a high concentration of particles to produce a response large enough for a detector to record, roughly 10^{15} particles per liter. This project's goal is to demonstrate a MPS system that can work with a significantly lower number of particles. To prove its viability, we simulate Magnetic Particle Spectroscopy using a coplanar strip waveguide as tunable AC excitation source with wide bandwidth (for high frequency measurement) and a Tunnel Magnetoresistive sensor for SPION detection (which is significantly more sensitive than other sensors). This simulation strongly suggests single particle MPS is not only possible but also can achieve high enough driving frequencies to study single SPIONs in the microwave regime, something that has not yet been demonstrated but has potential to help expand our understanding of magnetism in nanoscale geometries.

Kays, Lilly

Mentor(s): Dr. Matthew Childs

“English Mania” and Florence, Italy

During the fall 2019 semester, I studied abroad in Florence, Italy at Florence University of the Arts. I am a Global Studies major with an emphasis in Culture and a minor in Italian, so it was critical for my educational, personal, and professional development to study abroad in Italy. I traveled to Italy through a partnership program called SAI. This program was well-established in the Florence community, so they offered every SAI student the opportunity to be an assistant English teacher at a local school. I signed up because I believed it would be an incredible opportunity to teach but also learn more about the Italian culture. When I arrived my first day, I was met by a teacher with limited English speaking ability. She informed me that I was there to teach the class on my own. I had no student teaching experience, especially not with a kindergarten class. This experience reminded me of the concept, “English Mania”, which I learned in SCHC 477, Honors Schools and Global Society with Dr. Kara Brown. “English Mania” is essentially an obsession or eagerness for English learning. When I arrived to be a volunteer English teacher, I was overcome in this moment with “English Mania” and the idea that I, an unqualified American, was assumed to be good enough to teach introductory level English. These kids and even the teacher were

so eager to learn that I just adapted and started with the basics. The concept of “English Mania” and my beyond the classroom experience of teaching English in Italy was a true Global Learning experience. Not only did I gain a new perspective on the world and how it sees English speakers, but I had the opportunity to engage with the theory firsthand and learned how important it is to adapt and meet the needs of another culture. I look forward to expanding on this theory and utilizing my experience teaching English as I pursue a master’s in International Affairs with a focus in International Communication at Boston University this Fall.

Keeton, Sydney

Mentor(s): Mrs. Gina Spence

Combatting Mental Health Stigma on College Campuses

Throughout my college career, I have undergone many experiences that have made me passionate about mental health destigmatization in the community, but particularly on college campuses. I always had a personal interest in the field of mental health, which led me to become a Psychology major. After undergoing a personal physical and mental health transformation, I gained the confidence to take on roles that allowed me to make a fundamental difference in my community. I joined the Active Minds Anti-Stigma Organization, became the Vice President of Social Programs for our campus’s Psychology Honor’s Society, worked in peer leadership, and mentored adolescents at Hand Middle School. During this time, I was able to create an advocacy project regarding mental health stigma and its impact on the lives of those who suffer in silence. Through my research, I was able to gain better insight as to what specific societal issues contribute to this issue. I felt inspired to conduct my own research at my own college campus, surveying students about their experience with our mental health care system at our university. The results indicated that negative experiences and interactions with our student health services as it relates to mental health is a widespread phenomenon across our campus. My goal is to educate and promote the implementation of more effective mental health care for students at the University of South Carolina.

Keller, Michael

Mentor(s): Dr. Ioulia Chatzistamou, Dr. Hippokratis Kiaris

Polymorphisms in Unfolded Protein Response Genes

The Unfolded Protein Response (UPR) is a homeostatic pathway used by cells to edit and revise misfolded proteins and is important to be studied because it has been implicated in diseases such as diabetes, neurodegenerative conditions and different types of cancer. In addition, in light of its role in maintaining homeostasis it is essential for the adaptation of cells at adverse environmental conditions. The UPR guides how the cell will respond to Endoplasmic Reticulum (ER) stress. If the stress is greater than what the cell is able to respond to, the cell will respond by ending its life cycle through apoptosis. A better understanding of the UPR can help guide possible treatments or preventative methods for these diseases. The goal of the project is to determine if polymorphisms exist in the promoter region of genes involved in the UPR that may affect their expression and therefore the execution of the UPR. As a model we used genetically diverse animals of the species *Peromyscus*. Our hypothesis is that if such polymorphisms exist and affect UPR genes’ expression, they will ultimately influence the way the UPR impacts cell survival. Initially we sequenced 1 kb of the promoter of the ER stress chaperone GRP94 in 34 *P. maniculatus bardii* individuals (BW stock) and 10 *P. maniculatus sonoriensis* (SM2). No variations in the promoter of GRP94 in BW animals were found but several variations in the promoter of SM2 animals were revealed. Specifically, we found a deletion encompassing 6 base pairs, an insertion of 2 base pairs and various other base substitutions in the region of interest. Currently, the promoter fragments bearing polymorphisms and the corresponding wild type controls are being cloned into the pBV luciferase plasmid to evaluate if the polymorphisms discovered, influence promoter activity. Of note is the polymorphism involving the 2 SNPs that according to predictions by using bioinformatic tools alters the recognition for the transcrip-

tion factor MILF1.01, MEL1.03, and PSE.01. Subsequently, we will test if the expression of GRP94 differs in the animals bearing polymorphisms and subject them to cell viability assays to evaluate if they affect cell survival.

Kellogg, Victoria

Mentor(s): Ms. Virginia Simmons, Mr. Jason Morrow, Mrs. Regina Franco, Mrs. Pamela Cloys, Mrs. Noreen Denham

Mass, Endurance, and Fatigue Changes Cancer Survivors Experience During an Oncology Rehabilitation Program

Cancer patients who have completed treatment may participate in the Prisma Health Cancer Institute's Oncology Rehabilitation program. This program, Moving On, consists of hourly sessions held three times per week over 12 weeks. Objectives of Moving On include helping participants decrease cancer treatment related fatigue, improve endurance, and improve body composition. Participants are encouraged to participate in ≥ 30 sessions to see improvements. Participants completed a Brief Fatigue Inventory (BFI), a 6-minute walk test measuring distance gained, and a dual energy X-ray absorptiometry (DXA) scan using GE Lunar iDXA at baseline and after completing the program. Analyses were conducted using a t-Test: paired two sample for means and an ANOVA: single factor test to understand differences in fatigue, endurance, and body composition changes across categories of participants based on which cancer treatments they completed before the program. These categories of treatment were: chemotherapy/radiation, no chemotherapy/no radiation, chemotherapy/no radiation, and no chemotherapy/radiation. The analysis included 171 participants who completed ≥ 30 sessions of the program, pre- and post-BFIs, pre- and post-iDXA scans, and pre- and post-walking tests. Significant differences were observed for the 171 participants and for each treatment category for both fatigue scores (pre - 3.36; post - 1.57; p-value < 0.05) and the 6-minute walk test distances (pre - 1374.99ft; post - 1582.23ft; p-value < 0.05). The t-Test results showed no significant differences in total mass for the total population (pre - 179.76lbs; post - 179.37lbs; p-value > 0.05). However, significant differences were observed for the 171 participants for the following variables: VAT mass (pre - 3.22lbs; post - 3.10lbs; p-value < 0.05), fat mass (pre - 72.25lbs; post - 71.10lbs; p-value < 0.05), and lean mass (pre - 101.36lbs; post - 102.70lbs; p-value < 0.05). Lastly, ANOVA results showed significant differences between the treatment categories for pre-fat mass (p-value < 0.05), pre-total mass (p-value < 0.05), post-fat mass (p-value < 0.05), post-total mass (p-value < 0.05), and the changes in fat mass (p-value < 0.05) and change in total mass (p-value < 0.05). These results indicate participants may experience different, yet positive, outcomes based on cancer treatments they received but highlight the benefits of an oncology rehab program following treatment.

Kelly, Julia

Mentor(s): Dr. Elise Lewis

Broadening My Perspective

During the Spring semester of 2019, I studied abroad at London Metropolitan University in London, United Kingdom. Prior to beginning college, I went on a one month study abroad trip with my high school to Oxford University in the United Kingdom. This experience was so integral in my preparation and transition into college life, that I was sure I wanted to return to England. As a biological sciences major, I was unable to take my core science courses while abroad. This setback, however, turned out to be an asset to my experience. Since I was only able to take general education courses, I was able to gain a deeper understanding and appreciation for topics that I do not usually study, such as Computer Science and Film Studies. This experience also translated to my experiences living in a foreign country. I was able to travel to new places, meet interesting people, and experience life in a new way. My work in the classroom and my experiences outside of the classroom during these five months challenged me both as a student and as a person. I gained a deeper understanding of the world around me, and I now am able to strive to continu-

ously further that appreciation.

Kelly, Quinn

Mentor(s): Prof. Tiffany Conde

What matters in one place, might not at all somewhere else

During last spring semester, I had the opportunity to study abroad at the University of Auckland in Auckland, New Zealand. What I did not realize until the first day of classes was that I would spend most of my energy for the next four months on a consulting project for an emerging Auckland business, Nuka. My group of 5 students from China and New Zealand and myself were tasked with developing a product launch and market entry strategy for their newest product, Nuka Liquid Smoke, that is sourced from trees on the land of the native Maori population, with the goal of providing employment and revenue opportunities in their community. This task required me to synthesize my studies in business strategy, international relations, as well as professional communication and research to deliver the best possible recommendations to the client. This was a significant step in my journey because it was the first time I got to apply my learning to a real business with plans of operating internationally. Leveraging my learning over the previous three years was paramount, and communication especially took the forefront when we all got sent home to our home countries due to COVID. Regardless, we were able to deliver exhaustive strategies for three potential markets, US, China, and New Zealand, as well as the risks associated with each. This experience really opened my eyes up to how interdisciplinary business strategy can be, and further ignited my passion for my degree program. This was an incredibly important experience for me because it let me work on the exact type of project that I hope to work on professionally and resulted in me pursuing a management consulting role after graduation.

Kerwin, Mary

Mentor(s): Mr. David Deweil

Learning to Adjust: Panhellenic Leadership and Chiropractic Internship

My Greek Life experience has been one of the most significant and rewarding experiences of my college career. My most notable contribution to the University of South Carolina has been my dedication to improving the member experience not only in my own chapter, but in the Panhellenic community. After joining my organization and finding my home in the Panhellenic community, I was given the opportunity to achieve my academic goals, push myself socially, and to further develop my leadership skills. I went on to serve as the Vice President of Membership Development for the College Panhellenic Association, which allowed me to give back to the community that pushed me to grow into the woman I am today. This position taught me about using my leadership style, overcoming adversity, and working with a diverse group of people through conferences, programming for 4,000 women during a pandemic, and overseeing various committees. During my term, I also completed a practicum experience at Wiseman Chiropractic where I had the opportunity to observe treatments, perform therapies with patients, and learn so much about chiropractic, reigniting my passion for the field and solidifying my future career. Through my Greek Life leadership, as well as my practicum experience, I learned so much about myself as a leader and ultimately, what I want for myself in my future career.

Keschinger, Victoria

Mentor(s): Ms. Gina Spence

Peer Leadership in the Green Quad Community

Living in a residence hall is the first time most students will be living on their own and without their family. Inside the residence halls students will learn how to establish relationships with others, start working towards their goals they have to graduate from college, and learn many new things about themselves as

they go through new experiences at the University of South Carolina. Throughout my time at the University of South Carolina I have served as a Resident Mentor and an EcoRep in the Green Quad community. In these positions I have been able to grow personally as I learned how to lead others, organize events, facilitate difficult conversations, how to be a good support system to others and how to problem solve. During my time as an EcoRep I was able to teach other students about sustainability, environmental issues and how they can live a more sustainable lifestyle. As a resident mentor I was able to create a welcoming community for the residents, build relationships and teach them skills they can use later. In my presentation I will be discussing my experience as both a resident mentor and as an EcoRep, how it has impacted me, the Green Quad community, and how I will be using these skills in the future.

Khalil, Sammy

Mentor(s): Dr. Renee Chosed

The Role of PEAK1, USP34, and MMP28 in Successful or Unsuccessful IVF Embryo Implantation

Introduction: In vitro fertilization is one of the most successful ways to combat female infertility. However, more research is needed to increase the rate of successful implantation and live birth. This research explores the benefit of determining what genes, found in the blastocoel fluid from IVF embryos, correlate with successful implantation.

Purpose: to determine if the genes PEAK1, USP34, and MMP28, are expressed in the blastocoel-fluid conditioned media samples and if the genes correlate with positive implantation.

Methods: Blastocoel fluid-conditioned media was obtained following biopsy of ICSI-generated day-5 blastocysts. RNA extractions, library preparation (SMART-Seq Stranded kit) and Illumina NextSeq500 sequencing were performed at the USC Functional Genomics Core. Standard RNASeq workflow was conducted: 1) removal of adaptor sequences 2) alignment to human Gh38 genome with STAR, and 3) FeatureCount to obtain raw gene count number for each sample. Differential gene expression analysis (DGE) of raw counts was performed using DESeq2 applying negative binomial generalized linear models and taking advantage of the package to generate more accurate shrunken log fold changes and variance stabilizing estimators for data with considerations regarding low counts and high dispersion.

Results: The genes, PEAK 1 and USP34, are both upregulated and found in blastocoel fluid from IVF embryos that are associated with successful implantation. The gene MMP28 is downregulated and found less in blastocoel fluid from IVF embryos, but is also associated with successful implantation.

Discussion and Conclusion: Using pathway analysis on the blastocoel fluid, from IVF embryos that are associated with successful implantation, the genes PEAK 1, USP34, and MMP28 were found to have a positive correlation to successful implantation. PEAK1 may be associated with positive implantation because of its role in regulating the cytoskeleton in order to control cell spreading and migration. USP34 positively regulates the Wnt signaling pathway which play an important role in reproduction. This function could possibly be the reason for USP34's association with successful implantation. Genes in the MMP family are responsible for the breakdown of extracellular matrix for processes like embryonic development, reproduction, and tissue remodeling. This may suggest the reason for MMP28 association with positive implantation.

King, Brianna

Mentor(s): Dr. Denise Wellman

Covidcation

Last spring, I studied abroad at the Universitat Pompeu Fabra (UPF) in Barcelona, Spain. UPF offered

business courses from an international perspective, and these courses would count towards my business degree. I chose to study abroad to gain a multicultural perspective of business in Europe, but also to expand my knowledge on the Spanish culture and language through getting a hands-on experience. As a Spanish minor having studied Spanish for 17 years, I wanted to study in Spain to gain a first-hand experience of living in a Spanish-speaking country and to enhance my intercultural fluency. Aside from what I learned in the classroom, I wanted to expand on my language skills through social and professional interactions. Upon first arriving to Spain, I experienced a major “culture shock”, and it was hard adapting to a completely new lifestyle. I went to a country on a completely different continent all by myself, and I felt very lonely and isolated. I had to adapt to the culture change in order to grow confidence in my daily life while I was there. Among many other activities, I attended Spanish cooking classes and I learned common Spanish recipes to use while living in Spain. This experience was significant, because I knew I wouldn’t have adapted to Spain’s food culture as quickly and easily had I not attended the classes. I also visited Spanish monuments, cultural events, parades, watched Spanish tv, and listened to Spanish radio. The more cultural events I attended, the more I was able to adjust to the culture and thus, my knowledge of and interaction with the Spanish language and culture improved significantly. This wouldn’t have been possible without immersing myself in the several activities I was able to participate in to eliminate the “culture shock”. I now have a multicultural perspective background when working with business clients and can adapt to any situation. I feel confident that I will be able to help other students eliminate their “shock” while studying abroad by sharing my experiences abroad and providing solutions that will ultimately enhance their qualities as a whole.

Kleinman, Danielle

Mentor(s): Dr. Matthew Childs

Learning to Make Well-Informed Decisions through the Capstone Programming Council

As a Capstone Scholar, students are not limited to academic success within the classroom. Rather, we are encouraged to enhance our capabilities through leadership and service opportunities. I became a member of the Capstone Programming Council during the 2019 academic year to serve Capstone students through an organization that plans and executes events that add value to the student experience beyond the classroom. Some of these events previously included Scarowinds, tubing down the Congaree while participating in river clean-up, and working on arts and crafts while learning about mindfulness and overall well being. In addition to implementing events alongside my council members, my responsibility resided in public relations to market our events by collaborating with organizations within and outside the Capstone community and planning social media posts with the goal of creating greater brand awareness and increasing event attendance. Through this experience, I was able to deliver successful outcomes with effective planning, research and risk management. This experience, coupled with my studies in Finance and Management at the Darla Moore School of Business, further allowed me to hone and refine these organization and marketing skills. As a result, I now have a more thorough and experiential understanding of their significance in producing knowledgeable decisions in any leadership position as I pursue a career in finance.

Krebs, Allison

Mentor(s): Dr. Johannes Stratmann

Responses of Cultured Tomato Cells to Green Leaf Volatiles

Green-leaf volatiles induce a variety of powerful defense responses in plants that have not been fully identified or studied. This research aims to provide a better understanding of plant GLV signal transduction and if GLV perception/signaling translates into a defensive response in a process known as priming. We can determine GLV induced enzymatic activity of the proton (H⁺)-ATPase by measuring changes in medium pH. The pH of *Solanum peruvianum* (SP; a wild tomato species) suspension cells were measured after

exposing them to three common GLVs: Z-3-hexenol (HOL), E-2-hexenal acetate (2HAC), and Z-3-hexenyl acetate (3HAC). To more accurately reflect natural GLV-plant interactions, cells were exposed to a combination of GLVs, while others were treated with a single GLV for comparison. It has been found that 2HAC and 3HAC, while structurally similar, can induce two distinct pH reactions in plant cells. A lower concentration of 2HAC caused an alkalization response while the same concentration of 3HAC caused an acidification response. At a higher concentration, both individual treatments induced similar acidification responses. At both low and high concentrations, the pH curve for the 2HAC & 3HAC combination treatments induced an acidification response in the cells (pH curve most resembling that seen in the 3HAC treated cells). The pH did not decrease more than what had been observed in individual 2HAC and 3HAC treatments, so it may be determined that the effects of 2HAC and 3HAC are not additive in nature. Further research will investigate the effects HOL (individually and in combination with 2 & 3 HAC) has on SP pH response. In future experiments, SP cells will also be tested for flg22/systemin sensitivity after prolonged exposure to individual and combination GLV treatments.

Kuehler, Chelsea

Mentor(s): Dr. Sarah Miller

All the Little Things

Within the middle of the city limits sits a historic home. The Bedon-Lucas house and has been standing since 1820. It is the center of Walterboro, SC in Colleton County. The Colleton County Historical and Preservation Society (CCHAPS) continues to preserve this historic home through fundraisers and staying active within the community. When serving your community, it is important to find an organization to which you feel passionate about serving. I am passionate about history and its preservation. There was a call to me to volunteer and add what I could, when I could, to CCHAPS. For each committee and volunteer group I was a part of I was able to bring my strengths as an individual to the group to serve my community. This happened in more ways than one. Such as, being present on committees or being a support person behind the scenes to ensure events run smoothly. Being on a committee helps bring different people together to ideas to bring concepts to fruition. Whether this is an annual event CCHAPS holds or a new event to bring in fresh faces to the society. Volunteering time and effort is vital to non-profit organizations. Participating in support behind the scenes is just as important as physically serving on a committee. Website design and maintenance can make or break an event. Being a change-agent brings a wholeness to the community when working collaboratively with others who are serving towards a common purpose. Through serving as a change-agent you learn citizenship which connects you and your community through service.

Kwasny, Stan

Co-Author(s): Jon Isaac, Cassandra Gibson

Mentor(s): Prof. John Gerdes

Softdocs Etrieve Database

Refactor data management in the Etrieve installer. Remove need to ferry data from function to function and centralize storage location, update, and retrieval.

Lacera, Zara

Mentor(s): Dr. C. Nathan Hancock, Dr. Sarah Mendoza

Testing the Effect of BUD8 and TAL1 on mPing Transposition

Transposable elements, discovered by geneticist Barbara McClintock, are segments of DNA that “jump” to different locations in an organism’s genome. Transposable elements are important because they can cause mutations which results in genetic diversity and facilitates evolution. To measure the activity of a transposable element from rice, known as mPing, a yeast transposition assay was developed. Previous

results showed that a construct overexpressing the yeast BUD8 and TAL1 genes increased mPing transposition. However, the results did not communicate which of these genes specifically caused the increased rate. To determine which of these genes were influencing transposition, we made separate overexpression constructs for each gene. We will test these new constructs in yeast to measure how mPing transposition is affected. We anticipate that one of these two genes will increase transposition, while the other will not. Knowing the effects of these genes on transposition is important because it helps us understand how organisms regulate the activity of transposable elements.

Lady, Grace

Mentor(s): Dr. Melissa Duffy

How can I help? Investigating the Role of Social Supports in Academic Resilience Among Undergraduate Students

Academic resilience refers to a student's ability to emotionally and cognitively adapt to academic adversity, including transitions to new experiences, such as college. This ability to "bounce back" is an important characteristic for academic success (Robbins et al., 2018; Hodge et al., 2017). Although previous research has focused on factors internal to the individual in the resilience process, there is a need to also understand the nature of social supports. Therefore, the main goal of my senior thesis (within the broader Academic Emotions Study) was to explore the role of social supports in academic resilience among undergraduate students. Specifically, my arm of the study aimed to investigate what social supports students rely on and how students use social supports through times of academic difficulty, particularly during the COVID-19 pandemic and through the transition to college. Undergraduate students completed a questionnaire (N = 189) in the fall of 2020 that included measures of emotion regulation, academic emotions, academic resilience, social supports, and self-reported academic achievement. A subset of participants (n = 9) also completed a follow-up interview to further investigate how they utilize social supports in times of academic difficulty. Analysis of questionnaire data revealed a moderate, positive relationship between social support and academic resilience ($r = 0.33$, $p < 0.001$) and friends had the highest mean score of all agents of support ($M = 3.56$, $SD = 1.26$). Analysis of interview responses revealed that students most frequently reported using social supports for venting and informational support purposes. Interestingly, some participants who reported feeling supported specifically by instructors or TA's reported that it helped to boost their motivation in their academic work as well. Most participants also reported that the transition to online learning due to COVID-19 negatively impacted their number of interactions and quality of interactions with most social supports. These findings provide support for the relationship between social supports and resilience. Further research is recommended to better understand how and why specific types of social support interactions affect students and their academic resilience.

Lairtoo, Niya

Mentor(s): Dr. Kelly Goldberg

Australopithecus Afarensis: One of Our Best Known Ancestors

Have you ever considered what makes us uniquely human? What makes us uniquely different from other mammals? In late November of 1974, the answer to this question became clearer with the discovery of Lucy, a skeleton later classified as *Australopithecus afarensis*. Though not the first *Australopithecus afarensis*, Lucy's discovery made it clear that this species was more than just another ape, becoming the most complete skeleton from her time. *Australopithecus afarensis* suggests a transition from the trees to land and upright walking, two features later proven to be pivotal to our evolution into *Homo Sapiens*. This poster will explore the features of *Australopithecus afarensis* and how their existence is crucial to the story of *Homo Sapiens*.

Landires, Candace (Victoria)

Mentor(s): Dr. Elizabeth Easley

Student Organizations are Fundamental for Academic and Professional Success

During my second and third semesters at the University of South Carolina Lancaster (USCL), I was the President of the Rotaract Club. Rotaract is a civic-focused club that prepares members for future employment through community engagement. I joined Rotaract because my professors expressed that doing so would provide the opportunity to grow professionally and have career advancement opportunities in my future. What I did not know is that I would also gain a support system that aided me in my journey of attaining higher education. While registered for a full course load and being the President of the USCL Rotaract club, I also worked at a records storage facility full-time. Though time was a barrier, the support of the club advisors and members helped me excel as both the President and as a student at the University by providing a social outlet and guidance. Through Rotaract, I also had the opportunity to participate in a professional development training course through SC Works. Here I learned the difference between a regular resume and a functional resume. Target market, a concept from my Principles of Marketing class, is a great example of why someone would choose to use a functional resume. Depending on the company and a person's work experience, a functional resume may provide the reader with a better understanding of one's abilities when lack of work experience may be an issue. When I interned with the Lancaster County Court House in the Probate department, I used a functional resume during the interview process to highlight the skills and attributes that would align with the position. This experience helped me advance my skill in creating a resume based on my target market which will aid me in re-entering the workforce after becoming a School Psychologist. Without the Rotaract club and the leadership experiences it provided, I would have missed out on a lot of personal, professional, and academic growth opportunities.

Lane, Shannen

Mentor(s): Ms. Gina Spence

Peer Leadership

For college students who aspire to be professional leaders capable of motivating and inspiring others one day, peer leadership experiences provide a fresh start where one can gain the interpersonal, leadership and organizational skills necessary to know how to run and lead an organization. My leadership experience as an executive treasurer of Fashion Board at the University of South Carolina was one of my most formative engagements during my time in school. With my background in Accounting, I was able to utilize my financial and analytical skills when overseeing the organization's finances. However, I was also able to sharpen and develop skills outside of finance. Through negotiating with the Finance committee about budget-related deals and through collaborating with the executive team, I was able to enhance my communication and interpersonal skills. In addition, overseeing important organizational events such as the Student Designer Competition for our annual Fashion show, as well as organizing event presentations, allowed me to enhance my organizational, planning, and critical thinking skills. My presentation will discuss the positive impacts that this leadership role as well as other formative experiences have provided me that has prepared me to become the effective leader and professional I aspire to be.

Larsson, Julianne

Mentor(s): Dr. Holly Crocker

Greek Leadership

Sororities and Fraternities are a major part of campus life and membership in a Greek organization can promote personal growth, leadership development, academic success, moral integrity, and philanthropic involvement. As a member of Tri Delta, I have had the opportunity to form close relationships with a diverse group of people, network with alumni, and mature into a successful student and individual at the

University of South Carolina. During my sophomore and junior years, I served as the Continuing Education Chairman, during which I planned chapter wide events, coordinated with vendors to plan sisterhood activities, organized chapter meetings, trained fellow officers, connected with alumni, and sat on a standards committee to hold our officers accountable in fulfilling their responsibilities. Through this experience, I have gained tremendous insight into my leadership abilities, broadened my communication skills, enhanced my critical thinking and problem-solving, and was able to act as a mentor for other members of my sorority. As a Public Health major and aspiring physician, the skills I have acquired will greatly contribute to my future work in advocating for and promoting the health of my patients.

Latham, Crawford

Co-Author(s): Sullivan Smith

Mentor(s): Dr. Kelly Goldberg

Homo Habilis: The World's First Handy Man (Or So They Thought)

Modern handymen enjoy the use of many specialized tools, much like their hominid ancestor, *Homo habilis*, that earned its scientific name by creating prehistoric tools. Researching our prehistoric ancestors and their convergent evolution in tool making can help us better understand our own origins. Our goal with this presentation is to provide a complete overview of the species *Homo habilis* and their evolution. We will carefully consider archaeological findings and other credible scientific sources to display how *Homo habilis* had a hand in how modern man has evolved.

Lauber, Meagan

Co-Author(s): Madisen Faulkner

Mentor(s): Dr. Lauren Fowler, Dr. Matthew Tucker, Dr. Julie Mobley

Evaluating Non-Invasive Objective Measures of Fatigue and Time of Day Effects in Medical Students

Fatigue has long been an issue among healthcare workers, being associated with increased occurrences of medical errors, decreased task efficiency, and lower quality of patient care. Due to the prevalence of shiftwork and the biological strain of operating against one's circadian clock, medical professionals are at high risk for fatigue. In order to minimize accidental harm and optimize care, it is necessary to develop accessible, non-invasive, and reliable measures of fatigue. Fatigue is often measured via self-report questionnaires. However, this approach is limited twofold; fatigue is a multidimensional experience and such measures are inherently subjective and most measures do not account for time-of-day variations. Therefore, it is prudent to not only develop an objective measure of fatigue that can be cross-validated with subjective data, but to also examine how fatigue varies with time-of-day. Being a reliable, non-invasive, and quantifiable measure of cognitive activity, EEG presents such an opportunity to objectively measure fatigue. Thirty first- and second-year medical students were recruited from the University of South Carolina School of Medicine Greenville. Participants completed two consecutive data collection sessions approximately 12 hours apart, where their responses on the Epworth Sleepiness and Karolinska Alertness Scales were recorded to assess time-of-day effects on perceived fatigue. Participants were also hooked up to a 32 channel EEG cap for 5 minutes to objectively measure fatigue and time-of-day effects. Data analyses are underway, and we expect to find a positive correlation between higher scores on fatigue questionnaires and an increase in low-frequency theta and alpha wave activity indicated by EEG, with both measures demonstrating greater fatigue during the evening test condition. Obtaining objective measures of fatigue and time-of-day effects is important, as medical professionals would be more likely to develop countermeasures against fatigue if they were aware that they were more physiologically fatigued than indicated by subjective assessments.

Lauber, Meagan

Mentor(s): Dr. Jessica Klusek, Dr. Laura Friedman

Quantitative Analysis of Phonatory Parameters in Female FMR1 Premutation Carriers as a Potential Biomarker of Preclinical Fragile X-Associated Tremor/Ataxia Syndrome Symptoms

While fragile X syndrome occurs in individuals possessing >200 CGG repeats on the FMR1 gene, those possessing 55-200 repeats are classified as FMR1-premutation carriers. Previously, FMR1-premutation carriers were believed to be unaffected; however, research now shows they display distinct phenotypes, with the largest concern being their risk of developing fragile-X-associated tremor/ataxia syndrome (FXTAS). FXTAS is a neurodegenerative disorder characterized by tremors, parkinsonism, cerebellar-gait ataxia, brain atrophy and neuropathy. Given the premutation effects 1-in-148 women and 1-in-290 men, and the inability to predict which carriers will develop FXTAS later in life, it is necessary to develop methods of identifying potential pre-clinical FXTAS symptoms that are accessible to medical professionals, reliable, and non-invasive. Phonation is the production of speech via modulation of laryngeal tension to allow airflow that causes the vocal cords to vibrate. The neuromuscular sensitivity of the phonatory system makes it an ideal bodily system for detecting subtle neuropathologies that may occur before the onset of noticeable symptoms. Sustained /a/ phonation samples were obtained from 21 FMR1-premutation carriers and 28 neurotypical controls and were run through Praat Linguistic Analysis software to calculate key phonatory parameters. Parameters of interest were mean, median, and standard deviation of pitch, number and degree of voice breaks, noise-to-harmonics ratio (NHR) and harmonics-to-noise-ratio (HNR). Results showed significant differences in standard deviation of pitch and NHR between the premutation and control groups. Within the premutation group, significant correlations were found between the number, degree, and numerator of voice breaks and scores on the Unified Parkinson's Disease Rating Scale (UPDRS), as well as scores on the pain, energy-fatigue, and physical health limitations subscales of the RAND Health Survey. Significant associations between median and mean pitch and scores on the NIH Balance Test were also found. 57% of FMR1-premutation carriers met pathology thresholds for either NHR or HNR, with 33% meeting both, compared to the control group where 14% met one and 7% met both. This research supports the merit of phonatory parameters as a potential biomarker of subtle neuromuscular degeneration that could be used as an early diagnostic tool of pre-clinical FXTAS symptoms.

Laurendeau, Megan

Mentor(s): Dr. Robin Dail, Ms. Kayla Everhart

Research Apprenticeship on the PATH Study: Examining the relationship between body temperature and blood transfusions in preterm infants

Background/Significance: At 14.1 per every 100 preterm babies born, the United States has one of the highest preterm birth rates amongst developed countries. Preterm infants experience anemia due to frequent blood testing, which often necessitates a packed red blood cell (PRBC) transfusion. PRBCs are stored in a freezer and rarely is warmed above room temperature prior to infusing. Researchers have noted anecdotally that preterm infants experience hypothermia (<36.5C) with PRBC transfusions. Hypothermia can cause increased morbidity and mortality in preterm infants.

Purpose: The purpose of this analysis is to examine infants' body temperatures, before, during and after blood transfusions for incidence of hypothermia and thermal gradient patterns.

Methods: This is a secondary analysis of data from infants from a study conducted in a North Carolina neonatal unit. Abdominal and foot temperatures were recorded every minute for 28 days, in infants who were less than 33 weeks GA and between 500-1500 grams at birth. Infants received 1-4 transfusions each. We compared body temperature (abdominal and foot) 4 hours before, during, and after blood transfusions with descriptive statistics and examination of temperature plots computed using Microsoft Excel for

hypothermia and abnormal thermal gradients.

Results: Through analyzing the temperature differentials in the infants, the time of a blood transfusion, the infant's central and peripheral temperature decreases. This decrease in temperature is seen in both infant's central temperature and the peripheral temperature. However, it appears that the infant's peripheral temperature has a larger temperature change during the transfusion than the central temperature.

Conclusion: The change in the infant's body temperature in response to a PRBC transfusion causes the infant's central and peripheral temperature to drop, sometimes to hypothermic levels, due to the circulation of the blood stored in the freezer. The infant's peripheral temperature drops lower than their central temperature due to the infant trying to maintain homeostasis by keeping their core from becoming hypothermic. Understanding that this NICU doesn't routinely warm PRBC transfusions, and the abnormal thermal gradients these infants experienced at the time PRBC transfusions, further research is warranted on thermal stability during PRBC transfusions in preterm infants.

Leahy, Amelia

Co-Author(s): Wade Ward

Mentor(s): Dr. Sanjay Ahire

Sisters of Charity Foundation of South Carolina Outreach Optimization Project

The Sisters of Charity Foundation of South Carolina (SOCSC) is a ministry of the Sisters of Charity Health System. Since 1996, the Foundation has been addressing the root causes and effects of poverty in South Carolina strategically, using our own resources to reduce poverty through action, advocacy and leadership. It has distributed more than \$70 million to help alleviate poverty in South Carolina, and has distributed more than 2938 grants to non-profits working to reduce poverty in lives of individuals and families in SC. Still, SOCSC struggles to enhance its name recognition and hence its reach to potential organizations that can benefit from SOCSC grants as well stakeholders such as politicians and policy-makers who can be influenced to further SOCSC's advocacy for the poor and unfortunate.

The goal of our project was to optimize allocation of SOCSC's human and technical resources across 18 major outreach initiatives (from social media ads to advocacy events) to maximize the alignment of these efforts to SOCSC's brand enhancement. We first developed a multiple-criteria branding score index for each outreach effort (using weighted criteria like direct reach, total reach, potential for action, impact of action, cost, and ease). We then developed constraints on the use of various key managers' time directly invested in each of these efforts. Finally, we compiled the model in OpenSolver™ as an Integer Programming Model (18 variables x 30 constraints) to identify the optimal number of events per year for each outreach effort to maximize the branding enhancement score.

The model creates a more focused schedule for which outreach programs to perform, identifies which outreach programs are "Most valuable", and identifies which resources are the bottlenecks and finding a way to work around them. Our project and optimization tool contributes to SOCSC has integrated insights from the model and the project into their strategic outreach planning initiative.

Leahy, Amelia

Co-Author(s): Kathryn Duncan, Michael Curran, Brandon Chiott, Cory Johnson

Mentor(s): Dr. John Jensen, Dr. Sanjay Ahire

United Way Association of South Carolina – SC 2-1-1 Program Enhancement

The United Way Association of South Carolina manages the State of South Carolina's 211 system that provides information and support to anyone struggling with financial, domestic, health or disaster-re-

lated issues. It is a resource for finding assistance in local communities. This system provides free and confidential referral information via phone or computer to connect people in need to essential health and human services. The 211-referral service operates 24 hours a day, seven days a week.

The project tackled by our Operations and Supply Chain Team is to identify the best approach to expand contact center data services, to increase the efficiency of database maintenance, and to assess the perceived & actual value of 211 services. The project closely focuses on:

1. Audit and improve resource maintenance strategies
2. Audit and improve data collection practices
3. Construct a data portal to be used by 211 service providers, state and local government agencies, and other non-profit organizations that efficiently highlights emerging health and human service needs.

The project will result in significantly providing SC211 capability to provide accurate, timely, detailed, and customizable insights on emerging needs for social services to decision-makers in local and state government agencies and socially-missioned non-profit organizations. Ultimately, this will result in more responsive, efficient, and effective delivery of emergency assistance to the vulnerable segment of South Carolina's population.

Leili, Hannah

Mentor(s): Dr. Michael Beets, Ms. Lauren Von Klingraeff

Effects of resistance training on metabolic outcomes and body composition among overweight and obese youth: a systematic literature review and meta-analysis.

Over 340 million children and adolescents between the ages of five and nineteen were classified as overweight or obese (OWOB) in 2016. OWOB weight status in childhood is associated with negative anthropometric and metabolic outcomes including insulin resistance, fatty liver disease, and hypertension. These negative health outcomes may lead to life expectancy decreases from generation to generation. Resistance training, also called weight training, may be a promising way to engage youth with OWOB in physical activity, improving their body composition and metabolic outcomes. In this systematic review and meta-analysis, keywords and controlled vocabulary terms were used to search PubMed/Medline, Embase, EBSCO, Web of Science, and Science Direct for reviews of pediatric resistance training. Citations were imported into Covidence for tandem title/abstract screening prior to full-text review and data extraction. Predetermined inclusion criteria for the literature search were specified as follows: (a) traditional, behavioral weight loss programs (e.g., individual or family based, physical activity, healthy eating) and (b) resistance training (i.e., strength training) in overweight and obese youth (6-18 years) reporting body composition and metabolic outcomes. Out of the 1684 reviews that were screened from 1834 records identified through database searching, 84 studies matched the criteria for inclusion and will be included in the meta-analysis. Participants ranged in age, with 40.2% of the participants between 11-14 years and 48.8% of the participants older than 14 years. 61.9% of the studies contained mixed-sex programming and 25 of the studies focused exclusively on resistance training, with 19 taking place in a clinical setting. 75 of the studies (89.3%) had consistent sessions per week throughout the experiment's duration, instead of progressive/changing sessions. Meta-analytic models determining the effect of resistance training on metabolic markers and body composition based are forthcoming. Reviewed literature indicates resistance training for OWOB youth has been conducted in multiple settings with wide variability in session components, session duration and training duration. Most interventions had some success in recruiting and retaining participants though no large-scale or multi-site intervention has been conducted. Pending meta-analysis results will indicate the potential of utilizing resistance training to improve cardiometabolic outcomes for OWOB youth.

Lemmens, Nathanael

Mentor(s): Mrs. Jan Smoak

Reflections on a Semester in Leeds, England

During the spring semester of my sophomore year, I participated in a Global Exchange at the University of Leeds in Yorkshire, England. As a child, I made a commitment to studying abroad as soon as I fully understood the concept. Exposing myself to diverse ideas and new ways of thinking has been a central theme of my university experience, and my five months in England were an opportunity to practice that mindset every day. From a professional standpoint, my professors in Leeds offered a strikingly different perspective on the practice of journalism, and I developed a love for critical storytelling through a course focused on investigative reporting and British press scandals. I also gained vital study skills and a more self-assertive approach to assignments through the relatively detached British instruction style. On a personal note, I forged the most diverse friend group I have ever had – made up of people who routinely prompted me to challenge and adjust my upbringing and world view. As I traveled extensively across Europe, I was also exposed to high levels of poverty and homelessness, which inspired me to take two service-learning courses upon returning to UofSC. Studying abroad not only cemented my desire to work with an organization that makes tangible and positive change, it gave me the self-confidence and resources to meet a wide variety of challenges as I leave college and enter the real world.

Leslie, Benjamin

Co-Author(s): Cameryn Freglette, Natalie Long

Mentor(s): Dr. Svetlana Shinkareva, Ms. Sewon Oh

Ratings of Affective Narrative

Hedonic valence can be examined in controlled experiments, as well as in naturalistic settings, such as listening to narrative. The goal of this project is to obtain valence ratings for the narratives that were used in existing fMRI studies. In the first part of this project, narratives were segmented to follow grammatical and conversational rules. Texts were segmented to follow grammatical structures such as clauses, transitions, and commas. Commas which separated listed items, appositives, or transition words were not segmented. When no clear transition point was present, dependent clauses were used to parse the sentence. Two researchers independently segmented the narratives, then met to reconcile differences between their results. For the second part of this project, each segment will be rated on a valence-by-arousal grid in PsychoPy. Six narratives ranging from 7 to 14 minutes in length are selected for the current project. These ratings will provide a basis for the linking of subjective affective states for the narrative segments to the corresponding fMRI data from 302 participants.

Lew, Madi

Mentor(s): Prof. Anna Oswald-Hensley

My Experience as an Opportunity Scholars Program Representative

I thoroughly enjoyed the role I served as an OSP Representative for the spring semester. As an OSP representative, I mainly helped out around the office with tasks like shredding and copying as well as typical administrative tasks like pulling files and sorting papers. As an OSP representative, I was responsible to represent OSP members with giving ideas for cultural trips and helping to prepare for monthly meetings and workshops. This role helped to grow my leadership skills in a variety of ways; it was also interesting to get a feel for the inner-workings of an administrative role, something that has always appealed when it comes to my future career interests.

Lewis, Kirstin

Mentor(s): Dr. Tia Stevens Andersen

Adolescent Mentoring

In America youth at risk of school failure often fall into the school to prison pipeline. To help keep youth at of the system, mentoring can be a very useful tool. Mentoring youth at risk of school failure can help them to reach their goals, appropriately goal set, and boost confidence. This is why I am participating in UofSC's adolescent mentoring course where I am a mentor to a high school aged student. For this presentation I will be presenting on my experiences mentoring a student in a disciplinary alternative school. I will draw upon the knowledge of my instructor and existing literature about mentoring, school expulsion, risk factors, and other relevant topics to illustrate what is effective both in theory and in practice throughout my mentoring experience.

Lewis, Marnija

Mentor(s): Ms. Gina Spence

A Heart of Service

The population in a small town named Jinja, Uganda is riddled with health problems such as Malaria, Heart disease, and other health problems. I traveled with the Methodist Student Network here at USC alongside a team of physicians to help provide medical and dental support at a popular local church. My presentation today will display my experience providing community service abroad and what it truly means to have a heart of service.

Lindbom, Jessica

Mentor(s): Ms. Ramsey Coyle, Mr. Conner Black, Dr. Abigail Hogan, Dr. Jane Roberts

Examining sex differences in anxiety symptoms and negative affect in preschoolers with autism spectrum disorder

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by deficits in social communication and an increased presence of restrictive/repetitive behaviors affecting approximately 1 in 54 children in the U.S., with males being four times more likely to be diagnosed than females (CDC, 2020). As a result of these disproportionate rates, the current body of research lacks a nuanced understanding of the female phenotype. One of the most common cooccurring psychiatric conditions in ASD is anxiety, which can lead to harmful effects on personal well-being and emotional functioning (van Steensel, Bögels, & Dirksen, 2012). Negative affect is a facet of temperament that includes a child's level of discomfort, fear, sadness, frustration, shyness, and soothability. Early negative affect has been shown to be an early risk factor for both anxiety and ASD diagnoses, but little is understood about whether negative affect predicts anxiety differently in males versus females with ASD (Grant et al., 2009; Clifford et al., 2013). The current study seeks to examine sex differences in negative affect and anxiety symptoms to better characterize the ASD phenotype in females. The sample includes 43 preschool children with ASD ($M(SD)=53.60$ months (7.40); 20.9% female, $n=9$). Preschool anxiety symptoms were measured using the Preschool Anxiety Scale – Revised (Spence, 2001) and negative affect was measured using the Children's Behavior Questionnaire (Rothbart, 2001). To analyze sex differences in anxiety symptoms and negative affect, independent sample t-tests were employed. Additionally, within-group correlations were utilized to examine associations between negative affect and anxiety symptoms in males and females. Examining sex differences in both anxiety symptoms and negative affect concurrently in preschool aged children with ASD will contribute to the understanding of the ASD phenotype in females. Improving the understanding of the ASD phenotype in females is crucial to promote early detection and treatment of ASD and cooccurring conditions in this population. Further, results from this study can inform future research studies elucidating the sex-specific relations between negative affect and anxiety in ASD.

Livingston, Jordyn

Mentor(s): Dr. John Bernhart

Tasty Tuesdays: Assessing children as healthy eating behavior role models for caregivers

Introduction: Previous studies have been conducted to gain an understanding of the effects of nutrition education on children's healthy eating behaviors. These studies have shown that nutrition education in children have positive effects on the child; however, these studies do not address how a child's nutrition education affects the healthy eating behaviors of their caretakers who are primarily responsible for purchasing and preparing the food that the children eat.

Objective: The purpose of this study is to determine if children's nutrition education affects the healthy eating behaviors of children and their caretakers.

Methods: To study the effect of children nutrition education on the caretakers, we worked with EdVenture Children's Museum and the Tasty Tuesdays nutrition class to survey parents and children participants before the class and two weeks later. Classes are thirty minutes long and for children ages 5 to 12. Within the classes, led by a dietician, students cook a dish and are provided nutrition information during the session. The child survey assessed their understanding of the capacity to be a role model for healthy eating, self-efficacy for healthy eating, and self-reported eating behaviors. The parent survey assessed weight, cooking behaviors, and dietary behaviors using the Rapid Eating Assessments for Participants Survey (REAP-S). Participants received \$25 upon completion of both surveys. Edventure instituted monthly meetings between EdVenture and nutrition partners occurred during the project period.

Results: Complete data will be available in early April. The results will assess if there were changes in food behaviors of the caretakers following their child's completion of the class. Conducting the study presented many challenges as it relates to the complexities of conducting community-based participatory research (CBPR).

Discussion: The results of this study will be useful for EdVenture and nutrition partners for future child-based nutrition programming as it may provide evidence relating to the effects of nutrition education on family units. This presentation will also explore my experience of working with community partners in research and strategies to improve CBPR in the future.

Loftis, Christian

Mentor(s): Dr. Jianjun Hu

Lattice Thermal Conductivity Prediction Using Symbolic Regression and Machine Learning

Prediction models of lattice thermal conductivity (κ_L) have wide applications in the discovery of thermoelectrics, thermal barrier coatings, and thermal management of semiconductors. However, κ_L is notoriously difficult to predict. Although classic models such as the Debye–Callaway model and the Slack model have been used to approximate the κ_L of inorganic compounds, their accuracy is far from being satisfactory. Herein we propose a genetic programming-based symbolic regression (SR) approach for finding analytical κ_L models and compare them with multilayer perceptron neural networks and random forest regression models using a hybrid cross-validation (CV) approach including both K-fold CV and holdout validation. Four formulae have been discovered by our SR approach that outperform the Slack formula as evaluated on our dataset. Through the analysis of our models' performance and the formulae generated, we found that the trained formulae successfully reproduce the correct physical law that governs the lattice thermal conductivity of materials. We also systematically show that currently extrapolative prediction over datasets with different distributions as the training set remains to be a big challenge for both SR and machine learning-based prediction models.

Long, Natalie

Co-Author(s): Benjamin Leslie, Cameryn Freglette

Mentor(s): Dr. Svetlana Shinkareva, Ms. Sewon Oh

Perception of Emotion Authenticity in the context of COVID-19

Emotional expressions can be perceived as genuine or as fake. This research seeks to understand how people perceive the authenticity of happy and sad expressions conveyed in videos. Three researchers generated 12 scenarios that were intended to convey happiness or sadness. For authentic expressions, the social context was congruent with the described emotions (e.g. You and your friend are both chosen for a promotion). For unauthentic expressions, the social context was incongruent with the described emotions (e.g. Your friend is chosen for a promotion but you are not). Scenarios differed in the intensity of the emotions being expressed. The researchers were video-recorded while responding to the scenarios that they did not write with short vocalizations (e.g. "I can't believe it!"). To investigate how the COVID-19 pandemic affects perception of emotional authenticity, actors wore cloth face masks in half of the videos. Thus, 192 videos were created; happy and sad, authentic and unauthentic, mask and no mask. This set of stimuli will be used in emotional authenticity perception studies.

Long, Nathan

Co-Author(s): Ryan Welsh, Zach Fowler, James Strickland

Mentor(s): Prof. John Gerdes

HRSM Database

As a group we were assigned to improve an HRSM database. This database is where the HRSM network team stored information about their desktops. As a group we determined the best technology to use to successfully accomplish what they were looking for. With the help from Microsoft Access and Scan IT to office we were successful in this project.

Loprete, Ashley

Mentor(s): Ms. Hilary Lichterman

Internationalization of My Mind

Growing up, I was always passionate about traveling and experiencing other cultures but never exactly knew why. As I grew older, I continued to go out of my way to have these kinds of experiences, from majoring in international business to traveling around Spain for three weeks to studying abroad in Switzerland and making lifelong friends. It is because of these experiences that I came to realize and better understand why it is something I am so passionate about. As a future professional, and as someone who is taking a gap year to teach English to students in Spain, it was important for me to understand other cultures and know how to best interact with different types of people. The experiences I have had traveling and experiencing other cultures have had a significant impact on how I have grown as a person and in shaping my values. They have allowed me to become a very adaptable, empathetic, and curious person. I now am confident in my ability to teach English to kids in Spain because I am confident in my ability to communicate with them in Spanish due to my Spanish language minor. In my career, I know I will be successful working for an international company and interacting with international clients because I have studied different cultural differences in many of my international business classes and put those skills to use during my time abroad. Who I was before these experiences and who I am now is very different and I am proud of the person I have become due to the experiences I have had.

Love-Baker, Ty

Co-Author(s): Chandni Amin, Tyreek Johnson

Mentor(s): Prof. John Gerdes

UofSC Academic Advising Process Improvement

In short, we manage a referral process that allows faculty to alert academic advisors that their students are not attending or are disengage. At present it is a very manual process.

1) Faculty submit this form.

2) Daily we download the results to excel and identify student's academic advisors.

3) We mail merge the referrals to an intervention email account and then forward those emails to the student's assigned advisor and cc the referring faculty member.

4) Once advisors have intervened or exhausted their intervention efforts we ask that they fill out this form.

5) We then vlookup the results of the second form back into the first to assess our efforts. This is a very manual process both for us and academic advisors on campus and I think IT could likely help us streamline this process.

Lovett, Blakely

Mentor(s): Mr. Richard diMonda, Ms. Gina Spence

Blakely Lovett - Professional and Civic Engagement

Over the past two semesters, I have been fortunate enough to have been awarded enrollment in a state-wide program aimed at commercializing inventions within South Carolina Universities. My internship with the South Carolina Medical Device Alliance has allowed me to be a team member on two projects which have required comprehensive analysis of all steps required to commercialize and launch a medical device. Through a partnership with the Medical University of South Carolina, I have been able to have first-hand experience on working in a setting with many health care professionals. As a Public Health major at the University of South Carolina with a minor in Public Relations/Advertising, this experience has enabled me to gain knowledge on a career path that would allow me to apply my undergrad knowledge to the real-world. This internship has enabled me to consult with specialists & physicians to determine the potential commercial role of a new technologies, as well as creating a bottoms-up analysis forecast and expense financial proforma. More specifically, I profiled initial sales and clinical research sites that would be likely to benefit most from the value proposition of the device I worked on called BabyStrong. As well, I prepared a venture capital-oriented pitch deck for fundraising. This experience developed a passion in me for medical device marketing, and helped me apply my knowledge through various courses to the role I played in our teams.

Lucht, William

Mentor(s): Dr. Matthew Placek, Dr. David Damrel

The Effect of Economic Satisfaction on Trust in Government and Support for Normative Democracy

This research attempts to observe how economic satisfaction, economic perceptions/hopes, perceptions of regime norms, effects of trust in government and support for normative democracy, all through differing spatial lenses, plays in democratic norms in the Middle East and North Africa (MENA). Historical events showed, that with the Tunisian uprising that spread across the region, eventually forming the Arab uprisings, that the rest of the Arab world demanded to democratize their countries as well as modernize them. Old regimes have been replaced in almost all countries within (MENA), with nothing more than oppressive autocratic rulers. It seems that only Tunisia succeeded in its demands to democratize and is now experimenting with normative democracy, yet struggling to maintain a coherent economic system designed to procure security for its now democratically ruled citizens. With a lack in satisfaction, which

has had a negative effect on trust in government, Tunisians surprisingly, still support democracy, and this is a phenomenon that was looked at during the research. Along with research focused in (MENA), there has been serious consideration and attention given to other regions struggling with democratic regime norms, illiberal regimes, and autocratic, from Eastern Europe, China, and Latin America. Methods used to gather information were taken from data sets compiled by Arab Barometer wave V, published literature, and peer reviewed papers. The concluding results shows that as satisfaction with economy goes up, both trust in government and support for democracy, go up. In conclusion it was discovered that satisfaction with economy plays a salient role in how Tunisians, as do other states functioning under various regimes, view their government.

Lyman, Ethan

Mentor(s): Mr. Timothy Lewis

You Don't Have to be a Lawyer

In order to become a Carolina Global Scholar, I needed to complete some service on campus. I was especially drawn to the Rule of Law Collaborative (ROLC) because it was focused on promoting human rights and justice issues through encouraging organizations, governments, and people to support the rule of law. As an on-campus organization, ROLC works to promote the local and global rule of law, with funding from federal grants such as the \$5 million federal grant JUSTRAC+. I worked as a research assistant. On a weekly basis I would update the news feed on the JUSTRAC+ website with relevant rule of law articles. In addition, I would find and summarize rule of law related journals to post on the website. This way individuals involved in promoting or interested in the rule of law could stay up to date on current issues happening in the world as well as learn about new concepts or new ways to promote the rule of law. I was also able to engage with several employees and ROLC fellows through helping prepare for events. The name of the organization has law in its name, but one of the biggest lessons I learned was how diverse the rule of law community is. To support justice and human rights, a person does not necessarily need a law degree, as the rule of law and justice touch every aspect of life. Therefore, to further it, people from every profession should be involved. It is easier to think of certain concepts, such as the law, one-dimensionally. However, to fully understand and support the law and justice, I need to broaden my view of what the law is as well as how to practice it. As a business student, I began to understand how my education could help promote human rights and the rule of law through civic engagement. This has also led me to pursue a holistic aspect in my education. After my undergraduate business education, I hope to go to graduate school for a law degree and a master's in international relations.

Lyon, Andrew W.

Mentor(s): Mr. T. Cade Abrams, Mr. Bryan M. Terlizzi, Dr. Kyle Silvey, Dr. David F. Stodden

Associations Between Object Projection Skills and Performance on the Army Combat Fitness Test

Introduction: The US Army has developed the Army Combat Fitness test to assess physical military readiness (PMR) in its soldiers. In order to demonstrate adequate levels of PMR, soldiers are expected to perform complex ballistic whole-body movements projecting objects and demonstrate high anaerobic and aerobic endurance. The development and performance of foundational object projection skills (OP; e.g., throwing and kicking) requires significant contribution from the neuromuscular system to maximize power output in a short timespan (Ebada, K. A., 2013), which is similar to requirements of the ACFT. This study examines the relationship between three different OP assessments (throw-catch, throw speed, and kick speed) and overall ACFT performance. Methods: A convenience sample of young adults (N = 57; f = 15; Mage = 19.98±2.62 years) enrolled in a University in the Southeastern U.S. volunteered for the study. Maximum throw and kick speed from five trials was assessed using a radar gun (Stalker, Inc), with raw scores being used for data analysis. Throw-catch was measured by the number of times a person could throw and catch a standard tennis ball off a wall from three times their standing height in 30 seconds.

Participants completed two trials of throw-catch, with the highest score used for analysis. Participants also completed the ACFT, which consists of six subtests (hex-bar deadlift, sprint-drag carry, push-ups, leg tuck, standing power throw, 2-mile run). A summed composite ACFT score was created according to point values for each test (U.S. Army 2020), which is not based on gender-specific norms, and used for analysis. Pearson correlations were used to determine associations between each OP test score and the composite ACFT scores. Significance was assessed at $p < 0.05$. Results: Statistically significant correlations between the three different OP test scores and total ACFT composite scores were: max throw speed, $r = 0.68$; kick max speed, $r = 0.66$; throw-catch, $r = 0.51$. Conclusion: Our results provide evidence that the development of ballistic OP skills and performance may serve as an indicator for physical military readiness due to similar neuromuscular demands required for high level performance on the ACFT and OP skills.

Magraw, Hannah

Mentor(s): Dr. David Cutler

Musicians' Keys to Unique Branding and Successful Marketing

While many classically trained instrumentalists are prepared for the musical side of gigging, rarely are they explicitly taught the necessary business skills to survive as a freelance musician. can be “trial by fire”—a challenging and frustrating experience.

This research aims to identify business practices essential for these freelance musicians. It seeks to explain foundational marketing, branding, and customer service tactics for beginning freelance musicians and explore creative and unique approaches.

This research began with a review of current literature on freelance musicians and independent contractors in the gig economy. However, case studies were the main research method employed. A diverse and representative group of 15 classically trained instrumentalists were interviewed about how they stand out in the competitive field of gigging and how they market their skills to turn the first contact with a potential client into paid work.

Makharia, Riya

Mentor(s): Mx. Caleb Morris

Think Like An Engineer

During the summer of 2020, I worked at AGY, a fiberglass yarn and reinforcement manufacturing plant. I worked on the Quality Control team where my main jobs were to create spreadsheets to streamline processes and collect data on any product that was not meeting expectations. As a chemical engineering major at the University of South Carolina, this internship provided me with real world experience in the industry, allowing me to investigate my interests beyond the classroom. I was able to use skills I learned in the classroom to research the materials and how a small misstep in the process could cause a defect in the final product. Through data analysis, I collected information that brought me closer to identifying the overall issue. This internship proved to me that I was able to think as an engineer and cemented my decision to pursue chemical engineering as a career. From this experience, I hope to receive a full time position post graduation.

Manea, Amanda

Mentor(s): Dr. Nadia Al-Sammarraie, Dr. Swapan Ray

Combination of Autophagy and Telomerase Inhibitors for Controlling Growth of Human Glioblastoma T98G cells

Glioblastoma is the most encountered primary malignant brain tumor in adults. The heterogeneity of the tumor; activation of multiple survival mechanisms including autophagy and telomerase, and evasion of apoptosis are among the most prevalent reasons for its chemoresistance. Hence, it is imperative to target

the cellular mechanisms implicated in glioblastoma development and progression to improve the outlook of glioblastoma patients. Activation of autophagy, which promotes cancer cell survival, is reported as one of the hallmarks in progressive glioblastoma. Similarly, activation of telomerase is highly enhanced in some glioblastomas and it is correlated with the progressive disease. Currently, most of research and clinical studies have separately investigated the autophagy or telomerase inhibitors; however, there is yet no study combining both therapies. We aim to investigate the roles of the autophagy inhibitor quercetin (a bioflavonoid) and the telomerase inhibitor fenretinide (a synthetic retinoid) as combination therapy in human glioblastoma T98G cells harboring telomerase activity. The objectives of this investigation include inhibition of cell proliferation, prevention of autophagy, promotion of apoptosis, and morphological and molecular studies for revealing the underlying mechanisms for inhibition of growth in T98G cells. We used human glioblastoma T98G cell line and cultured in DMEM media in presence or absence of 10% fetal bovine serum (FBS). The cells were divided into four groups: vehicle (DMSO treated) control, quercetin treated, fenretinide treated, and quercetin and fenretinide treated. MTT assay was used to determine combination index for synergistic inhibition of cell proliferation. Methylene blue staining was used to detect changes in cell morphology. Further, morphological changes due to autophagy or apoptosis were visualized under the light or fluorescence microscopy. Western blotting was used to demonstrate changes in molecular pathways of autophagy, telomerase, and apoptosis in T98G cells. We expect that our results will prove significantly more inhibition of cell proliferation in combination treatment group than single treatment group due to inhibition of both autophagy and telomerase and promotion of apoptosis. If successful, we plan to use in vivo nude mouse model of glioblastoma to test the effects of this combination therapy on tumor growth and mouse survival.

Martin, Hannah

Mentor(s): Dr. Scott Gwara

“I think the king is but a man”: Constructing Empire in the Chronique Anonyme Universelle

One of the few medieval texts to circulate in scroll format, the Chronique Anonyme Universelle defines political empire from the perspective of cosmic history, arguing for a fundamentally Christian approach to just rulership. A fragmentary copy of the text, University of South Carolina Early MS 148, conveniently conveys this Christian focus in religious and secular “columns”: the (primary) left-hand side of the scroll is devoted to religious subject-matter, while the right covers secular events. Further parallel columns of text section historical eras into ever-finer subdivisions. This format invites readers to construe the work both linearly and laterally. One outlook established by these implicit correlations credits the righteous sovereign for the establishment and success of empire, and the sinful sovereign for its decline and overthrow. My study conceives of the Chronique Anonyme Universelle as a literary analogy meant to instruct French nobility on the obligations attending their own governance.

In my presentation I will explore specifically how governance is conveyed by illustrations of key moments in the history of empire. In conversation with the text, small “roundels” imply a cycle of virtuous building and cataclysmic destruction through the depiction of technology. In one moment, for example, the king directs his architect, and the architect his laborers, in the construction of Rome. As the city is built through the sovereign’s vision, power and righteousness, so too is empire constructed by his command of creativity, labor and administration. Stone by stone, the city is built by its inhabitants—and, citizen by citizen, the empire is built with its inhabitants. Naturally, empire is a joint enterprise that stems from the ruler’s faith in God and the citizens’ faith in the ruler. The philosophy of just rulership that emerges from these graphic elements is foundationally Christian in spirit, emphasizing the humility required to safeguard all who contribute to the empire.

Massar, Hannah

Mentor(s): Ms. Lauren Epps

Leading Through the Student Conduct System: A Panel of Your Peers

One of the many reasons I am proud to be a Carolina gamecock is we are part of a growing number of higher education institutions that allow any undergraduate student accused of an honor code violation to have their case heard by a panel of their peers. Members of the Carolina Judicial Council are trained specifically to hear cases of conduct and academic integrity violations committed by other students. As a business major, the first organization I joined was CJC so that I could have an opportunity to explore a law-related extracurricular outside my chosen major. Since freshman year, I have sat on countless hearings, some as a student panelist but mostly as hearing chair. As hearing chair, I have learned how to be an advocate for both the charged student and the university, how to guide deliberations and craft rationale that explains the outcome of the case, and have championed the Carolinian Creed – our university value statement. These valuable skills have led me to identify problems within the Carolina community, work with the university to solve some of those problems, and look beyond the campus to the greater Columbia community to see where I can be of greater service. My time in CJC has been a defining chapter of my undergraduate career; one which I hope can inspire others to ask not what their university can do for them, but for what they can do for their university.

Massar, Hannah

Mentor(s): Ms. Sarah Matthews

Cultural Competency in the Classroom and Beyond

Nearly 1 in every 5 women in the U.S. have experienced some form of interpersonal violence or sexual assault – that's one every 78 seconds. College campuses and urban centers see even higher rates, and for those who are members of a minority, the rate of sexual assault is higher still. Here in the midlands, we have a significant population of survivors, many of whom speak little to no English. When I became a volunteer advocate for Sexual Trauma Services of the Midlands, my hope was to serve survivors in the Columbia community, thinking I would be helping college students and Columbia residents. As a Spanish speaker, however, I realized that even just the smallest effort to speak the language of a survivor who was brave enough to come to the hospital and request a sexual assault evidence collection kit changed their attitude entirely and made them feel safe. This led me to seek out and explore the concept of cultural competency in my classes, finding that the ability to communicate with and relate to those of a different culture is a skill well sought after in nearly every field of study. Through courses that have explored cultural competency in law, law enforcement, and healthcare, I have been able to continue advocating for the midlands Hispanic community by interpreting for the doctors giving out the COVID-19 vaccine for Prisma Health. And as I look towards the future, I know that in my aspiration to work at the federal level to combat human trafficking my greatest asset will be my ability to competently support and fight for survivors of any culture.

May, Rachel

Mentor(s): Ms. Sarah Matthews

Supplemental Instruction for Self Growth

Throughout the course of my time at UofSC, I have had the opportunity to serve in many leadership roles and partake in many career-focused experiences which have allowed me to gain insights relevant to my future profession as a physician assistant. However, one that stands out as offering the most personal growth to me as an individual was serving as a Supplemental Instruction (SI) Leader for Anatomy & Physiology through the Student Success Center. I decided to take on this role due to my interest in the subject matter, but also for an opportunity to help other students. In this position, I held weekly review sessions

for students to go over challenging material. Overall, serving as an SI allowed me to strengthen my academic background in Anatomy & Physiology, which is a key foundational class to my future profession. Through this experience, not only was I able to understand the concepts covered in the class on a deeper level after additional semesters of hearing the material, but I was also able to communicate them effectively to other students. This position allowed me to move out of my comfort zone and become confident speaking in front of groups as large as 250 students. This was largely thanks to my understanding of the importance of being proactive in preparing for sessions. Patient education is a significant portion of day-to-day activities in this role and beginning to learn the skills of teaching and explaining will be monumentally helpful in the coming years as a clinician.

Mayberry, Samantha

Mentor(s): Mrs. Ambra Hiott

Leadership: Values in Action

Throughout my time at the University of South Carolina, I have had the privilege of holding countless leadership positions across campus that have allowed me to grow in confidence, leadership skills, and self awareness. I have learned about leading others, and what it means to live out your values through your words, actions, and leadership style. My most impactful experiences have been within Student Government, where I had the privilege of serving as a Freshman Council Member, a Cabinet Member, Chief of Staff to the Student Body President, and as the Director of Special Events on the Vice President's staff. Beyond Student Government, I have also been able to be involved in many other areas of campus including the Leadership and Service Center, Greek Life, Dance Marathon, and The College Panhellenic Association. When I came to college, I never imagined that I would have the experience that I have had. My time here at Carolina has far exceeded my expectations, and even my wildest dreams for what college would be. All of these experiences have led me to learn valuable insights about the role of effective communication in leadership, the value of relationships, and the necessity of practicing self reflection and embracing vulnerability.

McCabe, William

Mentor(s): Dr. Jabari Bodrick

To Gain a Global Perspective

Throughout my time at USC, I have pursued an intercultural education, both through academic studies and international experiences. I have participated in several study abroad programs, which have expanded my cultural awareness, and taken numerous courses, which have focused on the intercultural aspects of various fields. During my first international adventure travelling to Greece in 2018, I found myself fascinated by the experience of visiting an unfamiliar country for the first time. It reshaped my perspective on contemporary cultural, economic, and political issues affecting Greece and the European Union. Travelling to Cuba in 2019 and taking International Business classes further reinforced my transnational mindset as I encountered social and political attitudes quite different from what is portrayed in American media. As a student with an International Business major and a French minor, studying abroad in a Francophone country offered me the opportunity to engage in a fully integrated intercultural and academic experience. I decided to study in Belgium rather than France because I wanted to expose myself to a Francophone culture I had not studied extensively in school. In the spring of 2020, I travelled to Brussels for a semester-long study abroad program. Although my experience was cut short by the COVID-19 pandemic, the value of living in a foreign country for an extended time with other international students was immeasurable. In addition to improving my French language skills through conversations with native speakers, I also broadened my global perspective by engaging with students from all over Europe and the Americas. A major part of my study abroad experience was living with students from Latin America and learning about their language and cultures. These intercultural interactions heightened my awareness of cultural

difference and deepened my appreciation for diverse perspectives. I strongly believe my global intercultural education has prepared me well for my next academic pursuit, which is attending law school. Whether I end up working in international law or a different legal field, the ability to engage with individuals from different cultural backgrounds will serve me well as I represent clients and seek to understand complex legal situations.

McCain, Katherine

Mentor(s): Dr. Steven Fiester, Dr. Jennifer Grier

Elucidation of heme-b utilization mechanisms by the human nosocomial pathogen *Acinetobacter baumannii*.

The multidrug-resistant pathogen *Acinetobacter baumannii* is common cause of nosocomial pneumonia and sepsis, as well as wound and urinary tract infections. While there is an understanding of the clinical manifestations of this pathogen, it is still unknown how *A. baumannii* survives in the bloodstream and causes sepsis. Specifically, there is a general lack of understanding as to how *A. baumannii* survives and thrives in the iron-limiting environment of blood including the mechanisms by which *A. baumannii* degrades hemoglobin, binds heme-b and uptakes heme-b as an iron source from red blood cells. To this end, a M16C peptidase gene was mutated in the *A. baumannii* ATCC 19606 (19606) type strain to assess its function, if any, in hemoglobin degradation. The M16C mutant and control were subcultured from Luria Bertani agar into an iron-limiting medium containing 10% red blood cells as the sole source of iron. Bacteria were incubated for 20 hours at 37°C with shaking at 200 rpm. The amount of red blood cells remaining was assessed by flow cytometry. Bacterial growth was assessed by obtaining colony counts. Unpaired two-tailed t-tests demonstrated that there was no significant difference in the number of red blood cells remaining after infection with 19606 as compared to infection with the M16C mutant or two phospholipase mutants (*pla1* and *pld1*). Interesting, all three tested mutants grew better in iron-limiting medium than 19606 suggesting they are not involved in hemoglobin degradation or heme-b uptake. Additionally, the statistical data supports the null hypothesis of no significant difference. Our studies will continue by targeting genes identified from RNA-sequencing experiments currently in progress.

McCarty, Madison

Mentor(s): Dr. Jane Roberts, Dr. Abigail Hogan, Ms. Ramsey Coyle, Ms. Chandler Knott

Differences in Symptom Presentation of Anxiety Disorders in Children with Autism Spectrum Disorder, Younger Siblings of Children with Autism Spectrum Disorder, and Typically Developing Children

Autism spectrum disorder (ASD) is a neurodevelopmental disorder involving social, behavioral, and communication deficits affecting approximately 1 in 54 children (Sharma et al., 2018; CDC, 2020). Children with ASD have an increased risk for co-morbid anxiety, with approximately 50% of children diagnosed with ASD meeting diagnostic criteria for an anxiety disorder (McVey et al., 2018). Younger siblings of children with autism (ASIBs) are at an increased risk for developing both ASD and anxiety compared to typically developing (TD) children (Shepherd et al., 2016). Co-morbid anxiety often exacerbates ASD symptoms and has a negative impact on quality of life (Shepherd et al., 2016). Current literature indicates that specific and social phobias are the most common anxiety disorders in adolescents with ASD (Roberts et al., 2020); however, less is understood about prevalence rates of anxiety disorders in younger children with ASD and ASIBs. The present study aims to examine group differences in rates of social phobia, specific phobia, generalized anxiety disorder, and separation anxiety disorder in young children with ASD, ASIBs, and TD children. Further, this study seeks to examine patterns of symptom presentation across anxiety disorders by group. The Preschool Age Psychiatric Assessment (PAPA; Egger et al., 2006) will be used to inform DSM-5 diagnoses of the four anxiety disorders. The Mullen Scales of Early Learning (MSEL; Mullen, 1995) will be used to determine cognitive functioning. Participants will be drawn from an on-

going study focused on early development in children with neurodevelopmental disorders. Chi-squared analyses will be used to analyze group differences in rates of anxiety disorders and ANOVA analyses will be used to analyze the average frequency and duration of anxiety symptoms. It is hypothesized that overall rates of anxiety disorders will be highest in children with ASD and lowest in TD children, and that children with ASD will experience symptoms more frequently and for longer periods of time than both ASIBs and TD children. The findings of this study will add to current understanding of anxiety in children with ASD and ASIBs, which can better inform targeted anxiety screening, diagnosis, and treatment in these high risk groups.

McCorry, Allyson

Mentor(s): Ms. Gina Spence

Everyone is an Artist

Healing is not a linear process. At my volunteer internship at Seacrest Studios in Levine Children's Hospital, we work to help patients heal, but not in a traditional way. Seacrest Studios is a multimedia broadcast center located in the lobby of the Children's Hospital in Charlotte, North Carolina. Through the Ryan Seacrest Foundation, the studio streams radio, television and new media programming to over 200 patient rooms. We strive to ease the patient experience through radio shows, games, activities, celebrity interviews, and more. One of our weekly programs, iHeart Art has touched me the most. Once a week, we dedicate a half hour to making a fun art craft, while chatting and listening to music. This activity, sponsored by Arts For Life, an organization that provides educational art programs to support pediatric patients and their families, is streamed to patient rooms. This allows them to craft alongside us and learn new art skills. As someone who has previously struggled with my creative side, iHeart Art has been eye-opening. Simultaneously, it has strengthened my connection with the patients. Art allows one to see the world differently because there is not a "right" way to go about it. Art made by patients is unique and expressive of them, as it is for every artist that participates. Art allows for self-discovery. It teaches us to live in the moment, create without limits, and seek out the positive in our everyday. Collectively, iHeart Art puts a smile on the faces of everyone who participates. The activity lifts the spirits of those on every side of a television screen at Levine Children's Hospital.

McDonald, Kelsi

Mentor(s): Dr. Elise Lewis

Taking Initiative to go Beyond the Job

During my sophomore year I took UNIV 290 where I had the chance to gain more knowledge on what it takes to navigate different leadership roles. I have always seen myself as a natural leader and not afraid to go above and beyond in any situation and believed that this course would allow me to further develop those skills. As a class we were required to participate in a service project where I took the initiative and set up a time with the Ronald McDonald house to come and cook a meal for the families staying there. This experience allowed me to expand my network and also become more familiar with setting up meetings and working with directors. Being more comfortable in leadership roles inspired me to become a University 101 Peer Leader during the fall of my junior and senior year. As a Peer Leader I co-taught a class of 19 first year students where I facilitated discussions and executed activities to help them adapt to the campus culture. I was simultaneously in EDLP 520 during my junior year, where I developed skills and abilities to write lesson plans and deal with different situations and obstacles. By taking what I learned in this course and actively applying it in my own classroom I was able to enhance my experience and become a better leader while also bettering the experience of my students. The Society of Supply Chain Operations Excellence is a student run organization that I joined my junior year in order to get more involved and gain information about my major. Through this organization I had the opportunity to go on corporate tours and see how different industries work up-close. By attending all the tours and participat-

ing in every way I could, I was able to see my future more clearly and find the industry I want to work in after I graduate. Through all of these experiences I found ways to get involved and make the most out of everything I did which allowed me to grow professionally and learn more about myself.

McEllen, Madelyn

Mentor(s): Dr. Daniel Stuart

Illusory Peace in the Heart of Passivity: What Self-Mortifying, Nonviolent Jain and Buddhist Ascetics can Teach us about Violence and Human Nature

Nonviolent activism is defined as peaceful action to achieve social change. The most notable historical example of this was Mahatma Gandhi's campaign in India against British Colonialism. While there is very detailed research on the political aspects of his movement, among other nonviolent campaigns, many people disregard the underlying religious ideas and methods that are borrowed from Jain, Buddhist, and Hindu traditions. This project unearths the theoretical roots of nonviolent activism in these religious traditions. In so doing, it shows how possibilities for the efficacy of contemporary nonviolent practices for enacting political transformation in the direction of peace must be understood in connection to these origins. Furthermore, the project examines the paradoxical justifications of violence within peace movements, such as fasting and self-immolation, through case studies of Mahatma Gandhi, Thich Nhat Han, and Joanna Macy. I conclude by considering how one might apply—and when it might be appropriate to apply—these theoretical models and practices to current political struggles such as the Black Lives Matter movement and the violent military coup in Myanmar.

McFarland, Katherine

Mentor(s): Dr. Marketa Kubickova

Diplomatic History and Historical Diplomacy

During my spring semester of my junior year, I made the choice to take a semester off and take a full-time internship with the Department of States in Brussels, Belgium. Prior to this experience, I had previously studied abroad in the fall in Bordeaux, France. While I was awarded my internship before I went abroad, I utilized my time abroad to get comfortable, not only living on my own, but living on my own in a foreign country. I also used the time to brush up on my French skills. The internship was my first experience with government, really, and it ended up being the beginning of what I hope to be a career in public service. Working in and with the European Union, I was able to experience and understand not only some aspects of federal government, but international government as well. There is so much history steeped into the EU but also in the US, and this history became clear to me working in that government setting. Upon returning to the US and to campus, I took a class that expanded upon my understanding of history and diplomacy and narrowed the focus on intelligence operations. This classroom experience helped me to fully comprehend the lessons I had learned in Belgium. I now view the world in a different way, within a context of governmental decisions and historical context.

McGee, Kayla

Mentor(s): Ms. Brittney Ankrom

Making an Impact through Leadership

Over the course of my time at Carolina, I have had the opportunity to take on numerous leadership roles in order to better myself, but also to better the community that I have been placed in. I don't like to place a significance value on each of my experiences, however, I do look back at my collegiate career and recognize that my time served as a University 101 Peer Leader had a tremendous effect on myself and the university as a whole. Way back in 2017, when I was a freshman, I was encouraged to take University 101 and I am ever so grateful that I did. My peer leader provided me countless resources and help to assist

me and 18 other students through our transition from high school to college. From that instant, I knew that I wanted to be a University 101 Peer Leader and give back to the program that had given me so much. During the Fall 2019 and Fall 2020 semesters, I mentored a total of 38 freshman students. I had to utilize critical thinking skills throughout my peer-leading experience in order to work through a variety of uncertain scenarios and to work with a diverse group of students. For instance, this past semester (Fall 2020) I had to learn to adapt to COVID protocols as My University 101 class was the only 100% virtual course. My goal was to make this virtual course just as effective as it would have been if it were in person. I have learned about leadership throughout my coursework and to be able to see it actually put into action during my time as a peer leader has been tremendously rewarding.

McGill, Felicia

Mentor(s): Ms. Kayla Smith, Dr. Abigail Hogan, Dr. Jane Roberts

Relationship Between Social Motivation and Autism Symptom Severity in Autistic Children

Affecting 1 in 54 people in the United States, autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by social-communicative impairments. While ASD is often associated with reduced social motivation, recent studies suggest that autistic children may outwardly appear uninterested to social stimuli, despite an internal interest in social interaction. In response to novel social settings or novel people (i.e., strangers), typically developing (TD) children are more likely to exhibit socially motivated behaviors, while autistic children typically exhibit socially avoidant behaviors such as reduced eye contact or decreased social interest or interaction. This complex social profile of social impairments and social motivation highlight the need for additional research. This study will examine the relationship between social motivation behaviors indexed by ratings of positive affect and social boldness/approach during the Stranger Approach condition of the Laboratory Temperament Assessment Battery (Lab-TAB) and ASD symptom severity indexed by the calibrated severity scores on the Autism Diagnostic Observation Schedule (ADOS-2) in young autistic and TD children. We will code behavioral markers of positive affect and social boldness/approach on a five-point scale ranging from absence of behavior (1) to highest intensity and duration (5). Given previous findings supporting apathy and avoidance toward strangers in autistic children, we anticipate to find that low levels of positive affect and boldness/approach will be correlated with higher ASD severity scores. Investigating social motivation behaviors in autistic children is essential to understanding the complex social profile of autistic children and improving identification and characterization of comorbid conditions, which will lead to earlier treatments and improved long-term outcomes.

McIntyre, Kellie

Mentor(s): Dr. Jessica Klusek

Respiratory Sinus Arrhythmia as a Predictor of Semantic Interference Performance and Ageing in Women with the FMR1 Premutation

The FMR1 premutation is a genetic mutation characterized by an expansion of 55-200 CGG repeats on the fragile X mental retardation (FMR1) gene, effecting 1 in 151 women and 1 in 468 males. In those who carry the premutation, fragile X associated tremor/ataxia syndrome (FXTAS) is an almost exclusive disorder to this population and is classified as a progressive neurodegenerative disorder. FXTAS effects about 16% of women with the premutation, with a subset presenting with cognitive decline of working memory, executive functioning, and attention deficit-hyperactivity disorder which is seen to worsen with age. This cognitive decline can be linked to dementia and autonomic dysfunction, which impacts respiratory sinus arrhythmia (RSA), a measure of heart rate variability. Lower RSA levels have been documented in women with the premutation, suggesting that autonomic dysfunction is characteristic of the FMR1 premutation and may play a role in its age-related cognitive profile. The LASSI-L assessment is a test of cognitive function that is used to evaluate semantic interference performance, a marker for dementia risk.

This study hypothesizes that lower levels of RSA baseline and reactivity will relate to poorer performance on the LASSI-L semantic interference task across both groups, with effects more pronounced in women with the FMR1 premutation compared to controls. Additionally, the study hypothesizes that there is an association between lower levels of RSA baseline and reactivity and semantic interference will become stronger in women with the FMR1 premutation as they age. Of women with the premutation, 16% will develop FXTAS, which is associated with dementia. However, there is a limited body of research on FXTAS and dementia within the population of women with the premutation. The results from this study will provide insight into the possibility of RSA and semantic interference performance as a biological marker of dementia in women with the premutation, and promote early intervention tactics to reduce the effects of negative ageing within this population. Data from 30 participants are currently being processed and results will be presented.

McKenna, Mae

Mentor(s): Dr. Robin Dawson

Enhancing parenting skills and childhood development: A collaborative project with the Nurse Family Partnership

Background- The Nurse-Family Partnership (NFP) is an evidence-based, national-level home visitation program in which nurses work with young, first-time mothers to foster the positive development of their children. The NFP uses the Partners in Parenting Education (PPE) guide, consisting of twenty-eight educational modules (lessons and hands-on activities), to teach parenting skills to their clients. However, the Lexington/Richland South Carolina NFP has limited resources to deliver these PPE educational modules.

Purpose- The purpose of this project was to create portable workshops based on the PPE educational modules to 1) support the activities of the Lexington/Richland NFP nurses, and 2) enhance parental understanding of the PPE lessons and activities.

Methods- This project took a community-based participatory approach. First, a focus group was conducted with all Lexington/Richland NFP nurses (n=5) to identify modules they deemed most important for their clients. Subsequently, materials to support the lessons and activities in the identified modules were compiled into portable containers, along with instructions for use. The NFP nurses could then take these portable workshops with them to home visits.

Results- Five portable workshops were developed, including Emotional Refueling, Floor Time, Tune In/Tune Out, Playing is Imitation and Turn Taking, and Playing is Learning. The portable workshops were packaged into stackable plastic storage bins that included copies of the instructional activity cards corresponding with the materials inside the boxes. Sample materials included in the workshops included pipe cleaners, wooden building blocks, and matchbox cars to facilitate the interactional activities between the mother and her child.

Conclusions/Implications- While the portable workshops were well-received by NFP nurses, implementation was delayed due to the cessation of in-home visits during the COVID-19 pandemic. Future work will focus on evaluating the effectiveness of the portable workshops, as well as the development of others as indicated by NFP nurses.

McTighe, Clare

Mentor(s): Dr. Phillip Buckhaults, Dr. Carolyn Banister

The Effect of TP53 Mutations on Tumor Response to Standard Cancer Therapeutics

The human TP53 gene codes for a protein, p53, that regulates DNA repair and the cell cycle (Levine, 1997). Therefore, TP53 plays an immensely important role in the proper growth and division of human cells. Mutations in TP53 are also associated with resistance to many standard cancer treatment drugs (Hientz, Bhakta-Guha, & Efferth, 2017). More than 50 percent of human cancers have mutations within TP53; thus, it has become a major focus over the years in cancer research (Levine, 1997).

Organoids are in vitro cultures of primary cells established from human surgical samples (Kondo & Inoue, 2019). They recapitulate genetics of human cancers better than do cell lines (Pleguezuelos-Manzano, et al., 2020). Some of the organoids are tumor cells that have a functional TP53 gene, or are TP53 wild type (WT). Other organoids are tumor cells that are TP53 knock out (KO), and have no functioning p53 protein. My goal is to figure out what chemotherapy drug sensitivity differences are caused by TP53 mutations. To do this, my lab has used TP53 WT organoids and has created TP53 KO organoids using CRISPR/Cas9 gene editing technology. This is called an isogenic pair of organoids, because they are identical to each other except for the TP53 KO that we engineer into the cells. Differences between the WT and KO cells' sensitivities to various cancer drugs can be solely attributed to the TP53 gene mutation, and not some other genetic difference between the cells. We already have one isogenic pair we have created in the lab, which will be used for this project. I will perform drug sensitivity assays on these TP53 WT and KO organoid cells to determine the effects of TP53 loss on drug sensitivity. While doing this, I will find the right drugs and the right concentrations that do not harm the WT cells but do harm the KO cells. Because a patient's normal, healthy cells have a functional TP53 gene like the WT tumor cells, the drugs that harm the KO tumor cells but not the WT tumor cells would therefore not harm the patient's normal, healthy cells.

McVicker, Morgan

Mentor(s): Ms. Lauren Epps

The Power of Silence Breakers

In Columbia we have a shelter called SisterCare that assists women and children involved in domestic violence get the help that they need such as shelter, counseling, legal assistance, and most importantly a safe support system. My sorority, Alpha Chi Omega, dedicates our philanthropic efforts toward domestic violence awareness, and therefore we work closely with SisterCare to help support these women in need. Passionate for this cause, I chose to run for my sorority's philanthropy board my sophomore year. Elected to the position of sophomore representative, I worked on a team to break the silence of domestic violence and raise money for SisterCare. Throughout the year we held smaller events such as making cards to the women and children at SisterCare, holding local fundraisers, tabling on Greene street, and gathering and distributing supplies. My favorite and most successful event I had the opportunity to help organize was our fall philanthropy event -- Paint War. That year we had over 800 participants, it was one of the biggest philanthropy events that year raising over \$7,000 for SisterCare. I know through the money that was raised and the awareness that was spread we helped to make a difference for SisterCare which directly effects our Columbia community. Since being on the board, I learned how to spread awareness about domestic violence by educating people on how they can help prevent it and help those who are suffering. Being part of such a great organization I have become an approachable person in my community whom others trust to come to for support. I am thankful for the lessons learned that directly helped mold me into an Advocate for conversation and change in sensitive topics. This experience has transformed my view on activism in my community, I plan to further my acts of service by remaining as support system for women around me. This presentation will outline specific achievements I had while being apart of the philanthropy board and how they have changed my outlook on how even the smallest acts of service having outlasting effects.

Meadows, Taylor

Mentor(s): Dr. Elizabeth Easley

My Journey from Student Leader to Future Healthcare Leader

My college experience has been a season of gaining knowledge and awareness. I came to University of South Carolina-Lancaster (USCL) to become a Registered Nurse. After four years of a competitive nursing curriculum and peer leadership, I will be a Registered Nurse, and an informed community member. Early in my college career, I was a research assistant and coordinator for the IRB-approved SMART study. The

SMART study focused on rural community health indicators in college students which piqued my interest in community health nursing. This led to my internship with the Arras Foundation where I studied the health benefits of a walkable and thriving downtown. I was also introduced to the idea of USCL partnering with Lancaster County DHEC to implement a satellite clinic on campus. Collaborating with USCL and DHEC on The Hubb as a student leader was my most significant college experience because this opportunity allowed me to make a meaningful impact on my campus and within my community. Furthermore, I practiced within the classroom concepts in a beyond the classroom experience and I truly saw integrative learning come to life. For example, resiliency is based on risk and protective factors. Not having access to resources increases risk factors for health conditions, whereas The Hubb acts as a protective factor therefore improving the community's resiliency. My leadership experiences through research, the internship, and The Hubb involvement strengthened my understanding of health disparities and assumptions health-care providers make and encouraged me to become more open-minded. As a result of my integrative learning, I will be a more capable nurse who provides care to the holistic patient by considering access to all community resources.

Meilan, Julia

Mentor(s): Dr. Nathan Carnes

Medical Service Volunteer

During spring semester of my junior year, I completed a mission trip to Guarari De Heredia, Costa Rica through International Service Learning. Working as a medical volunteer was an amazing opportunity for me because it encompassed my two passions, service work and medicine. While there, I attended several medical seminars led by professionals in their respective fields on topics including pharmaceuticals, various injection techniques, common diseases, and holistic medicine local to the country. I also worked at a free clinic where I experienced recording the patients' medical histories and working as a scribe, performing diagnostic tests, triaging and taking patient vitals (blood pressure, heart rate, etc.), consulting with doctors on the diagnosis and treatment plan, and working in the pharmacy prescribing medicine. The seminars expanded my knowledge on topics I have learned in my courses as a Biological Science major, such as gaining insight into some common diseases that I later learned in my physiology course. I was also able to bring back new practical knowledge and implement it into my current job as a medical assistant, such as how to listen to a patient's lungs and determine if it sounds abnormal. This opportunity not only provided me with valuable clinical experience that I will be able to take with me as I progress in my medical career, but also opened my eyes to the large discrepancies associated with access to health care. For example, Nicaraguan refugees in Costa Rica were not afforded health insurance, so they have to pay out of pocket for medical services. There are also not many (if any) free clinics or hospitals local in the lower socio-economic areas.

Melton, Teresa

Mentor(s): Dr. Elizabeth Easley

Campus Organizations Create Community Leaders

Being involved in campus organizations has prepared me to become the leader I am today. I immediately became involved with TRiO shortly after registering with the university. From there, I participated in every community drive possible. This included the collection of items for United Way, local schools, HOPE of Lancaster, and the Lancaster County Sheriff's Office. I knew by focusing on these activities within the community, I could relate back to the knowledge I obtained in Introductory Sociology and Survey of Social Psychology courses concerning inequalities and socioeconomic diversity. Areas of the community are economically challenged, which is a problem that must be addressed through leadership. Alleviating dissonance caused by poverty and lack of education may require additional community resources. Through outreach work coordinated by campus organizations such as TRiO and PALs, I enhanced my working

relationships with leaders in the community. Having the support of community leaders is the first step in raising awareness of issues in the surrounding area. This is important because my area of concentration involves the eradication of Human Trafficking. Through my leadership on campus, I hosted a community awareness night that gave insight to recognizing the signs of Trafficking through my Peer Advisor at Lancaster (PAL) role. By volunteering my time and services on campus, I also began to work with the Sheriff's Office, which is partnering with local organizations to bring everyone together through outreach events. In doing this, the goal is to repair some of the discord that abounds from social inequalities and economic hardships. This would mean that the deviant behavior due to poverty would decrease. I have recognized through campus organizations, that leadership is not about how big or small the task is, but rather the desire to take action. Connecting campus organizations with community outreach creates great leaders.

Meltzer, Haley

Mentor(s): Dr. Jennifer Grier

Characterization of the Anti-Apoptotic Effects of IFIT3 During the Antiviral Innate Immune Response in an IFIT3 Knock-Out Cell Line

Interferon Stimulated Genes, or ISGs, are a group of proteins that are upregulated during the body's immune response to viral infection, though for many ISGs their specific functions are unknown. One such gene, Interferon Induced Protein with Tetratricopeptide Repeats 3 (IFIT3) is presumed to inhibit apoptosis of infected cells during the antiviral immune response. However, this has not been confirmed and the mechanism by which IFIT3 could inhibit apoptosis is not yet clear. In the present study, we are investigating the specific role and function of IFIT3 on apoptosis during the antiviral immune response of respiratory epithelial cells. In order to conduct the study, we made CRISPR-Cas9 plasmids with a guide RNA for IFIT3, which will be used to generate genomic mutations in the A549 lung epithelial cells so that IFIT3 will be absent. Resulting IFIT3 knock-out cells will be treated with a mimic of viral RNA to observe the changes to the apoptotic process when IFIT3 is not present. We expect to observe more apoptosis when IFIT3 is knocked out, which would indicate that IFIT3 does in fact have an inhibitory effect on apoptosis. By observing the changes in the cells that lack IFIT3 compared to wild-type cells, the effect that IFIT3 has will become apparent and help to broaden our understanding of the antiviral immune response to RNA viruses such as Respiratory Syncytial Virus, Dengue Virus, and SARS-CoV-2.

Melville, Alex

Mentor(s): Prof. Aaron Vannucci

Anion Pool Synthesis of Strong Nucleophiles for Developing Reactivity Trends with Carbon-Fluorine Bonds

This study investigates the reactivity of compounds containing carbon-fluorine (C-F) bonds. Previous research has proven that, under the correct conditions, applying an electrical potential to a solution containing amines causes deprotonation, leading to the formation of negatively charged anions. A pool of these very reactive anions may be easily and cheaply synthesized in solution using renewable energy. This study focuses on leveraging the high reactivity of deprotonated amines in order to selectively react with the carbon bound to a fluorine atom in certain compounds. The main objectives of this study are to determine reactivity trends of C-F bonds with nucleophilic amine anions and to discover new synthetic routes to forming compounds containing C-F bonds.

Mewborne, Quinlan

Mentor(s): Dr. Jessica Green

EEG Correlates of Consciousness

Our project is an electroencephalogram (EEG) study that aims to explore how the brain's processing of facial emotions differs in conscious and unconscious perception. We are also using the same data set to study how symptoms of depression and anxiety correlate with individual differences in EEG markers of conscious processing.

We aim to study how the emotional expressions of faces affects our conscious awareness and its neural signatures. This is critical to understanding both conscious awareness and how mood and anxiety disorders may influence what we perceive in our environment. By studying visual processing of facial stimuli in the absence of awareness, we anticipate gaining a greater understanding of the nature of consciousness and the underlying neural differences in depression and anxiety.

Miles, Julia

Mentor(s): Dr. Melissa Moss

Effect of Amyloid- β on P-glycoprotein Expression in Blood-Brain Barrier Models

The deposition of amyloid- β protein ($A\beta$) aggregates in the brain parenchyma and vasculature is a marker of late-stage Alzheimer's disease (AD). $A\beta$ monomers can assemble to form oligomers, which further aggregate into fibrils that deposit in brain. P-glycoprotein (P-gp), a transporter protein, has the ability to clear $A\beta$ across the blood-brain barrier. However, aggregated $A\beta$ protein may affect P-gp expression. Previous studies have identified reduced P-gp expression in areas of the cerebrovasculature where $A\beta$ deposition occurs. Madin-Darby Canine Kidney (MDCK) cells transfected with the human multi-drug resistance 1 (MDR1), which codes for P-gp, have been used to study P-gp due to the cell line's abundance of this protein. However, the relevance of this cell model to AD is unclear. This work compares the MDCK-MDR1 cell line to primary human brain microvascular endothelial cells (HBMVECs), the cells that form the blood-brain barrier (BBB) to determine if $A\beta$ modulates P-gp in MDCK-MDR1 cells in the same manner as P-gp in HBMVECs.

MDCK-MDR1 cells and HBMVECs were cultured on glass coverslips to form confluent monolayers. Cells were treated (6 h) with $A\beta$ monomers, oligomers, and fibrils at concentrations of 0.001 μM , 0.01 μM , and 0.005 μM . Following treatment, the cells were fixed and stained using immunocytochemistry to label cellular nuclei and cell surface P-gp. Images were taken through two channels using a Nikon TE 40 microscope. The DAPI channel captured the cell nuclei and was analyzed to determine the number of cells, while the TRITC channel captured fluorescence associated with cell surface P-gp. This image analysis allowed determination of P-gp expression per cell.

The monomeric, oligomeric, and fibril treatments each induced little change in P-gp cell surface expression by MDCK-MDR-1 monolayers. In contrast, $A\beta$ monomer, but not aggregates, decreased cell surface P-gp expression by HBMVEC monolayers. These results suggest that the MDCK-MDR1 line may not be the best model for studying $A\beta$ regulation of the transport protein P-gp in AD.

Minigiello, Sophie

Mentor(s): Dr. Hilary Lichterman

Diversity and Social Advocacy Begins with the Individual and Has No End

Change must be achieved at the individual level for a community to strive towards inclusions and advocacy for all. Individual change begins with self-reflection and reflection on experiences to create awareness and education, providing the ability to grow while actively dismantling mistakes. This process enables the community to learn and grow as a whole, while exposing and working against biases to strive for diversity

and social advocacy. Through my time in college, I have had the opportunity to be a part of a multitude of transformative experiences both within and beyond the classroom that shaped who I am today. My passions for mentoring, helping others, and working with the disability community led me to experiences that exemplify significant connections to my efforts in diversity and social advocacy. The many significant experiences that aided in my self-transformation and enhancement included, working as a Personal Care Attendant for a young girl with cerebral palsy, volunteering as a Teacher's Assistant in Spain, participating in the Office of Multicultural Student Affairs Diversity Dialogue, and mentoring different groups within the school community. Reflection on various aspects of these experiences assisted in uncovering links between my learning that have allowed me to change my perspective and grow as a student, individual, and advocate. Through reflection, I was able to connect concepts from my courses that support the importance of diversity and social advocacy to the transformative information I learned through links between my experiences. This process allowed me to identify and change previous biases, understand fundamental causes of novel situations, uncover points of prevention and intervention, and utilize methods of action for change; all of which are crucial in advocating for diversity and social inclusion. This adventure opened my eyes to the limitless possibilities in diversity and social advocacy and has granted me the ability to educate others of its importance and how they can begin their efforts. I will continue to strive for diversity and social advocacy throughout my life, as well as others, by empowering them to become educated and make changes to build a more diverse and inclusive world.

Minson, Isabella

Mentor(s): Prof. Sarah Matthews

Professional Pathway: Financial Internship Experience

During the past summer, I worked with Bank of America as a Leveraged Finance Analyst as part of their Global Capital Markets Division. This is one of the only investment banking functions that they have in the Charlotte, NC headquarters. The Leveraged Finance group helps provide strategic advice to companies on raising debt. Main job functions consist of credit analysis, work on leveraged buyouts, and high deal volume in below investment grade debt issuances aka leveraged loans, or anything with credit below BB+. As part of one of the largest multinational banks in the world, there is a wide array of opportunity in this group. As an International Business, Finance, and Supply Chain major at the University of South Carolina, my internship provided me with first-hand experience in the world of Finance in a different capacity than my previous internships within Wealth Management at Bank of America and Middle Market Financial Analysis at Wells Fargo. I had the opportunity to research and present on a company, work with other interns across the bank in a data analysis capacity, and network with individuals in the group. Participating in this internship reaffirmed my decision to pursue investment banking and made me more comfortable in my presentation skills to superiors. It is because of this experience that I will be returning full time after graduation to work for Bank of America as a first year Leverage Finance Analyst.

Misuraca, Nicholas - Co-Author(s): Gulnar Ibramsha, Ryan Stout, , , - Mentor(s): Dr. John Gerdes, , , , -- Boeing Flight Trends and Analysis Dashboard -- We are consolidating various data sources into a single database relating to airport and airline data from within the US which then can be used by the data visualization tool, Tableau. We will be able to see trends with this visualization tool that could potentially lead to business opportunities for the Boeing Company.

Mitchell, Ravyn

Mentor(s): Dr. Justin Mogilski

Disgust Sensitivity and Moral Judgment of Consensual Non-monogamy

Multi-partner romantic relationships (e.g. consensual non-monogamy; CNM) has often seen as something bad or immoral within Western societies. Because it goes against the single-partner romances that

people are used to, many people condemn these types of relationships. However, there is no definitive explanation for why. In our study, we examined how a person's disgust sensitivity relates to their moral attitudes toward CNM. We first asked a group of participants to identify the many reasons why CNM relationships are heavily stigmatized (Phase 1). From these responses, we created a measure of "Apprehension toward CNM" that we then administered alongside several psychometric measures of disgust sensitivity attitudes toward CNM (Phase 2). We predict that people with a high disgust sensitivity will more likely condemn CNM relationships. Data collection is ongoing, but we will discuss our preliminary findings in this presentation and outline how our data might inform the psychological study of stigma against CNM.

Mitchell, Austin

Mentor(s): Dr. Jennifer O'Neill

Battling Children's Mental Health in Richland 1 School District Through an Effective Food Share Program and Food Insecurity Training

Throughout the United States, 1 in 6 children live in a food insecure household. With 22,939 students currently enrolled in Richland 1 School District, this roughly equates to 3800 students who are currently facing some kind of hunger within the district. Historically, those facing food insecurity come from low-income communities, single-parent households, and those in black and Hispanic communities. So, with Columbia demographics accounting for high values in all three of these groups, child food security is more important than ever.

Studies done by the APA have shown a direct correlation between hunger and mental health. Severe hunger causes a problematic increase in depression, PTSD, and anxiety & stress. Were older adults facing hunger and food insecurity may not have the access and/or education to take advantage of food share programs, children should have opportunities as well to access food where they may not be able to in their homes. Incorporating student-focused programs like this into Richland 1 School District will positively effect students facing food insecurity. While educating teachers and faculty on the effects of students having inadequate food in their homes, they will also get a better understanding of how it effects their ability to study and focus during their classes.

In Richland 1 School District, it would be highly beneficial to implement a school food aid program across Richland schools to give students in all age groups more access to food/snacks. This gives students a confidential and anonymous way to take home what they may need on a daily basis, where in some cases the only meal some students receive is their school provided lunch. This will in turn have a positive outcome in the lives of students and families across Richland 1 School District. As more students are faced with food insecurity, their mental health should not be undervalued.

Mitchell-Nelson, Sessaly

Mentor(s): Mrs. Anna Oswald-Hensley

Chick-fil-A Work Experience

Since my freshman year of college, I have been working at Chick-fil-A. Chick-fil-A's company is devoted to great food, but also great customer service in the process. My Job title is a Front of House (FOH) Team Member, meaning I am mainly responsible for directly communicating with and serving the customers their food. Throughout my experience there I have been able to work various positions that helped me to understand the value of teamwork, professionalism, and customer service. All three of those values being cultivated helped me to nurture my leadership overall for the future. Although I did not understand this at first, having my job greatly aided in my college career. Working while studying taught me the importance of time-management and being able to do everything in excellence, as well as separating a business posture from a more casual/ leisurely attitude based on settings. This presentation covers how my job has granted me leadership skills that tie into my college life, and how it has shown me to apply insights I have

gained from certain classes regarding leadership.

Mitta, Alekhya

Mentor(s): Dr. Abigail Hogan

Predictors of Comorbid Anxiety in Children Diagnosed With Fragile X Syndrome

Fragile X syndrome (FXS) is a genetic disorder in which individuals are unable to produce a protein critical for brain development due to mutations on the FMR1 gene, thus causing intellectual disability and various associated physical and behavioral symptoms. Comorbid anxiety disorders are common in FXS, with at least 50% experiencing clinically significant anxiety symptoms that lead to greater overall impairments and poorer quality of life. A better understanding of early anxiety risk factors in very young children with FXS will enable earlier identification of anxiety symptoms and provide opportunities for the development of targeted treatments that would improve long-term outcomes in children with FXS. This study examined early anxiety risk factors (temperament, physiological regulation) that are known to predict anxiety in typically developing children as early anxiety risk factors in FXS. Participants included 24-month-old toddlers with FXS ($n=33$) and age-matched typically developing toddlers ($n=30$). Toddlers were presented with a social fear (Stranger Approach Task) and non-social fear (Scary Spider Task) challenge from the Laboratory Temperament Assessment Battery (Lab-TAB) to test their physiological responses to fear. Physiological responses (i.e., heart activity) were collected via electrocardiogram (ECG). The Early Childhood Behavior Questionnaire (ECBQ) negative affect subscale was used to measure temperament styles related to emotional reactivity. The same participants were assessed for anxiety symptoms later in childhood using the Preschool Anxiety Scale (PAS) questionnaire. Based on previous research, it is hypothesized that for both children with FXS and typically developing children, abnormal physiological and emotional reactivity in toddlerhood are early signs of later-emerging anxiety. This hypothesis will be tested through analysis of correlations and regressions between early risk factors and later anxiety symptoms. This research will facilitate the development of treatment and therapeutical plans with higher rates of success for children with FXS and comorbid anxiety.

Miyasaki, Sydney

Mentor(s): Prof. Eva Czabarka

Biplanar Crossing Number of the Complete Bipartite Graph

The concept of a biplanar crossing number was introduced by Owens [On the biplanar crossing number, IEEE Trans. Circuit Theory CT-18 (1971) 277–280]. We explore the biplanar crossing number of the complete bipartite graph. The methods of proof used in Czabarka et al [Biplanar crossing numbers I, Soc. Math. Stud., vol. 15, Springer, 2006, pp. 57–77] are formalized as D-drawings and used to derive upper bounds on the biplanar crossing number of the complete bipartite graph. The counting method, in an extension of Czabarka et al and Alireza and Zarrabi-Zadeh [New Bounds on k -Planar Crossing Numbers, arXiv, doi:arXiv:1911.06403], is used to provide a method to compute lower bounds for the biplanar crossing number of the complete bipartite graph. The possibility of Ramsey Theory, via the Bipartite Ramsey Number and the Connected Bipartite Ramsey Number, to obtain lower bounds on the crossing number is explored. We prove that the Connected Bipartite Ramsey Number and the Bipartite Ramsey Number are equal for complete bipartite graphs, and for bridgeless graphs in general.

Mohler, Lauren

Mentor(s): Ms. Asheley Schryer

Living in Community Through Service

Beginning the summer of 2019, I started my experience as a volunteer for the Harvest Hope Emergency Pantry in the Midlands. Harvest Hope Food Bank is South Carolina's largest food bank and helps provide

food to nearly one million people in need, across 20 counties in the state. When the pandemic began, food insecurity within the community climbed and the demand for volunteers followed. Food insecurity, a key issue under the economic stability domain of Healthy People 2020, is a significant national health problem and an underacknowledged, social determinant of health. Harvest Hope recognizes the one in six South Carolinians who struggle with food insecurity and helps them find stability through putting food on their table. As a weekly volunteer, I helped stock shelves, empty boxes, pack carts of food, and load food into the client's car in attempt to help my community meet basic humans needs. Through my time volunteering at Harvest Hope, I have seen first-hand, the detrimental effects of low socioeconomic status, specifically food insecurity, on the overall well-being of our community. I have also witnessed the positive impact a compassionate and dedicated volunteer presence can have on the community. I have learned that in order to actively live-in community, we need to serve and help others who are in need. Generosity connects us to one another and builds and everlasting community.

Monty, Morgan

Mentor(s): Dr. Jennifer Parker-Harley

A Breath of Fresh Arts: Community Arts in London, England

London, England is home to a vibrant arts scene that invites diverse populations within the city to engage with music, dance and theatre at little to no financial cost to participants. This research aims to identify methods of engagement that artists, arts institutions, and local programs in London have found to be successful in their efforts to engage their surrounding communities through participatory arts events and programming. Specifically, it gathers information from individuals and organizations in London whose artistic impact can be traced to projects and performances tailored towards communities throughout the city.

To survey these methods, interviews were recorded with five individuals who were asked about their background in the arts and career amidst their mission of bringing art to various populations throughout London. The findings from these conversations reflect a focus on maintaining the integrity of all produced work while simultaneously creating environments for various people to engage with art. All interview participants had technical backgrounds in the arts and many had connections to organizations throughout the city. The importance of partnerships in the arts as a means of expanding the reach of various projects and programs was essential to every individual's story. Interview participants were also surveyed about the challenges they have faced in their field of work. These conversations have been recorded and produced as part of a podcast mini-series called "A Breath of Fresh Arts."

Moran, Samantha

Mentor(s): Dr. Kelly Goldberg

The Mystery of the Paranthropus Aethiopicus

About 2.7 to 2.3 million years ago lived in Eastern Africa the Paranthropus aethiopicus. P. aethiopicus is characterized by its large face, teeth, and powerful jaw. However, the species remains a mystery to paleo-anthropologists, as very few remains have been found. Drawing on knowledge of our hominid ancestors, this project seeks to convey and understanding of the Paranthropus aethiopicus and its place among hominids. By conducting research into the diet, habitat, distinguishing features, and geographic location of P. aethiopicus, this project takes a step into uncovering the mystery of the species and its significance in the course of human evolution.

Morgan, Mary Pat

Mentor(s): Dr. Matthew Childs

Community Service with a Public Health Emphasis

I have spent the past three years as a member of USC's largest service sorority, Epsilon Sigma Alpha. I have spent two years on the executive board and currently serve as Philanthropic Chair, or the head of service, for the organization. Through Epsilon Sigma Alpha, I have completed over 300 hours of service on campus, in the greater Columbia community, and throughout the state of South Carolina. Much of the service projects I complete have a focus on healthcare or public health. For example, I have completed over 50 hours of service at the Women's Rights and Empowerment Network educating the public and advocating with the South Carolina General Assembly to advance health, economic well-being, and rights for South Carolina women and families. I served as a University 101 Peer Leader and Senior Peer Leader for two years, teaching for first year students as well as juniors and seniors. I participated in the "Healthcare in Rural Communities" alternative winter break put on by the UofSC Leadership and Service Center in January 2019. As a part of this alternative break I measured BMI, blood pressure, and blood glucose at three traveling health clinics in rural South Carolina, cooked/served affordable and healthy meals for at-risk community members, cleaned litter in underprivileged neighborhoods, and planted flowers around town buildings. I also volunteered as a research assistant for the Behavioral Medicine Research Group in the Department of Psychology for a research project called DRIVE (Developing Real Incentives and Volition for Exercise).

I cannot stress enough how much pursuing the Community Service pathway for Graduation with Leadership Distinction has helped me prepare for graduate school as well as my future career in public health. The firsthand experiences I was able to take advantage of as a part of my community service has helped me better understand the concepts that I have learned in class. It has also made me a more competitive applicant to any MPH program. Most importantly, it has inspired me to continue working in the public health field, which is something that I want to do for the rest of my life.

Morgan, Christopher

Mentor(s): Dr. Susan Wood

Understanding Cardiovascular Dysfunction in Gulf War Illness

During the Gulf War, soldiers were given Pyridostigmine Bromide (PB), an acetylcholinesterase inhibitor, prophylactically to protect against possible exposure to Sarin Gas. Years later, between 25-42% of these veterans began experiencing an array of neurological deficits and cardiovascular symptomology now termed "Gulf War Illness (GWI)." Since this disorder's inception, a lack of insight into the development of effective treatment strategies for the disorder has prompted studies of this sort. Our ongoing studies have begun to analyze the cardiovascular burden induced by PB when combined with repeated restraint stress (6hrs/day x 10 days) in rats and identified attenuated vagal tone. Vagal tone is protective over cardiovascular dysfunction and is attenuated in GWI victims during the nighttime. My project aimed to further understand this cardiovascular dysfunction by analyzing ECG and BP traces of rats in this 2x2 design study (drug [PB/vehicle] and stress [stress/control]). After the stress/treatment paradigm, all rats, regardless of stress history, were then challenged 10 days later (early phase; to model wartime treatment of veterans) and 90 days later (late phase; to model postbellum timing) with an acute 1hr restraint (ARS). Cardiovascular traces were analyzed to identify the effects that a history of PB treatment and/or stress had on cardiovascular dysfunction in the face of this psychological restraint challenge. It was observed that rats subjected previously to a combination of stress and PB treatment exhibited blunted vagal tone under resting conditions, confirming what was seen in GWI veterans. Analysis of ECG traces allowed for measurements of the sympathetic (LF) to parasympathetic (HF) balance. It was found that PB/Stress rats exhibit a robust spike in LF/HF ratio upon the completion of the ARS challenge at the early phase and

that they exhibit suppressed responses during the late phase. QRS duration analysis, cardiac health measurement, is currently underway. Arrhythmias were present throughout the groups in insignificant levels. These data indicate that PB combined with RRS is a valid model to study cardiovascular dysfunction in GWI. Our goal is to use this model to begin to develop effective treatments for GWI veterans.

Morton, Charles

Mentor(s): Dr. Thomas Crawford

Diffraction grating manufacturing using magnetically directed nanoparticle assembly

This project demonstrates a proof-of-concept for using printed magnetic fields to precisely assemble microstructures from magnetic nanoparticles and presents a method for transferring particles while preserving the ordered structure. Hard disk drive media with a patterned magnetic array printed on the surface is used as the assembly platform for the particles. When a suspension of nanoparticles in water is left to sit on the platform, the particles are drawn out of the liquid and align with the magnetic pattern. In order to transfer the structure off of the platform, the platform is coated with a layer of polyvinyl alcohol which can be dried and carefully removed, preserving the structure on the polymer substrate. Due to the transparency of the polymer and the reflectivity of the disk drive media, analysis of the structures is executed by studying the diffractive optical response of the structure. The diffraction is effected using white light, LED, and laser light sources. Photographs of the diffraction patterns from both reflection and transmission are subjected to a phase retrieval algorithm in MATLAB and IgorPro to reconstruct an image of the assembled structure. The anticipated results of this project show that there are very few losses in the particle transfer method, and that there is strong potential for this novel method of precise nano-assembly to be implemented in processes that require micro and nanoscale precision.

Moses, Benjamin

Mentor(s): Dr. Yordanka Ilieva

Detector Constraints for Gluon Imaging of Light Nuclei with J/ψ Photoproduction at the EIC

The Electron Ion Collider (EIC) is the next and largest facility being developed for experimental nuclear physics in the U.S. One of the interesting components of the EIC research is creating and improving upon the ability to study the effects of quarks and gluons on the atomic nucleus, which is the fundamental building block of all visible matter in our Universe. Quarks make up nucleons—particles such as protons and neutrons, which are in the nucleus. Gluons are the carriers of the strong nuclear force and bind the quarks together inside nucleons; however, we currently do not have a full description of gluons and their physics. We know, for example, that more than 98% of the nucleon mass is dynamically generated by the interactions of quarks and gluons, but we do not have a complete understanding of these interactions. The role that gluons play in nuclei is even less known. These are prominent questions at the forefront of nuclear physics today. In our research, we aim to obtain gluon images of light nuclei by probing the latter with J/ψ mesons produced in the high-energy collisions at the EIC. Mesons are subatomic hadronic particles consisting of a quark-antiquark pair, and J/ψ mesons are specifically comprised of a charm and anti-charm quark. While gluon imaging can be performed in many ways, J/ψ measurements can provide a clear view of the nucleus along the transverse direction. The EIC development is being done by a large collaboration of researchers including those at the University of South Carolina. The collider and its detectors are currently being designed, and our work is to establish requirements for these detectors, which must be met for precise gluonic imaging. Simulations involving J/ψ production are thus of great interest to both the EIC project as well as the broader nuclear physics community. In this project, we simulated collider data that we then analyzed to study detector constraints, and specifically the necessary angular coverage. Through our research to date, we have determined that to obtain useful gluonic information, the detector needs to have angular coverage in the sub-milliradian range.

Mott, Sarah

Mentor(s): Dr. Susan Wood, Ms. Brittany Pope

Estradiol-Specific Neural Regulation of Social Stress Susceptibility in Female Rats

Repeated exposure to social stress is a common risk factor for development of anxiety disorders. Women are twice as likely as men to suffer from anxiety. However, this increased susceptibility in females is confined between the onset of puberty and the end of menopause. This suggests that ovarian hormones may contribute to the disproportionate development of stress-related anxiety disorders among women. We have previously shown that witness stress (WS), a model of social stress in which a female rat is subjected to witnessing an aggressive social defeat encounter between a male intruder and a novel male resident, produces anxiety-like behaviors selectively in intact female rats. Moreover, intact females exposed to WS exhibit a distinct increase in corticotropin releasing factor (CRF) expression in the CeA. The current study seeks to understand specific 17- β estradiol-induced neural regulation that may contribute to heightened susceptibility to social stress among females. Following recovery from OVX or sham surgery, female rats were treated with either 17- β estradiol (17- β E, 10 μ g/rat, s.c.) or vehicle (veh, 0 μ g/rat, s.c.). One hour after injection, female rats were exposed to WS or control handling for 15 minutes and video recorded. WS-evoked burying, freezing, and rearing behaviors were subsequently quantified to assess stress-induced anxiety-like responses. To quantify CRF expression, perfused brains were sliced coronally and immunohistochemistry was conducted to double label for CRF and cfos in various stress-sensitive regions. Behavioral responses showed WS rats spent significantly more time burying compared to control rats. Veh-treated OVX rats were less behaviorally reactive to WS as evidenced by decreased WS-evoked burying durations. However, OVX rats treated with 17- β E exhibited WS-induced anxiety-like responses similar to those of intact females as demonstrated by similar stress-evoked burying durations. Furthermore, cfos positive CRF expression in the CeA was increased for intact WS rats. Analysis of stress sensitive brain regions such as the hippocampus and locus coeruleus are ongoing. Taken together, these findings suggest that 17- β E plays a paramount role in facilitating anxiety-like behaviors to WS and points towards specific neural regulation of these responses.

Support provided by R01 MH113892 and NARSAD Young Investigator Award 26809

Moy, Victoria

Mentor(s): Dr. Sue Heiney

Young Adult Electronic Cigarette Use: Misperceptions of Addiction and Disconnected Behavior Choices

Purpose

Electronic cigarettes, or e-cigarettes, were originally intended as smoking cessation devices but are now used increasingly as a first-line nicotine product by the young adult population. The long-term physical effects of e-cigarettes are not fully understood but are likely harmful to both lung and brain function. Understanding young adult e-cigarette usage patterns and motivations is important in developing effective evidence-based mitigation strategies.

Design and Methods

The purpose of this descriptive study was to explore e-cigarette usage among young adults, including frequency of and reasons for use, and self-perceptions of use. Quantitative data on the frequency and rationale for use of e-cigarettes among young adults was gathered using an online survey.

Results

Participants included 207 young adults ages 18-30 years. 54.8% reported frequent use, while only 1.9% rated themselves as "very dependent" on e-cigarettes. Results suggested a discrepancy between how frequently participants were using the e-cigarettes and how dependent on them they believed themselves to be.

Conclusions

This suggested discrepancy should be further examined using cognitive dissonance theory in order to inform the development of evidence-based interventions.

Practice Implications

Pediatric and adolescent nurses should be aware of the frequency of e-cigarette use in young adults and the motivations for their use as well as the potential for dependency. E-cigarette use is a recreational activity combined with social interaction. Understanding young adult e-cigarette perception and use is crucial for the guidance of nursing practice and the future health of this population.

Mullican, Sidney

Mentor(s): Dr. Kelly Goldberg

What is Peranthopus Robustus and What Does it Mean for Us?

The species *Peranthopus Robustus* is a now extinct primate that is known for its wide dish-shaped face that allowed for strong chewing muscles. Discovered in 1938, *P. robustus* has much to tell us about human speciation as a member of the family Hominidae. By studying fossil records and literature on the species, this study aims to consolidate and evaluate information on the species *P. robustus*, contributing in a meaningful way to the understanding of the speciation of humans and the parallels that can be drawn between the two species.

Murphy, Cathryn

Mentor(s): Dr. Whitney Zahnd, Dr. Jan Eberth

Analysis of Statewide Comprehensive Cancer Control Plans in Addressing the Disproportionate Rural Cancer Burden

Background: In 1998, the Center for Disease Control and Prevention initiated the National Comprehensive Cancer Control Program (NCCCP) to mandate American states, jurisdictions, and tribal organizations to develop plans aimed to reduce the burden of cancer within their region through the development of goals, objectives, and strategies to address the burden of cancer across the continuum. In 2019 the National Advisory Committee on Rural Health and Human Services released a series of policy recommendations related to rural cancer control, including one specifically recommending that these cancer plans include goals, objectives, and strategies concerning the burden faced by rural communities. Our objective was to assess the extent to which states and jurisdictions considered “rural” in the development of their comprehensive cancer control plans.

Methods: We downloaded all 67 current plans from states, territories, and tribal communities. We identified all mentions of rural communities within these plans, searching for the related keywords “rural,” “frontier,” “remote,” “distance,” “Appalachia,” and “Mississippi Delta” and examined how rural was considered across components of the plan, including descriptions of cancer burden and development of goals, objectives, and strategies.

Results: We found that out of the 67 listed plans by the NCCCP, 33% did not include any mention of rural communities whatsoever, only 40.3% included any kind of action related step targeting rural patients, and only 44% included any type of statistical figure to acknowledge the disparate burden felt by rural communities. The cancer type that was most frequently addressed in the plans was breast cancer.

Discussion: These findings could serve as a useful tool in the analysis of cancer plan development going forward. Additionally, this may provide the foundational information for future research, such as surveying plan developers, to assess their intention to include rural stakeholders and consider rural more fully in their plans going forward.

Mushtaq, Maha

Mentor(s): Dr. Mohamad Azhar, Dr. Mengistu Gebere

AMIRA 3-D reconstruction of mouse thoracic aorta with aortic dissection and rupture

Thoracic aortic aneurysms that develop into acute aortic dissections typically exhibit a vessel dilation of 5-5.5 cm, almost twice the normal diameter. In those with transforming growth factor-beta2 (TGFB2) gene mutations (Loeys-Dietz Syndrome Type -4), a vessel dilation is not found. Without the vessel dilation, it is difficult to catch a thoracic aortic aneurysm before it develops into acute aortic dissections. Acute aortic dissections are typically fatal. Tamoxifen-induced TGF β 2 conditional deletion in the vascular smooth muscle in 4 weeks old mice was found to have an aortic dissection and/or aortic rupture within 14 days. Histological sections of the mice heart and aorta were stained with hematoxylin and eosin (H&E). Images were captured under brightfield microscope. An AMIRA 3-D reconstruction of the sections was used to find the exact placement of the aortic dissection and rupture. The results will indicate the origin and progression of aortic dissection and rupture. This information will lead to a better understanding of the pathogenesis of aortic dissection and rupture in Loeys-Dietz syndrome-4.

Navarro, Abby

Mentor(s): Dr. Suzanne Swan, Prof. David DeWeil

How Levels of Femininity and Masculinity Affect Men's Mental Help Seeking Attitudes

This study aimed to uncover the relationship between levels of femininity and masculinity in men in regard to their attitudes toward seeking counseling. According to Sandra Bem, traditional masculine gender roles often include traits like tough, independent, strong, and not needing help from others. Sharing emotions or admitting to needing help can be considered weak and not masculine. Within traditional feminine gender norms, it is much more expected and acceptable to express emotions, vulnerability and help-seeking activities. These ideas suggest that femininity and its acceptance of vulnerability and emotions may be positively linked to attitudes toward counseling because counseling is centered around sharing emotions and being open and vulnerable. This study sampled only men in order to uncover the underlying effects of femininity and masculinity on their attitudes toward help seeking. The data for this study was collected from 30 male students at the University of South Carolina through GroupMe messages and emails sent out to various undergraduate psychology and business classes. Femininity and Masculinity were measured by the Bem Sex Roles Inventory (BSRI 2019), and attitudes toward counseling were measured by the Mental Help Seeking Attitudes Scale (MHSAS) (Hammer et. al 2018). Participants completed a survey containing these measures as well as demographic questions. The original hypothesis suggested that high levels of masculinity would be positively correlated with low scores on attitudes toward counseling, but this correlation was not statistically significant, so more research is needed to understand if masculinity is related to attitudes toward counseling. A significant positive correlation was found between high levels of femininity and high scores on attitudes toward counseling. These results suggest that traditional feminine traits may facilitate opening up and seeking help, which may be why the men with higher levels of femininity also had positive attitudes toward counseling. This correlation between femininity and attitudes toward counseling suggest that traditional feminine traits are more conducive to seeking help than other masculine traits, which is important to the destigmatization of men seeking help and challenging the idea that different genders and gender traits have different levels of acceptance for seeking mental help.

Newton, Blaine

Co-Author(s): Travis Wende

Mentor(s): Dr. Lee Morris

A UofSC Union Mystery: a Study of Ethnicity of a Shrunken Head Through Hair Characteristics

A shrunken head has been investigated for its authenticity to see if it is actually of human origin and if it is

a traditional Jivaro (indigenous South Americans) tsantsa. Tsantsas were human heads obtained from the enemy and shrunk with a special process to prevent the spirit of the dead warrior from haunting the soldier. Commercial shrunken heads were made for trade with Europeans and were often made from indigenous peoples, animals, and occasionally European peoples. We have since determined that the shrunken head is of human origin but not a ceremonial tsantsa. Such human artifacts are now considered to be unethical to retain in private collections and so many people seek to repatriate the artifact to its country of origin. However, shrunken heads are distorted by the shrinking process and skin tone is often obscured with charcoal ash. Thus, ethnicity (and thus origin) may not be determined by casual observation. One feature that can suggest ancestry is the hair, which is not affected by the shrinking process. Using light microscopy, we have observed a few representative hairs from the shrunken head to try to discern ethnicity. There are three main ancestral groups that exhibit different hair characteristics: European, Asian, and African. They differ by hair width, curliness, color, presence of a hair medulla, and cross-sectional shape. Indigenous South Americans typically have the Asian hair type, as their ancestors are thought to have crossed from Asia to the Americas when these continents were still connected. We are interested in determining the ancestry of the shrunken head as a step towards possible repatriation for this specific shrunken head. So far, the longitudinal view suggests the hair has Asian-type hair characteristics. A more detailed study of the strands, including cross-section analysis, is currently being conducted. Possible genetic analyses could be conducted in the future.

Ng, Minnie

Mentor(s): Ms. Gina Spence

Pharmily

My four years of undergrad were filled with numerous learning experiences and professional development opportunities, which allowed me to explore deeper into my goals and future career. After being early accepted into pharmacy school, I knew I was one step closer to my dream – becoming a hospital pharmacist. First semester of pharmacy school was undoubtedly difficult, but our class, consisting of 110 students, all became very close and helped each other. Soon, I obtained an internship at Kroger Pharmacy where I could apply my skills and knowledge that I learned in class to a real pharmacy setting. Through this internship, I practiced receiving a prescription, entering it into the computer, filling the medication, and releasing it back to the patient. This job has also allowed me to learn and recall popular prescribed drugs from brand to generic and vice versa, and the key counseling points for each of them. I believe that Kroger Pharmacy has impacted my learning experience and helped me grow the past two years. As a future healthcare professional, patients' lives are in my hands and they will depend on me to give them accurate information with confidence. Working at Kroger Pharmacy has definitely helped me tremendously in terms of enhancing self-confidence and building patient relationships. This internship has truly influenced and reshaped the person I am today and the pharmacist I will become. I hope to use the experience and skills I gain now to make an impact on patients' lives in the future.

Nguyen, Thien

Mentor(s): Dr. Cynthia Corbett, Mrs. Elizabeth Combs, Ms. Pamela Wright

Older Adults' Use and Perceptions of Smart Lighting

Background: According to the United States (US) Census (2018), adults aged 65 or older comprise 16% of the US population, and this number is growing. Adults' abilities to live in their chosen residence as they age has become an important focus in improving older adults' health and age-associated societal costs.

Purpose: To evaluate older adults' use of smart lightbulbs that are voice-activated through virtual home assistants (VHAs; i.e., Amazon Echo devices), and their perceptions of the usefulness and usability of smart lightbulbs.

Methods: A descriptive, mixed method study with a convenience sample of older adults (n=5) recruited from a parent study of participants familiar with using VHAs was completed. Participants received \leq eight smart lightbulbs that were installed in their homes with instructions from the research team. Data was collected weekly from the VHA's mobile app. After eight weeks, the researchers interviewed the participants about their experiences and perceptions of using the smart lightbulbs.

Results: Smart lightbulb use varied depending on the week and time of day (range 37-104 times/week). Most participants used the smart lightbulbs in the early morning/dawn. Most participants rated the usefulness of the smart lightbulbs 8-10 on a 10-point scale (10 = most useful). Reported benefits included: improved safety at night, reduced caregiver burden, more confidence living home alone, and decreased fear of falling. Participants reported some difficulty with the connection between the VHA and the smart lightbulbs.

Discussion/Conclusion: Most participants were able to effectively use the smart lightbulbs with the VHA and had positive perceptions of use, usability, and usefulness. Older adults want to explore technology; however, they need more resources for learning the technology and troubleshooting any issues. Preliminary evidence from this feasibility study suggests that smart lightbulbs and VHAs offer potential to improve older adults' abilities to age in place.

Nguyen, Tien

Mentor(s): Dr. Jason O'Kane

Quantifying the Performance of AquaNav

The underwater domain poses unique challenges for autonomous robots, including strong currents, challenging passageways and changing landscapes. Thus, UofSC robotics research labs implemented AquaNav, an algorithm that performs rapid planning of 3D motions for the Aqua2 hexapod autonomous underwater vehicle. Though the developers have shown through simulations and physical tests that AquaNav appears to be effective, currently there are no quantitative studies for AquaNav's performance. The goal of this project is to create an algorithm that tests the performance of AquaNav. We created an evaluation subsystem, using Python, that communicates with ROS (Robotic Operation System) and Gazebo simulation to perform a continuous distance calculation from robot to the nearest obstacles. The proposed tester results in a distance vs time chart that shows how well AquaNav performs at keeping the robot at least 0.5 meters from obstacles throughout the robot's execution.

Nguyen, Ivy

Mentor(s): Dr. Lorne Hofseth, Dr. Alexander Chumanevich

The Effect of Synthetic Food Dye Allura Red on DNA Damage

Introduction: Since the 1980s, early-onset colorectal cancer (EOCRC) has become a global phenomenon and has quickly increased in incident and mortality rates. It has been noticed and studied that colorectal cancer is linked to chronic inflammation and digestive problems. As a result, we have decided to investigate synthetic food dye additives. These food additives have been increasing over the past few years and consumed by millions of children and young adults worldwide. In this case, Allura Red, [a.k.a. FD&C Red 40; E129] was further investigated due to how vastly popular it is in food products and how past research has indicated that it can target inflammatory and microbial proteins. The purpose of this investigation is the further analyze the food dye Allura red and observe if it can cause DNA damage in the cell and see how it can impact the individual's potential of getting colon inflammation and/or colon cancer.

Methods: The experiment was performed in vitro using HCT 116 cells. The concentration of Allura Red varied between 1-100 uM. The cells were harvested at different times between 0-32 hr. Afterward, an

alkali comet assay, provided by Trevingen, was performed on each cell sample. Hydrogen peroxide treated cells were used as the positive control. After the comet assay, the cells were processed through Comet-score Analysis to quantify the DNA damage.

Results and Conclusion: The results showed the implication that Allura red can cause DNA damage. The damage was not as significant during the smaller range of Allura Red treatment. Between the hours from 12 hours to 32, there is a clear indication of increased DNA damage. Therefore, it can be concluded that Allura Red can cause DNA damage and there it has potential to cause chronic colon inflammation. While the DNA damage is not significant enough to cause colon cancer, this study can further continue to understand the extent of the damage Allura Red can do to the cells.

Nickoley, Jack

Mentor(s): Mrs. Gina Spence

Communication is Key

During the fall semester of my Junior year here at the University of South Carolina, I enrolled in Business Principles of Management (MGMT 371) as a part of my business administration minor. During this course the main focus was professionalism especially through communication, I was pushed from day one to remove filler words clean up my dialect. Through the teachings of Professor Hanley and his strict ridicule of using “um” I quickly found myself growing as a communicator. The following summer I interned for Hexion Chemical Company as a project management intern. Just prior to the start of my internship, a global pandemic struck down on the world, which altered the way business was conducted. Business moved virtual, my project was to call over 1500 of Hexion’s vendors both large and small to discuss changing their payment method to ACH payments as opposed to paper checks. This process was done through phone calls in which clarity proved to be key, language barriers and visual representations were at no help. Through the teachings of Business Principles of Management, especially the book presentation project in which we were required to present formally the topic of our book to a classroom filled with 60 students who were unaware of the book. I was prepared for the communication challenge and knew how to overcome. Throughout MGMT 371 we learned that preparation is key, know and practice what you will say to relieve nerves as well as hiccups in your speech. Another key was to not be afraid to pause, take a step back, think and then proceed. MGMT 371 has me prepared for a career in sales in which every day I will translate the lessons of the course into my professional career. I am very thankful for the experiences gained through Business Principles of Management as well as the teachings of Mr. Hanley.

Nilsson, Alexandra

Mentor(s): Prof. Elise Lewis

Taking Care of the Me in Social Media

Over the course of my junior and senior year at the University of South Carolina, I have worked as the Social Media Coordinator for Curtsy. Curtsy is a fashion-resale App, in which users can both buy and sell the clothes in their closet they no longer want or need, providing a sustainable solution to the fashion-waste problem our nation faces. Before working for Curtsy, I became obsessed with the app, as an avid thrift-shopper who is passionate about sustainable fashion. When I saw the position of “Social Media Coordinator” come up, having already worked as the social media director for my sorority on campus, Chi Omega, I knew I had to apply. As a marketing major, my job at Curtsy continues to provide me with real-world experience in content creation and social media marketing. I manage and oversee the official Curtsy Instagram, creating content daily for the platform that markets and promotes the app to new users, as well as content that creates a conversation surrounding sustainability. I also started up our platform on TikTok, using the increasingly popular app as another marketing tool for the company. As the social media coordinator I also managed our influencers and college ambassadors, having to find a way to keep them engaged amidst the ongoing pandemic. Most recently, I have taken over email marketing as

well, sending out weekly emails to our users promoting weekly sales, and fostering the Curtsy Community. Working with Curtsy over the past year and a half has combined my love for sustainable fashion with the creative marketing skills I have learned throughout my time as a student in Darla Moore. It has reaffirmed my choice to pursue social media marketing as a career, as well given me an outlet to work professionally in a field I am passionate about. As I graduate, I hope to continue working with Curtsy in San Francisco under the new Vice President of Marketing, in hopes to one day earn that title myself.

Nix, Sara

Co-Author(s): Zoe Screwvala

Mentor(s): Dr. Lori Ziolkowski

Assessing environmental and societal impact and future implications of glacial lake outburst floods in Exploradores Valley

This honors thesis project addresses the impact of glacial lake floods across the Andes through a case study on Exploradores Valley in Chile. With this assessment we aim to provide insight into the social, physical, and environmental changes in the aftermath of a GLOF. Through integrating previous knowledge of glacial lakes assessment in the Andes region, this project has the potential to advance current understanding of GLOF implications for other sensitive regions. Utilizing survey data from tourists in the region, analyzing visual damage to infrastructure, interviews with local guides, and the existing literature this project aims to comprehensively explore the GLOF impacts and provide information in light of intensifying natural disasters and environmental conditions.

Noneman, Matthew

Mentor(s): Dr. Kandy Velazquez

Effects of Ojeok-san on IL-10 knockout and Mdr1a knockout induced colitis

The herbal formula, Ojeok-San, as a natural therapeutic for inflammatory bowel diseases
Matthew Noneman, Patrice Cunningham, Gustavo Martinez Muniz, Nour Shams, Yvone Shametaj, Kandy T. Velazquez

Department of Pathology, Microbiology & Immunology, University of South Carolina – School of Medicine, SC, USA

Inflammatory bowel diseases (IBD) have become more prevalent in children and adults world-wide. Both Crohn's disease and ulcerative colitis (UC) are associated with relapsing and remitting symptoms including diarrhea, fatigue, bleeding ulcers, and pain. The cost of care of IBD is around 4 billion dollars annually due to the specific therapeutics and workplace productivity losses. Therefore, strategies to deliver cost-effective care for the prevention and/or treatment of visceral pain are of great importance. As more patients are utilizing natural supplements to ameliorate pain, we sought to investigate the use of an oriental herbal formula used in Asian countries for a variety of conditions including pain, gastrointestinal problems, and depression. Ojeok-san (OJS) consists of seventeen medicinal herbs, which have been shown to possess anti-inflammatory, immunoregulatory, and analgesic properties. In this project we utilized two genetic models of IBD: IL-10 knockout (IL-10 KO) mice and Mdr1a knockout (Mdr1a KO) mice. The IL-10 KO model results in chronic inflammation due to the expansion of Th1 and Th17 cells and poor function of Treg cells. On the other hand, the Mdr1a KO model promotes T-cell hyper-reactivity due to a defect in epithelial barrier function. Both of these models are commonly used in IBD due to the slow development of spontaneous chronic colitis (2-3 months of age) and their similarities with human IBD. In this study, we measured body weight, food consumption, and water intake. Conditioned place avoidance and spatial place preference were used to assess motivational components of pain and pain relief. We hypothesized that mice treated with OJS would exhibit decreased visceral pain and disease severity.

Nonnemacher, Madeline

Mentor(s): Mr. Jay Pou

Integrative Learning in an Electronic Environment: What a Virtual Internship with a Commercial Bank Taught Me About Leadership

The summer following my Junior year, I had my first internship that was directly connected to my intended future career path within the field of Finance. I was offered a position in the Commercial & Credit Leadership Program with Fifth Third Bank. This internship would potentially lead to a two-year rotational program through Fifth Third's commercial bank in Charlotte, NC. Fifth Third is the 14th largest national bank in the United States and was exactly the place that I wanted to be begin my career.

When the Coronavirus pandemic hit the United States in early April, I received news that my internship would be conducted completely remote. Although disappointed at first, my virtual experience exceeded all of my expectations in terms of interactivity. I was put in a rigorous, fast-paced training program throughout the ten-weeks and my pre-existing financial knowledge from classes in DMSB helped more than I ever anticipated. It was very rewarding to know that I had retained so much useful information from classes that I could actually apply that knowledge to real-world situations.

Aside from tasks I had for my direct team, I had the opportunity to network with over fifty people throughout the summer in a variety of areas of the bank. I was shocked at how welcoming everyone was to the idea of a phone call with a virtual intern, and networking turned out to be one of the most beneficial parts of the internship as I got a closer look into other potential career paths.

Following my internship, I received a full-time offer into Fifth Third's Commercial & Credit Leadership Program and did not hesitate to accept. Since the conclusion of my internship, I have taken several upper-level Finance classes at UofSC that have all connected to topics I learned during my internship. Seeing the connection between what I have learned inside the classroom to what I have learned outside the classroom is incredibly enriching. I cannot wait to continue on with my journey at Fifth Third.

O'Connell, Devin

Mentor(s): Ms. Maegan Gudridge

Growing Leadership in Different Capacities

In EDEL 471 I interned in a 5th grade reading classroom two days a week. I taught reading to 5 different 5th grade classrooms. I took over the teaching responsibilities for most of the semester, including two full weeks where I spent every day at school. I grew in my both my leadership and organizational skills. In my beyond the classroom experience I was the Vice President of Event Planning for Alpha Gamma Delta from November of 2019 to November 2020. I planned and executed around 8 events per semester, including social and special events. I also worked closely with the rest of the executive council team and attended weekly meetings and roundtables. My term also had additional special challenges due to Covid this year.

At first these two experiences don't seem to have anything in common. However, in both experiences I learned valuable organizational and leadership skills. I noticed that the strategies and skills I was learning in my internship are the same ones that was using and learning in my experience as VP Event Planning.

My presentation will go over these two different experiences, the insights I gained on leadership, and how it helped shape me in a professional and personal way.

O'Connor, Meaghan

Mentor(s): Dr. Joseph McQuail

Similar Working Memory and Stress Response in Male and Female Rats

The prefrontal cortex (PFC) is essential for top-down control of cognition as well as the coordination of

behavioral and hormonal response during stressful experiences. Cognitive and neuroendocrine differences are evident in stress-related neuropsychiatric mood disorders, such as depression and anxiety, as well as in aging and Alzheimer's disease. Clinical and epidemiological data indicate that women are disproportionately impacted by mood disorders and age-related cognitive decline, but comparatively little is known about essential sex-differences in PFC-dependent behaviors, such as working memory, or its role in coordinating behavioral and physiological responses to stress. The goal of the present study was to perform a comprehensive characterization of PFC-dependent functions in adult male and female F344 rats and to determine the biological basis for any potential sex differences. We first evaluated working memory abilities in males and females using the operant delayed-match-to-sample task where we observed no significant difference in acquisition or baseline performance, although females had a consistent numerical advantage (86% correct in females versus 83% correct in males) over males. In a subset of females, we inferred estrus phase by vaginal cytology and determined that working memory accuracy was similar across the estrus cycle. Next, we challenged males and females with 60 minutes of physical restraint, a potent and ethologically relevant stressor, and collected blood from tail vein to measure stress hormone secretion. While pre- and peak-stress responses were similar between males and females, females showed a marginally reduced rate of recovery after stress. Finally, males and females were evaluated for active and passive behaviors in the forced swim test. In summary, our findings indicate that males and females exhibit generally similar cognitive, physiological, and coping responses that depend upon the integrity of the prefrontal cortex. This suggests that sex alone is not the primary biological determinant that contributes to worse phenotypic outcomes in neuropsychiatric or age-related disorders. Rather, biological sex may comprise a risk factor that interacts with others (history of stress exposure, age-related changes) to produce apparent sex differences noted in particular clinical contexts (i.e., depression, Alzheimer's) and future work from our group will explore such interactions.

O'Looney, Caroline

Mentor(s): Mrs. Sarah Matthews, Prof. David DeWeil

The Impact of GLD

This past fall, I became the marketing and communications intern for the Center of Integrative and Experiential Learning (CIEL). To complete my tasks, I had to fully comprehend the Graduation with Leadership Distinction (GLD) process and the "why" behind pursuing this honor. The overwhelming consensus was that the GLD process allowed college students to look back on their education and connect the dots with how formal education blended with out of the classroom activities, whether it be through an internship, service work, traveling abroad, or anything between. Learning about others' impactful experiences inspired me to pursue GLD.

I am pursuing the Professional and Civic Engagement pathway, which meant reflecting upon my experiences and connecting them to concepts I've learned in the classroom. In my Journalism 332: Mass Communications Research class, I learned how to properly conduct a survey, which aided me as the Director of Social Events for my sorority. During my term, knowing how to craft a survey allowed me to gain input from the chapter. I learned a lot of the formal concepts that I had experienced in my internship with Atlanta Fashion Week in Retail 268: Principles of Fashion Merchandising. This knowledge has allowed me to become a more knowledgeable consumer and intern for Atlanta Fashion Week. My third key insight connected my coursework from Journalism 534: Magazine Publication and Design with my CIEL internship. In this role, I create marketing materials that advertise the services offered, as well as create the annual report, Distinction, which is created on InDesign. In my 534 class, I learned about InDesign, as well as magazine layout concepts.

The process has been more challenging than expected, but more rewarding than I could have imagined. I would not have pursued GLD if not for my internship with CIEL, and being exposed to the overwhelming impact it has made on college student's lives. Now I am proud to say it has impacted me, not only from the internship experience, but also the ability to reflect and articulate what I have truly learned from my time

here at the University of South Carolina.

O'Neil, Darian

Mentor(s): Dr. Faye Riley

Godfrey's Light

Over the winter break and continuing on into the spring semester, I directed a short film entitled "Godfrey's Light" alongside several other UofSC filmmakers. As an aspiring screenwriter/film director, this was an ideal opportunity to gain valuable experience working with a crew to tell a cinematic story and to better understand the ins and outs of film production. My job as director was to oversee all creative aspects of the film such as the script, the camera angles and shot choices, the stylistic editing, and to be in charge on set. "Godfrey's Light" is a dystopian sci-fi film that takes place inside a convenience store on the night of the televised execution of a convicted killer. The protagonist is Zoey, a young woman who works at the gas station alongside her father, who realizes she has a unique similarity to the killer. This film tackles some important social issues such as injustice and the ethics of capital punishment, while also invoking a feeling of empathy from the audience. The process of making this film took months from pre-production to post-production. Dr. Faye Riley served as a mentor and supervisor as a part of the Magellan scholar application. Then, a casting call was posted online to secure local actors. Principle photography lasted four days in December and post-production followed in the following months. Submission to film festivals is currently pending. The aim of this project is to effectively convey a social message through a short narrative film that borrows characteristics from the film noir genre. Through participating in this project, I have learned much more about the filmmaking process and it has shown me the composure needed to be an effective leader. My hope is that the film will leave audiences with a sense of introspection about the interconnectedness of humanity and if having "empathy for evil" is possible.

O'Toole, Hannah

Mentor(s): Mr. Jerome Scott

Exploring in understanding the behind the scenes of Student Body President office

Every year during the end of February and first week of March soon government elections take over our campus. But after the dust settles and winners are announced there is an overhaul of the organization and a new redistribution of power. These new leaders are tasked with maintaining order while also taking the organization in their own direction.

This past year I had the pleasure of serving as chief of staff the student body president. I've spent the last 365 days working behind the scenes to effectively run student government and advocate for students. The job essentially took over my life and gave me access to University administrators and students that I never otherwise would have crossed paths with.

This presentation will give an overview of what the inner-workings of student government is like the countless moving pieces that go into day-to-day activities and have groups of students continue to push our university in the right direction.

Okinaga, Adam

Mentor(s): Dr. Jennifer Grier

CRISPR-CAS9 Mediated Knockdown of Interferon Induced Protein 35 (IFI35) in a Human Lung Epithelial Cell Line for Investigation of the Respiratory Antiviral Response

Following viral infection of human cells, a class of hundreds of different genes called interferon stimulated genes (ISGs) are expressed and are essential to initial antiviral immune response. Unfortunately, the

functions of many ISGs remain unclear. The gene IFI35 is a noteworthy and poorly understood ISG that is consistently upregulated during infection by Respiratory Syncytial Virus (RSV) and SARS-CoV-2. IFI35 has also been shown to be expressed following exposure to lipopolysaccharide (LPS), a prevalent molecular signal produced by bacteria such as *Acinetobacter baumannii*. This bacteria is known for its strong antibiotic resistance, and has been found in hospital settings where it can cause both primary infection in lung cells, and secondary infections that can lead to ailments such as ventilator associated pneumonia after COVID-19. Using CRISPR-Cas9-mediated mutation, we sought to knock out (KO) IFI35 in lung cells in order to later study the effects that the gene has in primary viral infection, and primary and secondary bacterial infection. Guide RNA targets that targeted IFI35 were cloned into CRISPR-Cas9 vectors and then transfected into A549 human epithelial lung cells. Successfully transfected A549 cells were selected for, and single cell clone lines were produced. These clonal cell lines were confirmed through a Western Blot protein assay for the expression of IFI35, as well as genomic DNA sequencing that confirmed the specific mutations of the gene. Along with an IFI35 CRISPR-Cas9 control cell line, these assays identified two successful creation of IFI35 KO cell lines in A549 cells, something which has never been done before. The use of these IFI35 KO clones will later help elucidate the role of IFI35 in primary and secondary respiratory infections. The data produced from these future studies will be important given the prevalence of RSV and COVID-19, and the potential severity of hospital-acquired *A. baumannii* pneumonia.

Olson, Melissa

Mentor(s): Dr. Denise Wellman

The Perpetual Creation of Our Desired Self Through Resilience, Confidence, and Connection

Throughout my years in college, I have grown immensely as a person, a student, and an employee. In my portfolio, you will learn about some of the specific and most meaningful experiences I encountered during my time at Carolina through the professional and civic engagement GLD pathway. I was able to harness my previously introductory-level skills in communication, discipline, and teamwork to use them effectively and confidently in order to obtain jobs, connect and grow relationships with professors and mentors, as well as meet other open-minded individuals who helped me get through the adventure that is university life. I found that surrounding myself with individuals from various backgrounds is necessary to my own growth, happiness, and ability to have an open mind. Therefore, I have and will intentionally continue to reach out to new people, make connections with them and learn about their own process of getting to where they are today. Throughout my learning, I realized letting go of certain expectations and, instead, being present in every moment has allowed me to reach out to new people more effectively, ask important questions, and connect with individuals I may not have had the chance to with a close-minded outlook. A lesson that brought this point of view to my realization was my study abroad experience this past spring where I worked incredibly hard to be able to study in Florence, Italy, for the semester just for the program to be canceled after 5 weeks due to the rapid spread of a new pandemic, COVID-19. Although my plethora of experiences during college have taught me innumerable lessons, the most impactful learning I gained was how to reach your goals by consistently being resilient and adaptable in every situation throughout life as well as the importance of appreciating all that you do have in this moment. In the future, I hope to inspire and encourage others to do the same by confidently being a lifelong learner and continuing to live my life through this transformed perspective.

Ouyang, Emily

Mentor(s): Dr. Casey Giraudy

Patience Benefits Effective Communication

Throughout the last four years at the University of South Carolina, I have been fortunate enough to gain several meaningful and memorable experiences that helped me grow individually and professionally. In all of these experiences, I discovered that patience plays a significant role in benefitting effective com-

munication. As an individual who is pursuing graduation with leadership distinction in Professional and Civic Engagement, I was given the opportunity to reflect on my time in college. I recognize the role that patience has played in personal, team, leadership, and professional settings that allow me to see past surface-level interactions and understand other points of view. On-campus, I served as President of Preston Ambassadors in my living and learning community, Preston Residential College, a University 101 Peer Leader, and Membership Director of my service sorority, Omega Phi Alpha. Each of these taught me about the importance of patience in developing my skills as a student leader and teacher. In addition to these experiences, I began working at Lexington Medical Center as a medical scribe at the start of my senior year and was able to see how patience plays a significant role in healthcare. As an aspiring physician, I was given the first-hand experience of viewing how patience functions to help all the moving parts of the hospital run smoothly, and also how it benefits the patient experience as it allows patients to be more comfortable with asking questions and giving them a chance to fully understand their diagnosis and treatments. In this presentation, I will identify how exercising patience helped me take a step back to think critically on the different ways that I could serve myself and others as a good friend, leader, and teacher while also demonstrating how this lesson applies to my future profession in healthcare.

Padula, Sara

Co-Author(s): Mary Pelton

Mentor(s): Dr. Nathan Senner

Estimation of population size and habitat-use of the Red Knot (*Calidris canutus rufa*) in Seabrook and Kiawah Island, South Carolina

The rufa red knot is a long distance migratory shore bird that breeds in the central Canadian Arctic and spends its winters anywhere between the Gulf Coasts of the United States and Tierra del Fuego. During their spring migration, rufa red knots rely on a number of food-abundant areas along the Atlantic coast to rest and refuel. Unfortunately, along their journey there are a myriad of man-made threats impacting these important stopover sites -- such as coastal development and reduced food availability -- resulting in a drastic decline in the red knot population in recent years. As of 2014, they were listed as endangered in Canada and threatened in the United States. One of the biggest hindrances for red knots and other migratory birds is consuming enough food at each stopover site to get them to the next stop on their journey. Thus far, researchers have concluded that one of the major red knot stopover sites -- Delaware Bay -- provides less and less of a major food source for red knots -- horseshoe crab eggs -- every year. Their inability to refuel could prevent them from completing their migrations successfully. However, most research has focused on only this one area, and in order for conservationists to effectively protect this vulnerable population, they must have accurate data from every stopover site along their migratory path. Recent estimates suggest that upwards of 4,000-8,000 red knots gather on the Kiawah-Seabrook complex in South Carolina. In our study, we aimed to estimate the rufa red knot population size and determine what percentage of that population utilize the study site. We did so by performing weekly resighting of flagged and unflagged red knots on the islands and creating capture histories for the flagged individuals using bandedbirds.org. We are currently still collecting data, but, so far, we cannot dispute the importance of this habitat for the rufa red knots.

Pandala, Niharika

Mentor(s): Prof. Homayoun Valafar

A Preliminary Investigation in the Molecular Basis of Host Shutoff Mechanism in SARS-CoV

Recent events leading to the worldwide pandemic of COVID-19 have demonstrated the effective use of genomic sequencing technologies to establish the genetic sequence of this virus. In contrast, the COVID-19 pandemic has demonstrated the absence of computational approaches to understand the molecular basis of this infection rapidly. Here we present an integrated approach to the study of the nsp1 protein in SARS-

CoV-1, which plays an essential role in maintaining the expression of viral proteins and further disabling the host protein expression, also known as the host shutoff mechanism. We present three independent methods of evaluating two potential binding sites speculated to participate in host shutoff by nsp1. We have combined results from computed models of nsp1, with deep mining of all existing protein structures (using PDBMine), and binding site recognition (using mSTALI) to examine the two sites consisting of residues 55--59 and 73--80. Based on our preliminary results, we conclude that the residues 73--80 appear as the regions that facilitate the critical initial steps in the function of nsp1. Given the 90% sequence identity between nsp1 from SARS-CoV-1 and SARS-CoV-2, we conjecture the same critical initiation step in the function of SARS-CoV-2 nsp1.

Parise, Sarayu

Mentor(s): Dr. Jeff Twiss, Ms. Courtney Buchanan

Role of FXR1 and FMRP RNA binding proteins in axon growth

Axons provide long-range neural connections needed to propagate action potentials to, from, and within the nervous system. When these connections are disrupted by injury, the neuron must again extend its axon to reinnervate the target site. Proteins synthesized within axons have been shown to support developmental and regenerative axon growth. mRNA encoding growth promoting proteins are actively transported into axons by RNA binding proteins (RBPs) that gather mRNAs and shuttle them into axons as cargo via kinesin motors. Strict specificity and regulation of RBPs and their target mRNAs allows for both spatial and temporal regulation of axonal protein synthesis. FXR1 (fragile X mental retardation 1) and FMRP (fragile x mental retardation protein) are RBPs found in the mature axons of central nervous system (CNS) neurons (Akins et al., 2012 & 2017). Our lab has used a targeted proteomics analysis to profile axonal RBPs. that levels of FXR1 increased significantly by 7 days and remained elevated for up to 28 days after sciatic nerve crush injury in the adult rat peripheral nervous system (PNS). This period of elevation corresponds to initiation of axon regrowth to reinnervation of target tissues. This extended increase raises the possibility that FXR1 contributes to nerve regeneration. FMRP is a structural homolog of and forms complexes with FXR1. Though FMRP been extensively studied in dendrites where it contributes to post-synaptic plasticity, FMRP also localizes to peripheral nerve axons and its function there remains undetermined. I hypothesize that these Fragile X family proteins play a role in axon regeneration. To test this possibility, I used RNA interference (RNAi) strategies to knock down FMRP and FXR1 in cultured mouse dorsal root ganglia (DRG) neurons to test for potential effects on axonal outgrowth in culture as well as if the two proteins interact in PNS axons. We were able to confirm successful knockdown of FMRP and FXR1 using droplet digital PCR (ddPCR) and Western Blotting techniques. These studies are now being advanced to determine how loss of FXR1 and FMRP affects sensory axon growth, axon branching, and neuronal function.

Parker, Ajhia

Mentor(s): Prof. Jay Pou

The Need for Equity in the Classroom

I have had the opportunity to work along-side teachers in the public-school system for two years now. I have been in the College of Education internship program from Spring 2020 until Spring 2021. During this time, I have worked at two different elementary schools and have been able to work closely with second, third, and fourth grade. I have created and taught structured lesson plans for differentiated learners, attended professional development meetings, and reflected on classroom experiences that will help shape my teaching in the near future. My internship has been nothing but informational as I have experienced many unforeseeable circumstances, including the transition to virtual schooling. I have tuned into the need of equity in the classroom and that is why my mission as a future educator is to provide a safe and inclusive classroom environment for all students no matter their background or ability. Come to my pre-156

sentation to learn about my takeaways on topics like the importance of emphasizing cultural differences, community building, and the use of technology in the classroom. All of these elements can help improve equity overall in the public school system.

Paskalides, Grace

Mentor(s): Dr. Kelly Goldberg

Australopithecus Anamensis Species of Hominids

I am studying the Australopithecus Anamensis species of hominids. Looking at previous ancestors of homosepians gives insight on our history of human evolution. It sheds light on the range of behaviours both lost and gained due to natural selection. Using educational sources found both within and out of my anthropology 161 class room I will delve into the specifics of this species. I plan to highlight their individual behavioral characteristics, linguistic abilities as well as the social organization of the species. I will further look into contextual topics such as eating habits, shelter, and geographical location. Based on the fact that the Australopithecus Anamensis species is one of the earliest found in the genus of Australopithecus, I predicted that they were going to be more ape-like than human-like. While in certain areas this is true such as the fact that they are arboreal, my research uncovers that this species is more human-like than expected, displayed in their bipedal locomotion. This review of Australopithecus Anamensis indicates which of our traits were beneficial at the time and why. To extend this idea further, it helps paint the picture of why humans have developed certain behaviors in the past which ultimately shaped the society of the world today.

Patacsil, Courtney

Mentor(s): Dr. Kelly Goldberg

P. robustus: Who they were and how they relate to us.

Where did we come from? This question has plagued humans for as long as oral tradition has existed. We have crafted explanations from gods and goddesses to natural forces to evolution. It is in evolution that most humans believe the answers to our unique existence lie. Habitat and dietary needs are two of the most important influences morphological changes in evolution. Paranthropus robustus is a close evolutionary ancestor to Homo sapiens. This project will create an online museum exhibit on P. robustus used extensive preexisting research. The analysis of the data will shed some light on how humans evolved to be the way they are today.

Patel, Khushi

Mentor(s): Dr. Cynthia Corbett, Ms. Elizabeth Combs

Perceptions of COVID-19 and the Use of Health Information Technology among People who are Uninsured

Background: The novel coronavirus has claimed nearly 2.5 million lives globally and 475,000 lives in the United States as of mid-February 2021. Vulnerable populations, including low income and those who lack health insurance, are often more seriously affected due to risk factors such as health literacy. People with such socioeconomic disparities may lack knowledge of appropriate infection precautions [1] and/or have reduced access to care when ill [2]. Objectives: The objectives of this research were to explore: (1) participant experiences regarding COVID-19, including their knowledge of disease symptoms and risk factors, and (2) participant perceptions concerning a healthcare app designed to monitor the physical and mental health symptoms of COVID-19, associated safety concerns, and to facilitate community resource access for these symptoms and safety concerns. Methods: A prospective survey study was conducted with a convenience sample of uninsured adults seeking care at a free clinic. Respondents were queried about their awareness of COVID-19, their current technology use, and their knowledge in using technology to

aid their health regarding COVID-19. The surveys were available for all patients at the clinic to complete. Respondents placed de-identified surveys in a response box, where they were collected by the research team every three days. Survey response data were analyzed using descriptive statistics (e.g., frequencies, means). Results: Respondents (n=122) were 51.6% male, primarily Black (56.6%), and had a mean age of 48.9 years (range 19-72). Most respondents (73.2%) did not think they were at risk for COVID-19. Respondents' knowledge of the COVID-19 symptoms aligned well with CDC reports of the most common symptoms (97.2%) and aligned fairly well with CDC-published longer-term COVID-19 symptoms (73.7%). Most respondents (74.6%) reported interest in using the mHealth app to gain additional information regarding COVID-19 and available community resources. Implications and conclusions will be further discussed in the presentation.

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Patel, Maitri

Mentor(s): Ms. Tiffany Conde

My Perspective: The Role of Practical Experience and Research in Computer Engineering

In the summer of 2019, I transferred to University of South Carolina Columbia (UofSC) from one of the UofSC regional campuses. I got a job at University of South Carolina – Columbia, Palmetto College (UofSC-PC). I wanted to explore the different paths a computer engineering degree has to offer, especially computer networking. Before I started working at UofSC I was introduced to computer networkers at my previous job programming and installing Cisco switches, which are used to connect multiple devices on the same network within a campus. After I started working with UofSC-PC I was offered the chance to implement a Windows Deployment Server (WDS), which would help network administrators deploy Windows operating systems remotely. It was a great opportunity for me to learn a totally different side of computer networking which I was not exposed to yet. I approached the project by spending a few days I spent few days on researching and used the trial-and-error method to achieve my goals. In the computer engineering field, research plays a vital role, since technology keeps evolving and we have to keep ourselves updated before we start working on a new project. Before the on the WDS project, I only knew the hardware side of networking, and working on it I experienced software side of it. After completing the project, I was asked to help to implement WDS server for other regional Palmetto campuses. Successfully gaining both hardware and software experience with computer networking, it still left me curious to learn more, so I applied for a Networking Assurance internship with Verizon. My previous experience helped me get the internship. With all the diverse experiences I have gained within and beyond the classroom, I am able to refine my perspectives and views on my degree.

Patel, Kena

Mentor(s): Mr. Matthew Childs

Navigating COVID through Marketing at J&J

During the spring semester of 2020, I worked at Johnson & Johnson as a Brand Management Co-Op for the Oral Care Squad, specifically Listerine. A co-op is a full-time internship during the school semester. J&J is a company of strong marketers with the ability to make their consumers feel truly connected with their brands. As a marketing major at the University of South Carolina, Darla Moore School of Business, my

internship pushed me to have the best first-hand experience of brand management, product marketing, and brand marketing. I had the opportunity to touch many aspects of the business, like social media and communications, campaign launch, agency management, data analysis, e-commerce, and revamping both the Listerine Professional website as well as the Listerine Consumer Website. The Listerine Professional website specializes in educating Health Care Professionals on the different products in the Listerine portfolio as well as the ingredients and benefits in each to drive product recommendations. With COVID-19's emergence, my Co-Op shifted to remote halfway through and the business priorities shifted. I went from working on go-to-market strategy for new product innovation to social media awareness and communication. My Co-Op truly taught me to be agile in the professional world and reaffirmed my decision to pursue a career in Marketing. I was able to utilize many of the skills I learned and the projects I worked on to then apply it to the concepts in my classes here at UofSC. Through this experience, I hope to pursue a full-time career in Brand, Product, or Project management with a CPG company post-grad.

Patterson, Caroline - Co-Author(s): Patricia Davis, , , - Mentor(s): Dr. Kelly Goldberg, , , , -- Anthropological Research on Homo heidelbergensis -- Throughout history, a single question has guided much of our existence, from moral philosophy to biology to religion to space exploration: what does it mean to be human? This fundamental question can be examined through an anthropological lens by reflecting upon the ancestral hominids and how they relate to and differ from homo sapiens. One such ancestral species, the homo heidelbergensis, provides unique insight into our evolution and how we differ from other hominids, due to its position as the ancestral species of both homo sapiens and homo neanderthalensis. Through researching significant fossil finds and analyses conducted by biological anthropologists, the physical morphology and behaviors of homo heidelbergensis can be better understood in relation to homo sapiens in the modern day.

Patton, Emma

Mentor(s): Dr. Kandy Velazquez

The Effects of Ojeok-san on pain-like-behaviors in a mouse model of colitis

Colitis is an inflammatory bowel disease (IBD) characterized by inflammation of the colorectum. An estimated 3.1 million U.S adult have been diagnosed with IBD since 2015. Due to the extensive and long-lasting inflammation, patients suffering from IBD often experience common side effects of diarrhea, weight loss, rectal bleeding, and pain. Anti-inflammatory treatments are often used to decrease the symptoms of IBD but have little effect on the visceral pain (VP) experienced by the patient. The medicinal herbal formula Ojeok-san is commonly used in Asian countries due to its anti-inflammatory effects and analgesic properties. The anti-inflammatory effects of Ojeok-san have been linked to decrease in TNF α . Therefore, we sought to investigate the relationship between Ojeok-san and macrophage derived TNF α in an acute pre-clinical model of colitis. For this we used TNF flox/flox mice (control) and TNF alpha flox/flox-LyzMcre mice (mice that lack TNF alpha in myeloid cells). Colitis was induced through ingestion of dextran sulfate sodium (DSS, 2%) in the drinking water over the course of one week. Ojeok-san (2g/kg) was given via oral gavage for one week starting at day three of DSS administration. Body weight, food consumption, water intake, and disease activity were monitored daily. Referred somatic hyperalgesia (RSH) was assessed using von Frey filaments prior and post Ojeok-san treatment. Upon euthanasia, blood, colorectum, and dorsal root ganglia were collected and storage for further analysis. Complete blood panel analysis, disease progression, and gene expression for markers of inflammation and pain were assessed. Histological scoring system for chemically-induced colonic inflammation was achieved based on hematoxylin eosin and Alcian blue staining. Overall, no significant changes were observed in inflammatory cell infiltrate, intestinal architecture, and genes related with colitis (NOD2, TLR4, IL6) between TNF flox/flox and TNF alpha flox/flox-LyzMcre colitis mice treated with vehicle or Ojeok-san. However, Ojeok-san was able to ameliorate RSH independent of colitis. IL-4, MAPK6, CALCR, and OPRK were among the pain markers modulated in our study. Further studies will need to be conducted to determine the mechanism by which

Ojeok-san decrease RSH.

Peck, Brynn

Mentor(s): Mr. Timothy Lewis

Service Learning: Charity, Change, and Leadership Development

During my freshman year at USC, I decided to join a club on campus called Cocky's Canine PAALS. In an attempt to meet new people and get involved at school, I discovered one of my true passions. Having always been aware of challenges people with disabilities faced, I had never really been exposed to this firsthand or seen some of the work that is being done to make these peoples' lives easier. After being exposed to the life changing work that takes place inside of Palmetto Animal Assisted Life Services (PAALS), a Columbia nonprofit that trains service dogs and provides animal assisted intervention programs, my eyes were opened to just how much we can do to make a regular day a little easier for those with disabilities. Volunteering with Cocky's Canines allowed me to help with training and animal care duties at PAALS and also help with fundraising. Now the President of this organization and having given over 800 hours of service, I have come to understand the boundless impact that service dogs have in the lives they are placed with. I spent weekdays at the facility assisting in training exercises and weekends fostering some of these PAALS students. Each year, PAALS hosts an annual graduation for their service dog students and their new handlers to receive their diploma and talk about how their life has changed since receiving their PAALS dog. I have found that the countless hours of training have brought these people a newfound freedom they never imagined possible. They are once again able to immerse themselves in public places, run errands all on their own, retrieve dropped objects, do their laundry, return to work, or even just turn on the lights or open their doors. After four years of service and time I can't imagine spending any other way, I was exposed to the world of disabilities and the unique challenges that come with each, but more importantly, the life changing impacts our everyday companions can make in these situations.

Peddemors, Dylan

Mentor(s): Dr. Kelly Goldberg

What *Ardipithecus Ramidus* teaches us about ourselves

As humankind has become more socialized and moved away from its most primitive nature, it's difficult to know how we would act in our most natural state. However, by analyzing and unveiling the mysterious history of our evolutionary ancestors, we can uncover clues as to what it means to be human. How deeply rooted are our perceptions of culture and organization based in our intrinsic tendencies? By studying the physical and social attributes of *Ardipithecus Ramidus*, an ancient evolutionary ancestor of *Homo Sapiens*, we can see what fundamental characteristics we have retained throughout millions of years of evolution (you might be surprised how many there actually are).

Pelton, Mary

Mentor(s): Dr. Joshua Stone

***C. sowerbii* and the influence of feeding frequency on reproduction**

Craspedacusta sowerbii is a non-native, freshwater jellyfish found throughout large lakes, ponds, and quarries of the United States. In order to better understand the response of *C. sowerbii* populations to changing environmental conditions, this project observes the effects of varied feeding frequency on the asexual reproduction of *C. sowerbii*, beginning with a known number of polyps and tracking their reproduction over time. I also document potential triggers for changes in type of asexual reproduction to better characterize their life cycle. My project accompanies the ongoing research projects of my faculty mentor and will therefore enhance the knowledge of *C. sowerbii*. This research provides insight into the predicted increase in populations of a globally-distributed non-native species in response to warming global condi-

tions.

Peraino, Nicholas

Mentor(s): Dr. Andrew Gross, Dr. Austin Downey

Identification of objects with passively sensing artificial seaweed

As a mechanical engineer involved with other research projects, I was looking for the opportunity to refine my electrical and manufacturing skills all the while gaining knowledge about data collection, coding, and programming. After talking with one of my professors, he referred me to Dr. Gross who, at the time, had a slew of projects that he needed assistance with. I selected a smart sensor project, and Dr. Gross, Dr. Downey, and myself formed a new team. The two of them had a vision to develop a passive underwater sensor that would mimic seaweed. Through reading about sensor principles and electrical instrumentation online, as well as watching YouTube videos about light sensors, I began to wrap my head around my mentors' vision. I applied for a Magellan Scholar Research Grant and wrote a proposal and literature review that both won me the grant and facilitated my knowledge in sensors. Through additive manufacturing techniques, data collection methods, and statistical analyses, a final sensor was delivered whose idea can be used to further develop an array of passive sensors that has scientific and defense applications. This project is monumental in my professional development, as it provided me an opportunity to tackle an entire research and development problem by myself, along with the help of my mentors. Through failure and triumph, COVID-19 setbacks and grant extensions, this project has been instrumental in bettering my understanding of the breadth of the mechanical engineering field, and has provided me some pivotal bits of knowledge that will impact my future career endeavors.

Perin, Darcy

Mentor(s): Dr. Annie Bourbonnais

Constraining denitrification from dissolved N₂/Ar measurements in the Eastern Tropical North Pacific Ocean

Dissolved gases (N₂/O₂/Ar) are used as tracers for primary productivity and respiration processes throughout marine and freshwater environments. More specifically, N₂/Ar is a tracer of N removal occurring through denitrification and anammox. Denitrification is the sequential conversion of bioavailable nitrogen to N₂ gas and anammox is the oxidation of ammonium and nitrite to N₂ gas. Both processes are restricted to low-O₂ or anoxic waters. Nitrogen is an essential macronutrient limiting phytoplankton growth in most of the ocean, thus the balance between nitrogen inputs and sinks directly impact marine primary productivity. Most of the nitrogen is lost in three major Oxygen Deficient Zones (ODZ)s located in the eastern north and south Pacific Ocean as well as the Indian Ocean and Bay of Bengal. ODZs are currently expanding and play a central role in regulating the global ocean's nitrogen budget. We measured N₂/Ar and O₂/Ar ratios by membrane inlet mass spectrometry (MIMS) at 7 stations in the Eastern Tropical North Pacific, within the ODZ in December 2020 as a part of a research expedition (SR2011). We calculated biogenic N from our N₂/Ar measurements, which represents the net N₂ added by denitrifying microbes in ODZ waters. Biogenic N peaked at the top of the ODZ (200-400 m depth) to up to about 15 μmol L⁻¹ and matched nitrogen deficit calculated from nutrient concentrations. We will discuss the causes of observed differences between stations. Our results will also be used to calibrate a new gas tension device deployed on autonomous floats in the ODZ, which will allow us to obtain denitrification rates.

Perryman, Morgan

Mentor(s): Dr. Linda Shimizu

Synthesis of BODIPY Tag and Attachment to a Triple-Negative Breast Cancer Drug Under Development

Triple-negative breast cancer (TNBC) has the lowest survival rate of any type of breast cancer and is more likely to affect younger women. LY6K is a membrane protein only found in cancerous and male testis cells. This protein is overexpressed in 80% of TNBC cases which makes targeting LY6K a viable treatment option for TNBC. The drug under development, NIHB, was found to bind to LY6K by the National Institute of Health using Plasmon Resonance assay. When exposed to cancerous cells, NIHB inhibits tumor growth and is cytotoxic. Several synthesis schemes were investigated to synthesize the parent drug and optimize the yield. In addition to synthesis, methods to purify the parent drug were evaluated to afford >99% for our collaborators at F. Edward Herbert School of Medicine in Bethesda, MD to use for invitro testing. Current work focuses on tagging the drug with fluorophores and biotin labels with the goal of using these compounds to probe the mechanism of action. To attach these tags, a conjugate of NIHB was derived which included the addition a nitro group as a reactive group to which a tag can be attached. Specifically, boron dipyrromethene, BODIPY, a small, highly fluorescent compound was chosen as a fluorescent tag. Synthetic strategies for attaching the BODIPY tag to the drug will be presented. A mono-iodo-BODIPY derivative was prepared in four steps from 2,4-dimethylpyrrole. Next, this BODIPY derivative was coupled with 3- (4-boronophenyl) propanoic acid using Suzuki coupling conditions to afford the fluorophore ready for attachment to the drug. Once fully developed, NIHB could provide a less invasive, superior treatment option for young women suffering from triple-negative breast cancer.

Petersen, Madison

Mentor(s): Mrs. Tiffany Conde

My Journey of Applications of Public Health Within Research

As a Public Health major, I know how important physical activity and diet are when it comes to a person's health and lifestyle. Factors such as lifestyle habits, diet, and exercise are all components of social determinants of health that I was able to help apply to real life while at The Connect Lab last year. When I first joined The Connect Lab, the top priority was finding a virtual platform and then creating and transferring content to be presented virtually, as it was the summer of 2020, right the midst of the coronavirus pandemic. At the Connect Lab, I have been able to create, and present curriculum related to health and physical activity to youth in the surrounding Columbia area. Learning and teaching youth about the benefits of physical activity, mental health, and stress is something that has reaffirmed my commitment to Public Health and the health career field I hope to join upon graduation. Throughout this journey, I have learned the importance of Public Health outside of the classroom, as well as how to communicate Public Health aspects that I have learned from my research at The Connect Lab into my future medical career.

Peterson, Jenna

Mentor(s): Dr. Nicole Zarrett

Effects of COVID-19 on Physical Activity Levels of Adolescents in Underserved Communities.

The COVID-19 pandemic has brought the world to a standstill and has impacted people around the world in many ways. One major impact is the health toll it has taken on people. A decrease in physical activity and an increase in sedentary behavior has resulted from the mandated rules encouraging people to stay home and move activities like work and school online. Childhood and adolescence are critical periods for promoting physical activity to establish a firm foundation for lifelong health and well being. Significant and persistent health disparities also exist with lower physical activity rates and higher prevalence of obesity among underserved adolescents (i.e., minority and low income status). Given the low physical

activity rates and increasing obesity rates, especially among minority groups and those of lower socioeconomic backgrounds, it is important to research the further effects COVID-19 may have on physical activity (PA) levels in children and adolescents particularly in underserved areas. Doing this research will allow us to develop/implement further policy change and interventions targeted towards addressing disparities and promoting health among this population. The purpose of this study is to look at the potential changes in PA and sedentary behaviors that have occurred among adolescents attending school, living in underserved areas in the Columbia, SC area as a result of the COVID-19 pandemic. Surveys were administered to youth ages 9-14 (N= 39; 34% female; 37% minority status; Mean age = 9.76) within schools serving underserved communities (at least 50% of students on free/reduced lunch and of minority status). Results indicate youth self-reported decreases in PA opportunities and participation (e.g., after-school sports, PA opps in aftercare), as well as increases in sedentary behaviors (e.g., screentime).

Petrus, Raymond

Mentor(s): Mrs. Lauren Epps

Servant Leadership: How Being a College Tutor Prepared Me for My Future

The University of South Carolina's Student Success Center (SSC) is one of the most valuable on-campus resources available to USC students. Through the SSC, students can get free access to tutoring, supplemental instruction, writing help, student life consulting, and even financial consulting. My most valuable contribution to the university was the four semesters I spent working as a Peer Leader and tutor with the SSC. Through my two years of tutoring my fellow students in math, Spanish, finance, and accounting, I learned valuable lessons about leadership and communication. I tutored students of many different backgrounds, abilities, and ages, which required me to tailor my tutoring style to foster the academic success of my peers. During my third semester as a tutor, I also received the opportunity to serve as a PAM (Program Assistant & Mentor), leading my fellow tutors and helping them improve their teaching skills. In serving as a PAM, I learned that leadership is not about power or authority; leadership is the ability to externalize your desire to see others succeed and use that desire to communicate effectively and promote communal growth while standing side-by-side with your peers or colleagues. This experience helped solidify the leadership lessons I have learned in the classroom as a business major; If I am to succeed in the business world, I must know how to communicate well and respect the wishes of others. My Discover USC presentation will convey the lessons I learned about leadership through service as well as how my time with the SSC prepared me to succeed personally and professionally in the future.

Pfannes, Zachary

Mentor(s): Mrs. Theresa Harrison

Meaningful Lessons From a Moment of Darkness

During the winter break of studying abroad experience during the 2019-2020 school year, I took an independent trip to Krakow, Poland to visit the Auschwitz-Birkenau II Concentration Camp. Due to a lifelong passion for learning history and my time in classes such as Comparative Genocide here at UofSC, I had a great interest in seeing first hand the concentration camp and learning from experience rather than just relying on in class discussions and definitions. Among the lessons during the visit, my greatest takeaway was how important preserving this history was not only to Jewish victims of the Holocaust but the Polish and other ethnicities, cultures, and nationalities that were targeted as well. The experience opened my eyes to how moments in history influence a group's development. Furthermore, it highlighted how the way those moments are preserved and remembered is just as important and influential as the event itself. With this in mind, I hope to help educate others on the importance of shifting their perspective away from simple discussions and definitions and recognize the long term cultural impact of how we remember history. Moving forward, I expect my pursuit of an L.L.M. in Human Rights Law at Queen's University Belfast will allow me to deepen my understanding of this complex issue in order to better participate in both the

remembering and education processes.

Pham, Tina-Nhung

Mentor(s): Mrs. Gina Spence

Uncle Sam versus Zeus: The Reality of Varying Health Care Perspectives

In the Summer of 2019, I had the once-in-a-lifetime chance to travel across the world to one of the most inspirational places to ever exist, Greece. As a study abroad experience with the University of South Carolina, our focus was on the history of ancient sports medicine. This trip was a chance for me to step out of my comfort zone and examine the healthcare systems of a completely different country. Taking the course Public Health 102 made me aware of different health care perspectives but physically being in Greece and talking firsthand to varying healthcare professionals taught me so much more than a book ever could. I was able to actively participate in what I learned in class. Throughout my experience, I learned that Greece operates quite differently from the U.S. healthcare system with each country prioritizing a different aspect of health. While the Greeks emphasize prevention and holistic remedies, Americans focus on treatment and invasive procedures. I cannot say that one is more correct than the other because from what I have gathered, I believe that good healthcare requires the balance of the two ideas. As an aspiring healthcare worker, I hope that this experience will mold how I interact with my patients by not only acknowledging their cultural differences but also respecting their individual autonomy and showcasing all available treatment options for them.

Phan, Tra Mi

Mentor(s): Dr. Jing Fang

Define the function of p62 in erythropoiesis

Anemia is a common condition among the United States population. There are different forms of anemia; however, they all result from an inadequate production of healthy red blood cells (RBC). Understanding erythropoiesis, formation of RBCs, could help improve the therapeutic approaches to anemia. During the terminal erythroid differentiation stage of erythropoiesis, the immature RBC will undergo mitophagy, or mitochondrial degradation. Mitophagy is aided by p62, also known as sequestosome 1, wherein damaged mitochondria are transported to an autophagosome for degradation. In a preliminary study, p62-deficient mice showed an upregulation in genes involved in erythropoiesis as compared to wild type mice. In addition, the older p62-deficient mice had higher levels of hemoglobin in the blood and in individual RBCs. This implies that p62 may play a regulating role in erythropoiesis; however, the inactivated p62 cells exhibited only slight inhibition of early progenitor cell functions which indicates that p62 does not have a great effect on the early stages of erythropoiesis. It is hypothesized that p62 may play a role in the late stages of erythropoiesis. To test this hypothesis, bone marrow cells from p62-deficient mice and wild type mice will be collected. To determine the stages of terminal erythroid differentiation, Ter119 and CD44 antibodies and cell size (FSC) levels will be compared using a flow cytometer. To determine mitochondrial mass and activity, flow cytometer analysis of MitoTracker Green (MTG) and Tetramethyl-rhodamine ethyl ester (TMRE) staining will be used, respectively. It is expected that the results will coincide with the stated hypothesis that p62 may participate in the late stages of erythropoiesis.

Philips, Madeline

Mentor(s): Dr. Kelly Goldberg

Homo erectus to Homo sapien: What's Changed?

As the last human species to exist before Homo sapiens, the differences between modern humans and Homo erectus humans are evidence of the evolutionary changes that made modern humans who we are. This is what is fascinating- what parts were deemed unnecessary, and what traits were developed to make

humans more efficient? To look at this in depth, I will be familiarizing myself with both *Homo erectus* and *Homo sapien* and then comparing them to identify the differences that make each species unique. I predict that this research will help build a more wholistic look at humans and, perhaps, why we developed traits that we did.

Phillips, Kaylee

Mentor(s): Dr. Tracy Skipper

Overcoming Communication Barriers to Maintain Professionalism and Build Community

Walking through the halls of the hospital, I approached the foreigner interpretation office with great anticipation. I had no idea how much I'd learn throughout my internship abroad. As a Spanish minor, I wanted to study abroad, but as a pre-physician assistant student, I wanted a more health-specific approach to my time abroad. That's why I ended up interning at La Clínica Santa Isabel in Seville, Spain for a semester. While interning at the hospital for 3 months, I was able to shadow many medical professionals in different specialties including internal medicine, emergency medicine, pediatrics, and surgery. My favorite part of my internship was talking to the patients and the doctors.

Not only was I able to have this incredible shadowing experience, but I also had the opportunity to do frequent problem solving because my entire internship was in Spanish. Every day, I had to figure out what was happening around me and adapt—whether there was a patient asking me for directions or the doctors and nurses were using complex Spanish vocabulary. I also was able to effectively communicate more fluently, building on my relationships with staff members. As a future PA, I will be sensitive to common communication barriers and will strive to display empathy to all patients regardless of their preferred language because I now share a common and stressful struggle where my native tongue isn't as widely spoken in an intense environment such as the hospital. Having good problem-solving skills, self-motivation, and improved oral communication skills allowed me to have a great internship and make life-long friends.

Pia, Jessica

Mentor(s): Dr. Toni Torres-McGehee, Ms. Allison Smith

Energy Deficiency: Clinical Assessment Tool Comparisons for Collegiate and Recreational Athletes

Background: The Female Athlete Triad (Triad) and the Relative Energy Deficiency in Sports (RED-S) are similar syndromes associated with low energy availability (LEA). The Triad is defined as having LEA, menstrual dysfunction, and/or low bone mineral density. RED-S is an expansion of the Triad that also includes impaired physiological functions. The risk assessment tool used to diagnose the Triad is known as the Cumulative Risk Assessment (CRA). The assessment helps professionals determine female athletes' return-to-play status by classifying their risk as either high, moderate, or low. The risk assessment tool developed for RED-S is called the Clinical Assessment Tool (CAT). The RED-S CAT examines similar criteria, but uses respective green, yellow, or red lights to determine whether an athlete can return to play. There has been little research conducted to compare the tools and there is currently a sense of ambiguity as to which tool should be used to most effectively identify energy deficiencies among female athletes. The purpose of this study is to determine if the CRA is a more or less restrictive tool for determining risk in order to prevent future injuries among female athletes.

Methods: This is a retrospective study that was part of a larger, IRB-approved study. The data analyzed included demographic information, anthropometric measurements, eating disorder risk, energy availability, bone mineral density, menstrual status, and self-reported injury and medical history. After examining each athlete's data, the athlete will be scored using the CRA guidelines and placed in either a low, moderate, or high-risk classification. The data will be scored by 3 separate analysts to ensure its validity. For the

analyses, SPSS statistical software (Version 27; SPSS Inc, Armonk, NY) will be used and alpha will be set at 0.05. A Chi square analysis will be used to examine relationships between risk classification (high, moderate, low) and assessment tool (CRA vs. CAT). Significance level will be set at $P < 0.05$.

Results: The data is currently being analyzed and results will be presented at Discover Day.

Conclusions: TBD

Pierner, Tianni

Mentor(s): Mx. Caleb Morris

Bee a Leader

I joined the Carolina Beekeeping Club in the spring of 2019 because I needed to put something on my resume. But after the first semester of being a member, I fell in love with the club and the important pollinators we call the honey bee. In the academic year of 2019-2020, I worked as the officer of public relations and marketing. I came up with several events and connected with other clubs. After the year ended, I became the president of the Carolina Beekeeping Club, because I believed our club could do more and have a bigger impact on the University of South Carolina and its surrounding community. Through this experience, I have found how to lead and distribute tasks among my fellow officers. I have also learned how to work well with others who have different values and beliefs than I do. Through this, I have become more confident in myself as a leader and as a team member.

Pietrzak, Ashley

Mentor(s): Mrs. Maegan Gudridge

JUNE JAM Event Director: Working in the Event Industry

During the fall of my senior year at the University of South Carolina, I was granted an internship opportunity as an Event Director for JUNE JAM. This non-profit, which started in 1978, holds an annual music festival to raise money for local charities and organizations. Their annual June festival was canceled in 2020 due to the Coronavirus pandemic. While I worked there, I had the opportunity to be on the team to run and host the rescheduled event. I was placed in charge of drafting and submitting the company proposal to the State of Delaware Department of Small Business to approve us to hold the festival. To draft the proposal, the team met on virtually to discuss the COVID regulations and guidelines that we'd need to adapt to. After our proposal was approved, we were able to host our event in October 2020. The Department of Health and Safety gave us a rave review after their visit. I learned an immense amount about the event industry while on site for the festival including being adept to the "new normal," the importance of streamlining processes, and displaying leadership in a team setting. After this experience, I have committed to pursuing a career in the event planning industry.

Pitts, Mary Grace

Mentor(s): Mrs. Maegan Gudridge

My Time As President

My most significant beyond the classroom experience in my time at the University of South Carolina has been serving Phi Mu, a College Panhellenic Association organization, as President. Phi Mu has given me a home, the best support network in the world, and countless opportunities to grow both personally and professionally. In my time as chapter president, I oversaw and managed all operations of a 350-member chapter while focusing on continuous improvement of our processes. This included supervising and delegating responsibilities to 13 executive board members, as well as facilitating weekly board meetings and chapter meetings. In this role I also served as a spokeswoman and representative of the university, nation-

al headquarters, alumna, and officers. During my time, I also created the first mother's weekend, monthly newsletter, and Diversity, Equity, and Inclusion committee to increase chapter involvement expectations. My presentation will discuss my takeaways about the skills I gained and developed as well as how Phi Mu continues to provide experiences to better women as a whole.

Pizii, Connor

Mentor(s): Dr. Kate Flory
College Student Study

This presentation documents involvement with the College Student Study, a multisite survey study at universities across the U.S. The study examines ADHD, risky behavior (e.g. unsafe sex, substance use, etc.), and procrastination in college students. Participants also may opt for their parent or guardian to fill out a separate survey, so that researchers may document the developmental pathways and a more objective perspective of their child's attention and impulsivity issues.

Plemmons, Angela

Mentor(s): Dr. C. Nathan Hancock

Tissue culture treatment of wheat to induce mobilization of an mPing based activation tag.

Transposable elements are DNA segments that can be mobilized around the genome to cause mutations. Activation tagging is a mutagenesis approach where random gain-of-function mutations are induced by an insertion of an enhancer sequence near genes. An activation tagging derivative of the mPing element from rice, mmPing20F, was inserted into the wheat genome along with the ORF1 and transposase genes required for mobilization. These transgenic wheat lines show mmPing20F transposition, but not at sufficient levels. However, studies on mPing tagging soybean lines suggests that higher transposition levels occur during tissue culture. We propose to pass the existing mmPing20F wheat line through tissue culture and measure if heritable transposition frequency increases. The methodology includes isolating immature embryos and transferring the tissue to fresh media every two weeks. Once we obtain plants, DNA purification and PCR analysis will be used to confirm if heritable transposition occurred. We will use qPCR to determine how many copies of mmPing20F are present as we expect to see an increase in mmPing20F copy number if significant transposition occurs

Pokora, Robert

Mentor(s): Dr. Margaret Selph

Prevalence of Hepatitis C among uninsured patients in an urban population in the Southeastern US in comparison to other populations

Background/Information: Following the opioid epidemic, the United States has seen an increase in the prevalence of Hepatitis C (HCV). HCV is the leading cause of liver-related death, liver cancer, and liver cirrhosis. The national strategic plan to eradicate hepatitis includes increased screening and treatment for all patients with chronic HCV, with a specific emphasis on those with high risk for future transmission. Inconsistent disclosure of risk factors leads to lower rates of screening, underdiagnosis, and higher mortality, with disease burden hypothesized to be higher among underserved, often minority and indigent, communities.

Purpose: The primary endpoint was to evaluate prevalence of HCV among an urban, uninsured population in a mid-size city in the Southeastern US. A secondary goal was to compare this prevalence with regional and national prevalence. This data may inform future screening and treatment algorithms to improve outcomes in underserved and high-risk communities.

Methods: An in-depth retrospective review of documentation from patient encounters during a 3-month period was performed. Additional reports were obtained from the electronic medical records to support

this data due to some limitations described below.

Results: During the collection period, 45/661 patients (6.8%) had a diagnosis of HCV in the electronic medical record or in the paper chart, while over the two-year period, 77/2307 patients (3.34%) had a diagnosis of HCV in the electronic medical record system. Meanwhile, in 2016, the highest estimated prevalence of HCV in SC was 1.7%, the estimated prevalence in the US was 1%, and the estimated prevalence in Chicago was also 1%.

Limitations: Limitations included technical difficulty accessing reliable information due to the use of both electronic and paper documentation at the clinic. Volunteer providers are utilized, making documentation less consistent. Among this often-transient population, barriers to access, limited case management and follow-up capability, and perceived stigma may limit disclosure of risk factors or adherence with screening and treatment recommendations.

Conclusions/Implications: This population has a higher prevalence of HCV compared with SC and with the US ($p < .0000$). This population carries a higher burden of disease, however future research is needed to confirm the generalizability of these results.

Pollard, Casey

Mentor(s): Dr. Tracy Skipper

Reform, Abolition and Restorative Justice

In the summer of 2020, I completed a remote internship for State Senator Scott Surovell of Virginia's 36th district. During my internship, I conducted donor research, drafted constituent response letters, and composed research on criminal justice reform policies. Specifically, my research projects focused on state policies of assault on law enforcement officers and the Virginia Senate Democratic Caucus' proposed Police Reform and Criminal Justice Equity Plan. As a Political Science and Sociology major at the University of South Carolina, I gained a deeper understanding of state politics and institutions because I was able to connect criminal justice reform efforts to my studies of mass incarceration, prison and police reform. The experiences I gained through this internship expanded my passion and hope for criminal legal justice. After I graduate, I hope to work in grassroots criminal justice.

Ponder, Courtney - Co-Author(s): Madeline Dowis, Isiah Hairston, , - Mentor(s): Prof. John Gerdes, , , , -- IIT Internship Location Map -- This is a project that shows the different internships from different states and countries, within IIT.

Porter, Katherine

Mentor(s): Dr. Jun Zhu

Mutations of Human Norepinephrine Transporter at Threonine544, Aspartic Acid378, and Tyrosine545

The HIV-1 transactivator of transcription (Tat) is a major viral protein that affects neurocognitive function and impacts the development of HIV-1 associated neurocognitive disorders. Disrupting dopamine (DA) transport in the central nervous system is a biomarker of Tat induced neurotoxicity. However, two monoamine transporter receptors can uptake dopamine in affected regions. Both the norepinephrine (NE) transporter (NET) and dopamine transporter (DAT) play a critical role in reuptake of DA. This study determined the mutational effects of human norepinephrine transporter (hNET) on basal inhibition of DA transport. Through the computational 3D structure modeling, three mutants were identified that were critical for Tat binding. Mutants T544P, D378L, Y545H were looked at in this study and compared to wild-type hNET. The DA uptake assay showed no difference for each of the three mutants when compared to wild type hNET. Statistical analysis was calculated with a one-way ANOVA. Compared to wild-type hNET, the maximal velocity (V_{max}) of [3H]dopamine uptake was decreased in D378L and T544P, and unaltered in Y545H. These results demonstrate that mutations at potential Tat binding sites influence basal DA up-

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take, providing insights into identifying targets for improving NET-mediated dopaminergic dysregulation.

Poteat, Thomas

Mentor(s): Mrs. Ambra Hiott, Ms. Grace Kazmierski, Ms. Alexandra Shay

The Building of a Team

Leadership is a skill that takes time and effort to cultivate. Whether it be through labs where one learns to work together with many different people or being a member of an organization, leadership can take many forms. I have been a part of Sustainable Carolina for four semesters and have led the Zero Waste team for three. Learning how to manage a team of many different people while also delegating, collaborating, and growing a new team from scratch all came with challenges, but also posed a chance for me to grow and hone my skills of communication, problem-solving, and teamwork.

Building a team from scratch can be difficult, as we had to identify projects to pursue, find issues on campus, and build an understanding of the purpose of our team. While difficult, especially due to the complications of COVID, we as a team persevered and found ways to create educational content while being socially distanced. Thanks to my rhetoric, psychology, and lab courses, I have learned to cooperate with people of many different backgrounds, lead and take responsibility within groups, and use effective communication in a team. I have been able to garner strong leadership skills throughout my time with Sustainable Carolina, and learning how to build and manage a team will help me in my future endeavors of working on and managing teams.

Powell, Allison

Mentor(s): Prof. Meagan Gudridge

Peer Leadership in the Greek Community during COVID-19

When I joined the panhellenic community, I never imagined the impact it would have on me. After falling in love with my sororities values, I knew I wanted to get more involved. I became the Vice President of Finance Elect, meaning I would be VPF for 2020, which I started training for in Spring 2019. However, when I came back that fall, I learned that nationally my sorority had decided to restructure their executive council and the role was now Vice President of Finance and Housing. Though a challenge as two roles were now combining, I readily took it on. In January 2020, my newly elected executive council and I began setting goals for our term. By March of 2020 I had finally settled into my role of invoicing members, paying expenses, writing checks, and budgeting. However, things took a turn as the COVID-19 pandemic arrived, shut down UofSC, and derailed our spring semester.

During a time when there was no guidance or rule book, I really used the Exemplary Leadership Model by showing my chapter the way forward. One of the most challenging parts of being the financial leader of my sorority during a pandemic was the refund process. The women in my chapter, many of whom financially impacted by the pandemic, wanted and needed their refunds for meals, housing, and chapter dues. Members were frustrated with me as they wanted their money as soon as possible. I quickly realized that although I was waiting on UofSC, our meal provider, Pi Phi Headquarters, and the owner of our house for money, to the women in our chapter this was ultimately my responsibility. I decided to lean on knowledge from my classes and unify the women in my chapter under a common goal and make sure they knew I was fighting for them. I focused on being a servant leader and started communicating constantly with them so they knew everything I could tell them the moment it became available. By the end of the summer, after hundreds of emails and phone calls I got every chapter member their money back.

Prisendorf, Danielle

Mentor(s): Dr. Mohamad Azhar

Role of Cardiomyocyte-Specific Transforming Growth Factor Beta1 in Adult Heart Disease

Transforming Growth Factor Beta (TGF β) is a superfamily of multifunctional proteins whose expression and regulation play numerous roles in cellular development, specifically the development of cardiac muscle or myocardium. Dysregulation or overexpression of TGF β ligands, precisely TGF β 1, causes a plethora of cardiac abnormalities, such as cardiac fibrosis and cardiomyopathy. In this experiment, transgenic TGF β 1 mice were crossed with tamoxifen-inducible Myosin Heavy Chain II Cre recombinase mice (Mer-Cre-Mer). Adult double 'conditional' transgenic mice (Tgfb1TG;Mer-Cre-Mer) mice were injected with 5 daily doses of tamoxifen drug in order to activate the expression of constitutively activated form of TGF β 1 in the cardiomyocytes (predominant cell type that form the cardiac muscle). Heart tissue from tamoxifen treated conditional transgenic mice was collected, processed, embedded, cross sectioned and stained in order to be analyzed for cardiac hypertrophy (enlargement of cardiomyocyte) and cardiac fibrosis (excess collagen accumulation). Through histological examination, it is hypothesized that the upregulation of activated TGF β 1 in cardiomyocytes is the cause of cardiac hypertrophy and/or cardiac fibrosis in adult mice, and potential analysis of these cross-sectioned hearts will allow us to understand the link between dysregulation of TGF β 1 and heart failure.

Pudi, Sreya

Mentor(s): Dr. Deanna Smith

The Classification of Basket Neural Cells in the Mammalian Neocortex

Basket neuronal cells of the mammalian neocortex have been classically categorized into two or more groups. Originally, it was thought that the large and small types are the naturally occurring groups that emerge from reasons that relate to neurobiological function and anatomical position. Later, a study based on anatomical and physiological features of these neurons introduced a third type, the net basket cell which is intermediate in size as compared to the large and small types. In this study, multivariate analysis was used to test the hypothesis that the large and small types are morphologically distinct groups. Further testing involved the identification of individual large and small basket neurons and whether it is possible to categorize them by individual morphological features.

Rader, Shelby

Mentor(s): Dr. Melanie Cozad

Controlling What We Can

Identifying Barriers to Diabetes Care Associated with COVID-19 in a Low SES Diabetic Patient Population -- Background: In South Carolina, one in seven adults have diabetes, a chronic illness that leads to premature mortality if uncontrolled (SC DHEC BRFSS, 2018). Successful management of diabetes includes glycemic control, medication adherence, diet, and exercise (Schmittdiel, 2008). Sub-optimal diabetes self-management is traditionally related to patient age, education, socio-economic status, beliefs about medications, and perceived barriers to obtaining and taking medications as well as external factors (Kretchy, 2020). In 2020, the COVID-19 pandemic began impacting everyday life. Currently, the barriers to diabetic care and management that have arisen as a result of the COVID-19 pandemic are not well understood. Patients with diabetes face greater risk of more serious complications if they are infected with the coronavirus (SARS-CoV-2) and poor diabetes management enhances disease complications heightening COVID-19 morbidity and mortality (Critchley, 2018).

Objective: Given the heightened risk diabetes patients face, this study's objective was to identify barriers to diabetic management related to the COVID-19 pandemic for a vulnerable, low SES patient popula-

tion within the southeastern United States.

Methods: This study employed a prospective, cross-section design. A 34-question survey was completed by 60 participants with diabetes receiving care in an internal medicine clinic for low SES patients who are un-or under insured. Participants were contacted (by email or phone) and recruited to participate in the survey. Responses were recorded using HIPAA compliant software.

Results: This study found 28.33% of participants had indications of a major depressive disorder as identified by a PHQ-2 score of 3 or greater. Additionally, 61.67% of participants reported increased worry and anxiety suggesting a major impact on mental health as a result of the COVID-19 pandemic. Just over one-third (36.67%) believed their care routine and diabetes management changed due to the pandemic. The pandemic's impact on self-management is evident with 48.48% and 56.41% of patients experiencing a change in diet and/or exercise, respectively. Environmental barriers such as increases in financial strain (50%) and feelings of decreased provider accessibility (45%) were also reported.

Implications: Understanding implications of COVID-19 on diabetic management from patients will help clinicians develop strategies to mitigate risks associated with diabetes management and manage anxiety associated with the pandemic during future clinical visits.

Radonis, Madison

Mentor(s): Dr. Marketa Kubickova

My Study Abroad Experience

I have always had a keen interest to travel and explore new places. That is why in the Fall of 2019, I decided to leave the United States for three months and study abroad at the University of Málaga in the Andalucía, Spain region. I come from a Hispanic background and wanted to improve my Spanish speaking skills to be able to talk to my relatives and not have a language barrier. In addition, I am a Spanish minor and wanted to improve my speaking skills for that aspect as well. At first it was hard, being in a foreign place, not knowing anyone and leaving my loved behind. However, I adapted to the environment and truly got to know myself. I came back from Spain a stronger person. I grew professionally, emotionally and mentally. This happened because of the plethora of trips I took, with and without my program. One of the classes I took while in Spain was Spanish Culture and Society. I had the opportunity to travel to many different cities throughout Spain and got to experience what I learned firsthand. Besides the cities in Spain, I also travelled to countries in Europe and Africa. I also got to meet the locals and became friends with them. As cliché as this sounds, I would say that studying abroad "changed my life" and I cannot wait to tell you about my experience.

Radzak, Kyle

Co-Author(s): Alex Barlowe, Bryson Livingston

Mentor(s): Prof. John Gerdes

South Carolina Health and Human Services Metrics Update Project

Worked with South Carolina Department of Health and Human Service's Office of Information Assurance to update the department's metrics for better security practices and a way to visualize the departments vulnerabilities.

Rawson, Ryleigh

Mentor(s): Mr. Rico Reed

Understanding Healthcare Inequities: My Lessons in Becoming an Optimal Ally

As a Public Health major at the University of South Carolina, I have been involved in numerous experiences that have fueled my passion for providing equitable care and opportunity to underserved communities. I was able to serve as the president of GlobeMed, where I primarily led teams in hosting fundraisers for our partner Non-Governmental Organization(NGO) known as Alternative for Rural Movement in Odisha, India. In addition to raising funds for this partner, I assisted in developing curricula to promote healthy lifestyles for young girls in India and educating students at UofSC about pertinent public health and social justice topics. I also served as the marketing director for Students Helping Honduras, where I promoted awareness and fundraising events that supported the goal of developing 1,000 schools in the country, even having the chance to go directly to Honduras to engage in the community and serve as an ally. I've also had the opportunity to work as the public health liaison in a research and service project in Malawi, Africa that focused on evaluating the current sustainability of public health organizations and highlighted the need for continued implementation of practical public health policies. It is my goal to serve as a healthcare provider and advocate for the youth of underserved populations, and my public health experiences have provided me with a significant understanding of the socioeconomic, political, and cultural factors that play into the health disparities faced by minority populations. Through these experiences, I learned that poverty perpetuates poverty due to the lack of education, resources, and community development projects that are preventing these countries from being able to sustain their own development. As healthcare providers, we should not seek to serve only those populations who can afford care, but also those populations who are stagnated due to a lack of access to adequate healthcare. My presentation will focus on how these firsthand experiences have shaped me into a more confident and compassionate public health professional and how their lasting effects have encouraged me to pursue further opportunities in order to better serve as an ally for these communities.

Regnier, Grace M.

Mentor(s): Prof. Joseph A. McQuail

Sex Moderates Cognitive Reserve in Aging

Advanced aging is associated with varying degrees of memory loss and, in the most severe instances, dementia due to Alzheimer's disease (AD). A wealth of studies seek to uncover the mechanisms that contribute to memory loss or disease, but less work examines the factors that preserve cognition into advanced ages or despite the presence of AD neuropathology. Cognitive reserve (CR) refers to factors acting across the full lifespan that buffer the aging brain against memory loss and disease. Elucidating mechanisms of CR necessitates the integrated study of neurobiological and cognitive changes that are moderated by a hypothetical CR variable. Animal models will be vital to determine causal relationships underlying CR, but studies to-date focus on cognitive changes in male rats of very advanced age (>50% median survival) and typically within a single task or cognitive domain. This study aims to support new CR research by characterizing working memory and reference memory in young adult, middle-aged, and older-age male and female F344 rats. Using an operant delayed-match-to-sample test, aging was associated with progressive decline of working memory. Overall, working memory accuracy of females was greater than in males, but comparisons within each age group showed that this advantage dwindled with age. Age-related decrements in reference memory, assessed using the Morris water maze, were also observed. In this domain, males tended to show better learning than females, and these cognitive differences were consistent at each age. These data confirm that working memory and reference memory decline continuously over the lifespan of male and female rats. Against this backdrop of progressive cognitive change, females exhibit higher working memory accuracy but steeper cognitive decline, whereas reference memory, where males show marginally better ability, declines at similar rates between sexes. In summary, normal aging is

strongly associated with decline of memory across multiple domains (i.e. working, reference), but sensitive behavioral analyses in rats can distinguish sex-specific differences in baseline cognitive abilities and presumptive rates of decline over the lifespan. These behavioral data provide a robust reference against which putative CR interventions may be studied.

Reilly, Elizabeth

Mentor(s): Dr. Matthew Childs

Utilizing Applied Behavior Analysis to create positive social experiences for children with physical, mental, or emotional disabilities.

During my junior year of college, I interned at the Unumb Center for Neurodevelopment in Columbia, SC. The Unumb Center is a facility for people of all ages to receive Applied Behavior Analysis (ABA) therapy. ABA therapy is successful in the treatment of children and adolescents with physical, mental, or emotional disabilities because it uses concise, effective communication. The goal of ABA therapy is to eliminate unwanted behavior and encourage desired behavior. While I was an intern I worked with children of all ages in a social skills group. We used ABA therapy to assist our patients in building and maintaining social relationships. As an intern, I was responsible for creating lesson plans and activities to enhance the children's social relationships. My fellow interns and I followed the ABC model of ABA therapy. This model stands for Antecedent, Behavior, and Consequence. After learning this model in my psychology classes, I knew it would prove to be successful at the Unumb Center. I have worked with children on the autism spectrum since I was young because my mother teaches special education preschool. With this background and my education in psychology at the University of South Carolina, I knew I wanted to go to graduate school for occupational therapy (OT). However, the experiences I had at the Unumb Center were what led me to looking at pediatric OT specifically. From this internship, I have gained leadership skills, patience, and adaptability along with experience using the effective strategies to enforce applied behavior analysis. In my presentation, I will explain how I applied my understanding of ABA therapy from my psychology courses in my internship at the Unumb Center.

Rhymer, Emma

Mentor(s): Dr. Denise Wellman

Women Empowering Women

As a leader in the Greek community, the idea of women empowering women has become my daily inspiration and vision behind my goals. This past year, as Vice President of Service of the College Panhellenic Association (CPA), I had the opportunity to serve as the liaison between CPA and a non-profit organization called Circle of Sisterhood. The mission of Circle of Sisterhood is to unite sorority women to use their privilege of receiving a college education to break economic barriers that surround education for women and eliminate the burden of oppression and poverty across the world. Through various fundraising efforts, we had the opportunity to fund two grants to the Circle of Sisterhood foundation for a total of \$20,000 supporting women's empowerment. Through these donations, we are making a difference both domestically and globally in the lives of women by taking action to address the prevalence of gender inequality in our world. Although this experience allowed me the opportunity to support organizations in need, this experience provided immense change and growth within myself, both personally and professionally. I have gained a stronger sense of confidence, gratitude for education, vision for my future, and desire to improve the current healthcare system. As a future leader in healthcare, it is integral that I continue this work after college. I plan to address inequalities that influence the health of all patients, regardless of gender, ethnicity, race, or any other factor that has commonly created division and unequal treatment.

Ricca, Liliana

Mentor(s): Ms. Jenna Smith, Ms. Abigail Hogan, Dr. Jane Roberts

Relationship between restricted and repetitive behavior and anxiety in children with fragile X syndrome and autism spectrum disorder

Restricted and repetitive behaviors (RRBs) are one of the core symptoms of autism spectrum disorder (ASD). RRBs can be repetitive motor movements or speech, as well as an insistence on sameness or routine. RRBs can be impairing when they interfere with an individual's ability to interact in social relationships or engage in other activities. However, RRB severity can also be an indicator of anxiety severity with previous research suggesting that children with ASD who exhibit greater anxiety symptomatology display more repetitive behaviors than children with ASD without anxiety (Rodgers et al., 2012). Furthermore, children with fragile X syndrome (FXS), a neurodevelopmental disorder and the leading genetic cause of ASD, have shown to exhibit elevated rates of RRBs. Children with FXS are at an increased risk of both ASD and anxiety and thus, it is important to characterize RRBs within this population (Baribeau et al., 2020). This study aims to investigate group differences in the severity of repetitive behaviors and anxiety symptomatology and to assess the relationship between these factors in preschool-aged children with FXS, with and without ASD, compared to typically developing preschoolers ages 3 to 4 years old. Repetitive behaviors and anxiety symptomatology will be assessed via parent report using the Repetitive Behavior Scale - Revised (RBS-R) and the Preschool Anxiety Scale (PAS) respectively. Repetitive behavior and anxiety severity is expected to be greatest in children with FXS and ASD, and repetitive behavior severity is expected to be positively associated with anxiety symptomatology. Identifying potential early markers of anxiety, such as repetitive behavior severity, in children with FXS, with and without ASD, is important and crucial to understanding development and informing targeted interventions.

Ricche, Gabrielle

Mentor(s): Prof. Alexander Yankovsky

The Relationship Between Forcing Conditions and Extended Coastal Buoyant Plumes

Coastal buoyant plumes are formed from the freshwater river discharge and its mixing with oceanic water in estuaries, primarily caused by tides. These plumes play an important role in delivering nutrients, pollutants, and sediments to the coastal ocean. The longer the plume's residence time on the continental shelf or near the coast, the more biogeochemical processing of nutrients can occur. This means that an increased residence time on the continental shelf will cause more nutrients to remain near the coast, while fewer nutrients will reach the open ocean. These nutrients play a key role in primary production and can cause harmful events such as toxic algae blooms and hypoxic events. Both the shape and reach of these plumes are controlled by a multitude of forcing conditions. This research will examine the three most prominent factors, freshwater discharge, tidal pulses, and wind stress, in order to determine which forcing elements cause the formation of cross-shelf plumes with high length-to-width aspect ratios that can cross the shelf and reach the Gulf Stream. This will be accomplished by identifying significant plumes through the use of satellite imagery and analyzing the forcing conditions surrounding these key dates. The goal of this project is to gain a better understanding of coastal buoyant plumes and the flow dynamics that influence them, specifically those plumes that directly reach the open ocean to interact with open ocean currents.

Robbins, Palmer

Mentor(s): Prof. Anna Oswald-Hensley

Palmer Robbins GLD Presentation

As an Early College student with aspirations to become a leader and pioneer in the field of aerospace engineering, I have decided to pursue a Graduation with Leadership Distinction in Professional and Civic

Engagement as part of pursuing my Associates of the Arts degree from USC Sumter. As a part of seeking this honor, I have participated in multiple beyond-the-classroom experiences including volunteering with different organizations in my community, working with other peers in student government and other organizations, and attending conferences to help further develop my leadership and communication skills. Volunteering in my community has brought with it valuable knowledge about how to go about improving a community in a way that everyone can appreciate. Realizing the impact such simple acts can have on entire communities has allowed me to see why everyone and everything they do matters. Elsewhere, working with other peers has taught me how to both be a part of a team and be a leader. As a team member, I have learned how to listen to other's thoughts and provide my own to supplement the ideas that other people have brought forth. Opposing that, being a leader has also taught me to take everyone's suggestions and compile them into something that the group can manage to succeed at while incorporating the best parts of everyone's ideas. However, none of this could be done without further learning about and improving my skills as a leader and a listener. Different conferences have taught me how to approach different situations with different people still get the best out of everyone. My best experience with leadership thus far has been my role in creating a video with my high school student government. I led a small group of people who created a video to promote registering to vote to high school seniors. This task incorporated all of the aspects hitherto mentioned, and it was the first big test of my skills as a leader and as a community member. My presentation will focus on just exactly how deeply my experiences have impacted who I have become today.

Robbins, Thomas

Mentor(s): Dr. Brett Sherman

Trust, Reliance, and the 'Stag Hunt'

Researchers from a variety of academic disciplines have taken up a common question in recent years; "What is trust?". Political scientists might be concerned with how we trust governmental institutions or voting systems, economists may be interested in how trust interfaces with their assumptions regarding rational agents, and ethics researchers might be concerned with how we use trust to live a good life. All these different research avenues are similar in that they require some working definition of trust. Despite the variety of this interest, there have generally been two sorts of methodologies employed to define trust. First, trust might be approached empirically by considering the sorts of situations in which we experience trust. Alternatively, trust might be considered on a more abstract level to define it out of its basic content and structure. Both methods have been used by a variety of researchers and thinkers for approaching trust, and both have their own corresponding strengths and weaknesses. This project combines both methodologies as a way of approaching trust from a mutually informed perspective, thus maximizing the benefits and minimizing the weaknesses of both methodologies. To do so we consider a quintessential environment which trust emerges from, known as the 'stag hunt' or the 'trust dilemma', and analyze it for its abstract and fundamental elements. In doing so we establish two necessary conditions for the emergence of any instance of trust. These are a specific uncertainty, possessed by the trustor or subject of trust, and a situation of reliance.

Roberts, Asher

Mentor(s): Mr. Bryan Terlizzi, Mr. Cade Abrams, Dr. Kyle Silvey, Dr. David Stodden

Associations between object projection skills and performance on the Army Physical Fitness Test

Background: The US Army currently assesses one aspect of physical fitness using the Army Physical Fitness Test (APFT). Motor competence (MC) assesses the ability to successfully perform various complex functional movements and is a predictor of physical fitness into adulthood (Utesch et al., 2017). Thus, MC lays a foundation for physical fitness that may prepare future soldiers for the functional movements and fitness requirements for operational readiness. This study examined associations between three object

projection (OP) skills, a subset of MC (e.g., throwing and kicking) and examined associations between product scores of three different OP skill assessments (throw speed, kick speed, and throw-catch) and performance on the APFT in a recruitment population. Methods: A convenience sample of young adults (N=89; f=22, m=67; Mage=19.7±2.2 years) from a University in the Southeast U.S. participated in this study. Maximum throw and kick speed of 5 trials was measured using a radar gun (Stalker Inc.). Throw-catch was measured by the number of times participants throw and catch a ball off a wall (3 times standing height away) in 30sec (2 trials). Maximum throw and kick speed and maximum throw-catch score were used for analysis. OP scores were compared to APFT subtests raw scores (push-ups and sit-ups in two minutes, two-mile run time) and composite APFT scores (U.S. Army, 2018). Pearson correlations examined associations between the OP test scores and APFT composite and subtest scores by gender subgroups. Results: Moderate positive correlations were found between OP tests and composite APFT scores: throw velocity, (f=0.28, m=0.24); kick velocity, (f=0.36, m=0.37); throw-catch, (f=0.27, m=0.37). Highest correlations between APFT subtests for females were between throw max and sit-ups, (rf=0.45) and kick max and sit-ups (rf=0.39), and for males in kick max and push-ups (rm=0.45), and throw-catch and push-ups (rm=0.40). Conclusion: Scores on OP assessments reflect experience with performance of OP (and MC) in childhood and adolescence. Developing a broad range of OP skills across childhood and adolescence is important for promoting a foundation of physical fitness that will promote adequate levels of overall physical function for soldiers.

Roberts, Jamie

Mentor(s): Prof. Johannes Stratmann

Changes in MAP kinase activity and medium pH in response to plant Volatile Organic Compounds in tomato cells

When plants are attacked by herbivores, they can communicate this to unwounded parts of themselves and to neighboring plants. This communication process is mediated by volatile organic compounds (VOCs), however, not much is known about how these VOC signals are relayed in the cell to achieve a response after their initial perception. My project aims at an in-depth characterization of two components of the VOC-induced signaling pathway, change in extracellular pH and activity of MAP kinases. These components can be quantified by measuring the medium pH of tomato cell cultures, and by western blots using antibodies against active MAP kinases. I focused on the three VOCs, cis-3-hexenyl acetate, trans-2-hexenal, and cis-3-hexenol, which were tested at various concentrations over a period of up to 120 minutes. I found that the three different VOCs induced specific changes in the medium pH of the tomato cells as well as specific MAP kinase activity patterns. Subsequently, this data indicates that the three VOCs are perceived by different receptors or that they activate a common receptor in different ways. Overall, in the long-term this will help us to identify VOC receptors.

Robinette, Evan

Mentor(s): Dr. John Bernhart, Dr. Sarah Burkart

Examining the Effects of an After-School Physical Activity Program on Elementary School Students' Well-Being

Objective: The purpose of this project was to examine the effects of participation in Run Hard on PA levels, positive youth development (PYD), and life skills transfer (LST) in elementary and middle school children.

Background: Students participating in after-school programs may receive benefits to physical and psychosocial development. School-based physical activity (PA) programs have been linked to increases in academic performance in participating students. The Run Hard program is an after-school PA program based in South Carolina that trains children in grades 2 through 8 to complete a 5K race over the course of 8 weeks. To date, no research has examined the effectiveness of Run Hard in increasing student PA, positive

youth development (i.e., confidence, connection, caring, compassion, character), and life skills. It is hypothesized that participation in Run Hard will increase PA, increase PYD, and increase LST in participants.

Methods: Twenty participants are being recruited from Run Hard to participate in this study. Data are collected at two time points: prior to and following the 8-week program. PA is assessed using the Physical Activity Questionnaire – Children version (PAQ-C). In addition, PA is measured using accelerometers on a subsample of 10 participants. Life skills transfer is being measured by the Life Skills Transfer Survey (LSTS), and positive youth development is measured by the Positive Youth Development Student Questionnaire (PYDQ-S). Data analysis will include descriptive statistics of the sample and paired t-tests to compare PA, LST, and PYD.

Results: Full data collection will be completed in May 2021. Baseline results will be presented at Discover UofSC in April 2021. We anticipate that participation in Run Hard would increase PA, increase PYD, and increase LST in participants. A community report will also be created for the Run Hard organization to share with schools and community groups.

Discussion: The results of this study will show a positive effect of a community physical activity program on youth. It will help the Run Hard program increase marketability and interest throughout South Carolina and nearby states for greater dissemination.

Robinette, Evan

Mentor(s): Dr. Brie Turner-McGrievy, Dr. John Bernhart

Examining the effects of a vegan diet on osteoarthritis pain levels

Objective: The purpose of this study was to investigate the impact of a 12-week community-based vegan soul food dietary intervention on weight loss and osteoarthritis (OA) symptoms in African Americans (AA).

Methods This single-arm pre-post trial involved participants attending weekly classes and meetings to learn about adopting a vegan diet. Eligibility criteria included being overweight or obese, self-identify as AA, 18 and 65 years old, and live in the greater Columbia, SC, area. Participants (n=19) completed questionnaires and an objective weight assessment at baseline and 12 weeks. The questionnaires included the Knee Osteoarthritis Outcome Score (KOOS) scale to assess OA symptoms in five domains of pain, symptoms, activities of daily living, sport and recreation function, and quality of life. This single-arm pre-post trial involved participants attending weekly classes and meetings to learn about adopting a vegan diet. Online classes were led by a community health worker knowledgeable about plant-based diets and soul food cuisine. It was hypothesized that participants would report a significant reduction in OA symptoms and that decreases in OA symptoms would be significantly associated with weight loss.

Results: The average age of participants was 48.7 years (SD=8.7). The anticipated results of this study are that scores in all five domains will improve. Preliminary results reveal that weight significantly decreased (p=0.01) and OA pain and symptom scores decreased, indicating reduction in severity. Pain scores at 3 months were 4.1 points lower than at baseline (p=0.28) and symptom scores at 3 months were 1.5 points lower than at baseline (p=0.27). ADL, sport and recreation, and quality of life scores also decreased, indicating an improvement. ADL scores at 3 months were 3.6 points lower than at baseline (p=0.47). Sport and recreation scores at 3 months were 3.4 points lower than at baseline (p=0.51). Quality of life scores at 3 months were 4.9 points lower than at baseline (p=0.46).

Conclusion: A community-based program teaching a soul food vegan diet was associated with significant weight loss among participants and may be associated with an improvement in OA health status.

Robinson, Isabelle

Co-Author(s): Malorie Webb

Mentor(s): Dr. Elizabeth Will, Dr. Jane Roberts

Syndrome-Specific Attention Profiles in Infants with a Neurodevelopmental Disorder

An important aspect in the development of an infant is their exploration of and interaction with their environment. Children with a neurodevelopmental disorder such as fragile X syndrome (FXS) or Down syndrome (DS) often present with atypical object and social attention. An infant with dysregulated attention or impaired motor development may miss learning opportunities in their environment and delay cognitive development. The purpose of this study is to explore syndrome-specific differences in attention profiles, including object and social attention, disengagement, and dyadic attention, in children with FXS or DS as compared to typically developing children. This project utilizes data from a longitudinal study collected from 12-month old infants from the FXS (n=29), DS (n=24), and TD (n=42) groups. Each attention profile was measured separately using the Autism Observation Scale for Infants (AOSI) in which infants were given a variety of toys to play with. An examiner prompted interaction and play. To investigate syndrome-specific attention profiles, we will 1) test group differences in object and social attention, 2) test group differences in disengagement, and 3) test group differences in dyadic attention. Based on previous research, we expect that FXS groups will exhibit prolonged visual engagement with the toys and have difficulty disengaging or shifting attention to social bids, while DS groups will spend more time in social attention and have difficulty engaging with the objects. TD groups will successfully regulate their attention between objects and social bids. The purpose of this project is to identify early markers of attentional difficulties. If a child cannot regulate their attention it limits their developmental opportunities. This research will eventually be used to develop intervention strategies to encourage healthy attentional control and cognitive development.

Roche, Samantha

Mentor(s): Ms. Gina Spence

Failure Is The Best Teacher

Failure is one of the best teachers out there, and to be successful, you have to be comfortable with failing. The summer after my Freshman year, I applied for an events operations internship with Charlotte Center City Partners, a nonprofit organization focused on the development of the city of Charlotte through entertainment, infrastructure, neighborhoods, jobs, and more. I was new to the industry and excited for new experiences to grow. What I didn't realize was how often success also comes some level of failure which I learned during the internship application process: I failed before I even got an interview. However, I had no idea that this failure would actually lead me to eventually get the job. With the help of one of USC's finest professors, Dr. Stephen Shapiro, who often shared his wisdom with our SPT 380 Sports Marketing class, I found myself reminiscing on some of my past failures after an inspiring lecture. It was then that I truly realized just how important failure is when it comes to success, and this would be a defining moment in my Sport and Entertainment Management career.

Rodgers, Jessica

Mentor(s): Dr. Susan Lang, Mr. Bryan Benitez-Nelson

Comparing Carbon Sources of Microbes in the Chimneys of the Lost City Hydrothermal Vent Field: Does Location Matter?

The Lost City Hydrothermal Field hosts distinctive microbial communities supported by the products of serpentinization reactions. Chimney interiors are characterized by an anoxic environment, while the exteriors are mixing zones of hydrothermal fluid and seawater. The anoxic environment of the chimney interior should promote microbial communities that differ in energy and carbon sources from those living on

the exterior. We collected a large, intact chimney from Lost City during the 2018 expedition with distinct interior and exterior sections. We have analyzed lipid biomarkers from both interior and exterior sections of the chimney to investigate the spatial distribution of microbial communities, focusing on the fatty acid synthesizing bacterial community. The distribution of long-chain fatty acids are distinctly different between the interior and exterior of the chimney. The interior section contained saturated fatty acids while the exterior contained both saturated and partially unsaturated fatty acids. These differences provide insight into the spatial distribution of the microbe communities inhabiting chimneys. This spatial distribution implies that each community is utilizing distinct carbon and energy sources. Identifying these sources could offer insight into the ability of similar serpentinite environments to host microbial communities.

Rodrigues, Danny

Mentor(s): Prof. Tiffany Conde

Harmony Through Clarity

During the spring semester of my sophomore year, I learned about the importance of perspective through the teachings of Professor Andrew Spicer's IBUS310: Globalization and Learning class. Twice a week, we would meet to discuss several real-world dilemmas where there was no clear correct answer, forcing us to recognize the validity of each viewpoint and see the situation as a foreign government official would. Not only did such a format strengthen my awareness of the behaviors and emotions of those around me, but it allowed me to empathize with the struggles of a diverse collection of students 9,000 miles from home. One full calendar year later, I found myself boarding a plane destined for Brisbane, Australia. While abroad, I formed lasting relationships in the wake of a global pandemic, consoling individuals as they dealt with increased isolation and stress. These experiences allowed me to put into practice the lessons of IBUS310: Globalization and Learning, as students of Asian, Australian, French, English and Italian descent shared their stories, problems and perspectives with me over the course of an unforgettable semester. These relationships prompted me to immerse myself further into the melting pot of culture that I had become surrounded by, as I sought out a student organization called the Queensland University of Technology Exchange Buddies (or QUT Exchange Buddies for short). The organizers of this group scheduled a series of excursions for students to participate in and make the most of their time in Australia, providing me with opportunities to climb mountains, intermingle with exotic wildlife, and witness the sheer beauty of the Australian coastline. Each adventure allowed the members of the group to feel more comfortable, accepted and understood, instilling a feeling of harmony unlike any other. To this day, I carry the spirit of unity and camaraderie that I felt in Australia with me in every social interaction that I take part in, preaching the value in developing one's multicultural lenses wherever I go.

Romes, Aubri

Mentor(s): Dr. Casey Giraudy

Leading Through Mentorship During a Pandemic

A student's first year of college is an extremely formative time that shapes a student's attitude toward academic success, community, and time management. All of these factors impact the rest of the student's college experience and ultimately affect their career. During my senior year, I served as a University 101 peer leader where I had the opportunity to help first year students navigate their transition to college and share my passion for the University of South Carolina. As a peer leader, I acted as a mentor and liaison between the students and my faculty co-instructor. I was able to organize lessons about important topics that influence one's college career including time management, academic success strategies, on-campus resources, and how to build a strong community that promotes success. This opportunity allowed me to cultivate my leadership and presentation skills and gave me the unique chance to serve as a mentor in the midst of a pandemic. In such uncertain times, it was critical to be a mentor who was able to adapt to ev-

er-changing situations and communicate effectively. I was able to develop my communication skills both in-person and via online platforms. Adapting to new situations, overcoming situational obstacles, and becoming more comfortable with various forms of technology enabled me to be an effective mentor during turbulent times. Being an effective mentor enabled my students to transition to college more smoothly and successfully prepared them for life on-campus and in the workforce. Having experience being a successful leader with the ability to build relationships in all kinds of environments will help me stand out as a valuable leader in the community and will facilitate my success in my future business career.

Rondeau, Emma

Mentor(s): Dr. Hannah Rule

Reaching my Full Potential at the University of South Carolina

Here at the University of South Carolina, students are presented with a tremendous amount of resources to help them reach their full potential at the school. I am lucky enough to be a part of the Student Success Center as a Supplemental Instructor (SI). This role allows me to connect with so many students on campus and help them succeed. For six semesters, I have been an SI for Calculus II. This means that I attend class with the students and hold hour-long sessions, three times a week to help cover material with the students and work on examples with them. I am in charge of leading and organizing these sessions so that they are catered to different learning styles. I chose to take this role my Sophomore year of college because of my passion for math. I know that I have such a love for math and, although math is a tough subject for other students, I wanted to teach them in a way that they could love it as much as I did. I wanted to share my passion with other students and get them excited about learning. I was able to do this by creating a welcoming and fun environment for all students who came to my sessions. I tried my best not to lecture at them but to get them involved in what I was teaching. Throughout my job as an SI, I've met so many amazing students who have grown to be great at math. I found that a lot of my students not only came to my sessions for help, but also as a place to meet new people and enjoy their time at Carolina. I am honored that so many students found comfort in my sessions and in the environment that I created, and I am pleased to say that I successfully passed on my passion of mathematics to many other students in my sessions.

Rowland, Alan

Mentor(s): Dr. Yanwen Wu

Analysis of Piezoelectric PVDF-Au Films

Polyvinylidene Fluoride, PVDF, is a plastic polymer that has piezoelectric effects when created under an electric field, meaning it can produce an electric response to a mechanical impulse. Studies have characterized PVDF thin-films well, but either the recipes for the films are hidden from the paper or they only characterized the piezoelectric phase of the film. In addition to this, not many optical studies have been conducted in order to test whether one can achieve a wavelength-dependent light sensor with PVDF films. PVDF thin-films, when embedded with gold nanoparticles, are theorized to produce an electric response when subjected to a wavelength that matches the resonance of the gold nanoparticles. The idea is that the plasmon resonance induced by the incoming light resonating with the gold nanoparticles in the film will produce mechanical stress on the film, thus producing an electric response. Dr. Wu's research group has been working for the past two years in order to create a recipe to produce piezoelectric PVDF thin films consistently and they have tested the films for their piezoelectric effect. The PVDF films created under high-electric fields have been sent to undergo X-Ray Diffraction and exhibit a primarily polarized phase. Also, preliminary data has shown that the PVDF and PVDF-Au films, when compared to control films, consistently show a significant piezoelectric response. These results indicate that the recipe can consistently create polarized PVDF thin films and that the films are exhibiting a strong piezoelectric response, which will pave the way to testing the PVDF-Au films for their increased piezoelectric response due to plasmon

resonance.

Rubenstein, Rose

Mentor(s): Dr. Terry Wolfer

The importance of cross-cultural psychology and knowledge

Traveling has always been a passion of mine, and I believe in the importance of cross-cultural psychology and knowledge. As a psychology major with a sociology minor, I have learned a lot about how society and our culture shapes who we are and how we act. Learning about other cultures and how it affects norms and behaviors is extremely important for personal and societal growth. I plan to go to graduate school and become a psychotherapist, so learning more about other people and what affects the way they behave is truly beneficial for my future since culture helps shape who we are and the symptoms we may display when ill. Seeing the world through a new lens by immersing yourself in a culture is the best way to learn about others and that is what I got to do when I went abroad. Being half Canadian I have been traveling out of the country since I can remember, but my opportunity to study abroad in Amsterdam at the Vrije Universiteit, although cut short, was a life changing experience. My opportunities to travel to Greece and Italy on my semester and to Israel on Birthright were also transformational. When I was abroad I was able to learn about the different degrees to which these cultures handle preventative medicine and how they define it, especially in the Netherlands at the beginning of the coronavirus. While at the Vrije Universiteit I was able to take a cross-cultural psychology class and a Dutch language and culture class. Being able to take these classes abroad was especially significant because I could point out in real time the different concepts I was learning about. My immersing myself in these cultures I was able to learn about the different societal norms and expectations and how they differ from what I am used to in the United States and Canada. By learning about these new cultures and how different people act, I am more able to put myself in other peoples' shoes and understand differences. These experiences also allowed me to become more empathetic.

Rush, Samantha

Co-Author(s): Terrica Bowers

Mentor(s): Dr. Susan Richardson

Bromide and Iodide Mapping of South Carolina Rivers: What Kinds of DBPs Form in the Wonderful Iodine State?

The disinfection of water has been hailed as one of the most important triumphs for public health in the 20th century. Drinking water treatment plants generate safe drinking water by inactivating microorganisms through the use of several popular disinfectants including chlorine, chloramine, chlorine dioxide, UV irradiation, and ozone. Each of these disinfecting agents, despite their ability to sanitize water sources, also contain the ability to generate toxic disinfection by-products, or DBPs, when reacted with naturally occurring organic matter, bromide, and iodide. Therefore, the presence of bromide and iodide ion precursors present at different geographical locations can be a concern for human and aquatic health. This study examined the relationship of bromide and iodide ions as precursors to DBP formation in the first statewide analysis of the various bodies of water in South Carolina. Since the Fall Line in SC served as the coastline in ancient times, fossilized seawater, or ancient salt deposits, containing high concentrations of bromide and iodide have remained. Through a partnership with the South Carolina Department of Health and Environmental Control (DHEC), water samples obtained both throughout the state and over the course of two years were analyzed for bromide and iodide concentrations using Ion Chromatography. In accord with the Fall Line, samples containing high levels of bromide and iodide were located at or below the Fall Line. Moving forward, this general trend is critical to determine the relationship of DBP formation levels in drinking water across the state. Currently, the relationship between preexisting bromide and iodide levels and resulting DBP formation are underway by performing liquid-liquid extraction, gas chro-

matography mass spectrometry (GCMS), and total organic halogen (TOX) methods to identify and quantify DBPs at absent, low, medium, and high iodide concentration levels in the state. Based on the number, concentration, and identity of the toxic DBPs discovered, this research will offer quantitative information of potential hazards to make water safer for human and aquatic life.

Rushton, Isobel

Mentor(s): Mr. Jerome Scott

Peer Leadership

This institution and the student organizations that I have joined have built me into a woman that values knowledge, citizenship, and unflinching determination. My most significant contribution to the University of South Carolina has been my commitment to raising the student voice to the forefront of administrative, faculty, staff, and institutional decisions. Serving as the first international Student Body President and representing over 50,000 of my peers at the local, state, and national level allowed me to grow both personally and professionally and find a passion for advocacy. Through my role as Chapter President of Alpha Chi Omega, I cherished personal connection and found a future in Domestic Violence Awareness. I gave tours to over 1,000 prospective students as a University Ambassador and learned what it meant to mentor younger students and interact with a diverse group of people. My presentation will discuss the insights that I have gained through my various leadership positions and how these roles allowed me to grow into the woman I am today.

Ryan, Madison

Mentor(s): Dr. Carole Oskeritzian

Regulatory role of microRNA-34a on human mast cell inflammatory gene expression

Tissue-resident mast cells (MC) are located around blood vessels where they initiate inflammatory processes through the release of vasoactive mediators, including the sphingolipid metabolite sphingosine-1-phosphate (S1P). We previously reported that in vitro S1P ligation of MC-expressed S1P receptor (S1PR)2 upregulated inflammatory genes that promote vasculature network expansion or angiogenesis. Using a preclinical model, our laboratory established that S1P served as a MC stimulus in pre-symptomatic eczema, an inflammatory skin disease. We also established that S1P stimulation decreased the expression of microRNA-34a in mouse MC. Short noncoding RNAs, microRNAs act as post-transcriptional silencers. Based on predicted microRNA-34a target gene analysis, we hypothesized that decreased microRNA-34a may up-regulate MC angiogenic vascular endothelial growth factor-A (VEGF) and S1PR2 gene expression. Human primary skin MC were in vitro activated with S1P and gene expression measured by quantitative real-time PCR (n = 4 donors). A 22.5% decrease of microRNA-34a expression was substantiated after S1P activation, normalized to SNORD96A housekeeping gene and unstimulated controls. We found a concomitant increase in target gene expression of 1.78-fold for VEGF (n = 4) and 1.53-fold for S1PR2 (n = 3). Next, human skin MC were transfected with a synthetic microRNA-34a inhibitor to mimic S1P activation (n = 3). After confirmation of microRNA34a inhibition in transfected MC, we found an increase of VEGF mRNA expression (1.25-fold) and of S1PR2 (1.28-fold for 2 out of the 3 donors). These results uncover a novel regulatory role for microRNA-34a on MC inflammatory gene expression. Funding: Magellan award to MRR and NIH/NIAMS-R21-AR0677996 to CAO.

Saathoff, Emily

Mentor(s): Dr. Jeffrey Schatz, Ms. Julia Johnston

Feasibility of an electronic pain management intervention for parents of preschool aged children with sickle cell disease

Introduction: Youth with sickle cell disease (SCD) experience vaso-occlusive pain crises that increase in

frequency with age. Vaso-occlusive pain is commonly treated with pharmacological agents. Behavioral pain management strategies can be used to help mitigate pain among youth with SCD. Currently, these strategies are often not accessible for youth or parents. The present study examines the feasibility and utility of an electronically-based intervention that teaches behavioral pain management strategies to parents of preschool children with SCD. The aim of this intervention is to educate parents and help them apply cognitive and behavioral strategies that can be used to help manage their child's pain while fostering strong coping skills at a young age.

Methods: Parents (N=10) of children between the ages of 2 and 6 with SCD were recruited from an outpatient hematology/ oncology clinic. Caregivers completed baseline measures before watching six videos on behavioral pain management strategies for youth with SCD over 6-12 weeks. After each video, participants completed online and phone surveys about video satisfaction, use of behavioral pain management strategies, and efficacy of these strategies.

Results: 80% of participants reported that the pain management videos were 'very' to 'extremely' useful and that the information in the videos was relevant for their child. 100% of participants indicated that the information was easy to understand and rated visual and audio quality as high. 100% of participants reported that they would "definitely recommend" this intervention to other families. 100% of parents whose child experienced sickle cell pain during the intervention reported using behavioral pain management strategies from the intervention, which were rated as 'useful' to 'very useful' in helping to manage their child's pain.

Discussion: Findings from the pilot study indicate that the Preschool Pain Management Program is perceived as high quality, easy to understand, and includes relevant and useful information for parents. Importantly, parents whose child experienced pain during the intervention endorsed use of the behavioral pain management strategies taught through the intervention. Collectively, these data suggest that this intervention study is feasible, useful, and helps parents apply behavioral pain management strategies to manage their child's sickle cell pain.

Saftner, Jackson

Mentor(s): Dr. Thomas Owens

Mapping of Shear-Coupled P-waves in North America

Shear-coupled P-waves are particularly ephemeral waves produced by S-to-P conversion of vertically polarized, teleseismic shear waves. Under certain conditions, shear-coupled P-waves can achieve total internal reflection within the crust, producing large amplitude arrivals. In previous studies (Owens & Zandt, 1997; Zandt & Randall, 1985), shear-coupled P-waves were used to discern crustal properties and to resolve upper mantle discontinuities. Shear-coupled P-waves are difficult to observe because they require specific source depths, radiation patterns, as well as a source-receiver distance within the post critical regime. Due to the specific conditions required to produce shear-coupled P-waves, previous observations are sparse. In the time since previous studies on shear couple P-waves, seismic network coverage has vastly improved in North America. EarthScope's Transportable Array (USArray) project has improved coverage by collecting data at temporary stations deployed at roughly 70 km intervals across the entire United States. Using a program called standing order for data (SOD) (Owens et al., 2004) we automate the data collection process to find seismograms from source-receiver pairs similar to those used in Zandt & Randall (1985). Using a series of sorting scripts, we manually select seismograms with clear shear-coupled P-wave arrivals. We expect to find relevant shear-coupled P-wave arrivals at several stations in close proximity to one another. Combining these observations with synthetic seismograms, produced using the reflectivity method (Randall, 1994), we can further constrain the parameters required to observe shear-coupled P-waves. Provided we find large SPmp phases (S-waves converted to P-waves at the free

surface and reflected up from the moho), we can determine crustal properties using the methods discussed in Owens & Zandt (1997). In the event that the large SPmp phases appear less frequently, we can also use more general waveform modeling techniques (Zandt & Randall, 1985; Gangopadhyay, Pulliam & Sen, 2007) to produce models that we can then compare to results from other studies in the area.

Saini, Jasdeepkaur

Mentor(s): Prof. Anna Oswald-Hensley

Leadership role

I got the opportunity to become a Peer Coach for OSP during April 2020, when I had an interview and later, I was selected to be one of the peer coaches for 2020-2021. I started working in August 2020 (fall semester). In this leadership opportunity, I was supposed to be a friendly mentor for the new freshman student, so they can feel free to share and discuss their college life issues. As students won't feel comfortable to address issues to an adult, who's an older person (professor/advisor) and be someone they can consider me as a friend who knows about the college life they would step into and would feel free to share me their problems. Along with keeping a friendly relation with my mentees, I respected their confidentiality and kept their information private. I would text them at least once a week to check on them and to see how things are going for them. I could have done a picnic lunch somewhere under trees on the campus but, because of COVID, I would have a lunch or pizza party at least once a semester where they get more comfortable talking to each other. I chose this opportunity, because I have known how difficult first year of college for someone who comes directly after high school like me. I had many issues when I was a freshman and especially in the first semester, because I had no one to guide me through. I decided to be a peer coach because I did not want the new freshman students to go through the same problems I did. I tried to catch up on them and help them in all the possible ways I could. I found out that freshman can have problems, to which I could have the solution. I have learned many things in my experience of the leadership role, and I plan on using what I learned further in my college life because, I feel helping someone to not make the same mistakes is not just a job but has become a habit for me now.

Saliccioli, Brittany

Mentor(s): Dr. Scott Tanner

Modeling inflammatory bowel disease using p-glycoprotein deficient *Caenorhabditis elegans*

Inflammatory Bowel Disease (IBD) is a term used to group similar diseases characterized by the chronic inflammation of the digestive tract. The MDR1 gene codes for a protein called P-glycoprotein (pgp), which is found in intestinal cells. It is suggested that pgp affects the intestine through the formation and function of tight junctions, which forms a barrier between two intestinal cells by linking them together. Failure of this barrier would allow bacteria through the intestinal wall, leading to chronic inflammation in the bowel, as seen in patients diagnosed with IBD. *C. elegans* are simple, transparent organisms that have a short generation time and high offspring numbers. *C. elegans* contain 15 different pgp genes, and pgp-3 is known to be expressed in the intestine. Because pgp deficiency is associated with intestinal damage, we hypothesized decreased fluorescence, growth rate, and survival rate in pgp-3 deficient *C. elegans* compared to the control, indicating intestinal damage. Nile Red, a fluorescent dye, was used to compare intestinal permeability and ingestion of Nile Red in the control and pgp-3 deficient *C. elegans*. A Student's t Test was performed. There was a significant decrease in the mean fluorescence in pgp-3 deficient compared to control ($P \leq 0.01$). Mean defecation behavior length, a measurement between intestinal contractions, was significantly increased in pgp-3 deficient *C. elegans* ($P \leq 0.01$). A lifespan study was performed on control and pgp-3 deficient *C. elegans*, and a Log-Rank test was performed. Pgp-3 deficient *C. elegans* had shorter lifespans than control *C. elegans* ($P \leq 0.01$). Pgp-3 deficient *C. elegans* displayed lower Nile Red fluorescence staining and a longer mean defecation behavior length. These indicate decreased ingestion and intestinal function. Additionally, the pgp-3 deficient *C. elegans* displayed decreased survival

compared to control. Taken together, these data suggest intestinal damage present in *pqp-3* deficient *C. elegans*, which could be used as a model for intestinal disease.

Salrin, Allie

Mentor(s): Ms. Maureen Grewe

Leading with Integrity

Through the 2020 calendar year, I served as the president of the Carolina Judicial Council (CJC). CJC is an affiliated student organization which trains members to serve on student-requested disciplinary hearing panels. Additionally, CJC members act as ambassadors of the Carolinian Creed. My experience as president of CJC was both the most challenging and most rewarding of my college career. As president, my aspirations were to support our membership's personal and professional growth, expand CJC's campus impact, and further develop member accountability. In any normal year, the role requires a significant amount of flexibility and responsibility. In the year 2020, the role of president required an even greater degree of flexibility and responsibility. By March of 2020, when campus closed, I and my fellow executive board members had already started planning and programming initiatives to be continued throughout the year. Because of the challenges posed by COVID-19, we had to cancel the majority of our events for the spring 2020 semester, including our largest event, CreedX. This is when my leadership skills were greatly tested. To continue to see that CJC and its members were successful, I lead our executive team through moving all of our operations online. This transition required me to exercise my leadership skills to ensure the functionality of CJC, and both the development and accountability of our members. I was able to still accomplish these goals by leading with integrity and compassion. I aim to use this experience and my growth as a leader as I enter the field of law enforcement after graduation.

Samani, Stephanie

Mentor(s): Dr. Francis Spinale

Insight into the Heart with Exercise- Post Transcriptional Molecular Events

Introduction: Exercise is a recognized treatment modality in patients with cardiovascular (CV) disease and is important for overall CV wellness. While exercise changes CV structure and function, such as that of the left ventricle (LV), the molecular basis for this effect is unclear. MicroRNAs (miRs) are conserved small non-coding RNAs that control post-transcriptional processes within cells and how miR profiles may change with exercise is an area of active investigation. This study tested the hypothesis that LV miR profiles would change in a pig model of exercise and in association with changes in LV function.

Methods and Results: Mature pigs (n=5) were trained to run on a treadmill at a setting of 10 degrees elevation (5 days/week for 4 weeks) with a goal of 2.5mph for 10 minutes. LV function, particularly diastolic function was examined using speckle tracking echocardiography at baseline and at end exercise. LV samples were then analyzed using a custom miR array (84 miRs) and non-exercise pigs (n=10) were used as referent controls. LV myocardial stiffness, a key physiological measure of efficient LV filling, fell by approximately 25% after exercise training. A robust change in 18 miRs was observed in which 78% (14) were upregulated and 22% (4) were downregulated. Moreover, miRs with a greater than 2 fold change with exercise were mapped to processes regulating LV myocardial growth.

Conclusion: A standardized exercise training protocol improved critical indices of LV function, particularly stiffness indicative of enhanced/efficient filling. The molecular basis for these exercise induced changes in LV function likely include shifts in post-transcriptional control by a specific set of miRs. These findings set the stage for how to utilize miR profiling to enhance exercise effectiveness on LV function, particularly in patients with CV disease.

Samuels, Kara

Mentor(s): Prof. Anna Oswald-Hensley

The Impact of Student Government

I am currently the President of USC Sumter's 2020-2021 Student Government Association and I have been serving in this role from the previous semester. As the President of SGA, I represent my peers, faculty, and campus overall to the community. Going further, I (along with the officers of SGA), are the face and voice of the student body, meaning that whenever students submit complaints, and suggestions, I am ready to formulate solutions and assist in making those ideas a reality- with the help of the Student Life Department. When I first came to USC Sumter, I already knew that I wanted to be a member of SGA (seeing that I was a member of my previous high school's organization), but I wanted to step further and become an officer. However, I was terribly nervous and doubted in my leadership skills because I was not the most outspoken or confident. Even though I was uncertain in my abilities, my firm belief in advocating for others was far more important than being shy. I knew that having this experience would further develop my confidence skills and I would have the opportunity to lead my peers. I also chose to run for President because I wanted the honor to represent my school wherever I went. Although it is hard work, it is very rewarding. Serving in this position strengthened (and continues to strengthen) my leadership skills. I am more outspoken, confident, and assertive. I have also learned how to better manage my time and prioritize. Additionally, and more importantly, I have improved in understanding, interacting, leading, mediating, and working with people who have different opinions and lifestyles than me. In addition, I developed a deeper appreciation for differences, because each person has a unique view of life that I can learn and draw inspirations from. SGA tremendously impacted me, and I know that I will use the valuable lessons from this moment on. In anything I pursue, I will be confident, outspoken, and an advocator for anyone who may need it.

Sanchez-Cruz, Maria

Mentor(s): Prof. Marketa Kubickova

Minorities health being impacted by social factors

There are several independent aspects that include one's cultural background, which can have a major impact on one's health. One's cultural background, religion, race, ethnicity, income, and numerous similar factors can play a huge role in the health of an individual. The underrepresented community has constantly dealt with difficulties in receiving adequate representation and it is necessary to obtain data for these communities that are not being properly investigated. The purpose of the study that I volunteered for is to use a 2-year nutrition behavior program that evaluates how well a vegan diet versus a low-fat diet can help prevent cardiovascular diseases within the African American community in South Carolina. The study duration is 2 years with several cohorts that are still taking place where participants are being put through a food intervention with 2 different food groups. Finally, the study demonstrates how the simple factor of race plays a huge role in health-related issues. Indications are that research within minorities can improve health and statistic representation giving the medical field and world a better overview of social impacts on minorities' health. This information can be very helpful in increasing health opportunities for minorities as there are several diseases that are high in numbers within African Americans and other major minority groups like Hispanics and women.

Sandago, Emma

Mentor(s): Dr. Ana Pocivavsek, Dr. Snezana Milosavljevic

Sex Dependent Cognitive Impairments in Kynurenine 3-monooxygenase Deficient Mice: Relevance to Schizophrenia

Cognitive impairments in schizophrenia (SZ) have been associated with the kynurenine pathway of

tryptophan degradation. Metabolites of this pathway include kynurenic acid (KYNA) and 3-hydroxykynurenine (3-HK). As an endogenous antagonist of NMDA and α 7nACh receptors, KYNA is implicated in learning and memory processes. Elevated levels of KYNA have been found in individuals with SZ. To mimic increased KYNA in rodents, the kynurenine pathway is disrupted by knocking out the gene *Kmo* which encodes the enzyme kynurenine monooxygenase (KMO). We hypothesize that reduction of the KMO enzyme induces cognitive impairments in mice. To test this hypothesis, we presently utilized 4 groups of C57BL/6J mice: knockout *Kmo*^{-/-} (KO), heterozygous *Kmo*^{+/-} (HET) and *Kmo*^{+/+} (WT) offspring from HET breeders, and wild-type (control). Male (n=35) and female (n=16) mice were tested in two behavioral assays, passive avoidance (PA) and Barnes Maze (BM), to assess learning and memory as a result of increased KYNA. Male control, HET and KO mice exhibited learning between the testing days in the PA. Female control and HET mice exhibited avoidance learning, but WT and KO females did not display learning between trials. In the BM, control and KO males did not differ in goal box entry latency. While control females readily learned in the BM, female KO mice displayed significant impairment, evidenced as higher latencies in goal box entry across testing days compared to controls. In female mice, we report a main effect of testing day and genotype in the BM experiment. Other parameters of the BM including velocity, distance traveled, and false escape entry errors were also analyzed. We presently demonstrate preliminary evidence of learning and memory impairments in *Kmo* KO female mice compared to counterpart controls, while learning is not impaired in *Kmo* KO male mice. These results indicate that the elimination of KMO may cause cognitive deficits in a sex-dependent manner and our ongoing studies are designed to further test this hypothesis. Our findings provide new insight towards the contribution of KYNA in learning and memory in a novel genetically modified rodent model for studying cognitive impairments associated with schizophrenia.

Santaniello, Tom

Mentor(s): Ms. Maegan Gudridge

Change starts with a conversation

My most impactful contribution to the University of South Carolina was serving as a Resident Mentor. Being an RM taught me how to connect with people, effectively lead a diverse group, respond to crises and adapt to meet others' needs. I'm a better person because I was an RM. University Housing's tagline for RMs is that they make an impact on others. I was fortunate that the position had such a profound impact on me. I never expected the job to be a defining experience of my college career, but it became the cornerstone of my time at UofSC. My presentation will focus on the lessons I learned as an RM and how I plan to translate them beyond my undergraduate experience.

Santiago, Berenisa

Co-Author(s): Daniella Monroy

Mentor(s): Dr. Lisa Fitton

Empirical, social, and practical advantages of a bilingual education setting

Our presentation focuses on bilingual education compared to monolingual education often used in the United States. We discuss empirical, social, and practical advantages of a bilingual setting, comparing it to a typical monolingual setting. The goal of a bilingual education program is to (1) equally give all children the opportunity to become fully proficient and literate in both languages, and (2) support all students' cultural identities. Throughout U.S. history, many public schools have been restricted to educating learners in primarily monolingual English classroom environments. Traditional immersion schools have prioritized assimilation over diversity, leading students to lose touch with their inherent culture thus muddling their self-identity. Therefore, our presentation will also point out how an effective dual language environment may reduce some of the negative consequences of English-only learning environments. Diversity and individual culture in this setting would promote both the maintenance of a child's first language, and

the internalization of familiar social values.

In English-only settings, dual language learners are also at heightened risk for over-identification and under-identification as having disorders. Both forms of misidentification have negative consequences to their learning. Assessment of bilingual children in only one language cannot accurately measure overall language proficiency and competence. A dual language setting that provides an effective bilingual support system that recognizes student's abilities in both languages would help children early on with navigating a different cultural and linguistic setting. If done effectively, bilingual programs can encourage development of strong language skills, healthy self-image, high cultural awareness, and sense of belonging among participating children. These outcomes can be obtained by providing equal resources and opportunities to completely master both languages. Providing necessary resources could include hiring more professionals who are aware of the advantages of successfully mastering two languages, and not just pushing one language in a classroom setting. A developed curriculum where two languages can coexist has many advantages such as helping bridge academic gaps, fostering positive cross-culture interpersonal skills, and contributing to building an equitable system for all learners.

Satme, Joud

Mentor(s): Dr. Austin Downey

Structural Health Monitoring using a Drone Delivered Sensor Package

This paper presents a novel method of procuring and processing data for the assessment of civil structures via vibration monitoring. This includes the development of a custom sensor package designed to minimize size/weight while being fully self sufficient (i.e. does not rely on external power). The developed package is delivered to the structure utilizing a customized Unmanned Aircraft System (UAS), otherwise known as a drone. The sensor package features an electropermanent magnet for securing it to the civil structure while a second magnet is used to secure the package to the drone during flight. In this work, the novel B-Spline Impulse Response Function (BIRF) technique is utilized to extract the Dynamic Signature Response (DSR) from data collected by the sensor package. A series of tests were performed to validate the feasibility of these methods including a flight test and data collection tests. The flight tests confirmed the ability of the drone to deliver and recover the sensor package from the underside of a structure. The same structure is used to demonstrate that the DSR techniques successfully detect structural damage in a fast and efficient way. The advantages and limitations of the proposed techniques at their current states are discussed and recommendations for further developments are made.

Satti, JJ

Mentor(s): Dr. Homayoun Valafar

MassBlast: Protein FASTA Analyzer

Better understanding of new arising organisms (such as COVID-19) heavily relies on the comparison of its genome or proteome to other well-studied organisms. Comparison of biological organisms begins with comparing the peptide sequences with one another. The National Center for Biotechnology Information (NCBI) provides tools such as the Basic Local Alignment Search Tool (BLAST) to specifically accomplish this task. However, BLAST is only designed to excel in comparing one singular sequence file to another sequencefile. However, under practical conditions, researchers may be interested to compare the sequences from one organism to an entire library of selected organisms. his requires running multiple BLAST queries, which is not practical for gathering that mass of data. Additionally, the results that BLAST queries produce are long and very detailed, therefore not easily comprehensible. Data as such is very useful and it certainly conveys a lot of information, but it can be difficult to parse given its scale. To facilitate a more useful user experience, we have developed a computational tool named MassBlast.

MassBlast is both a web and desktop application that helps researchers overcome these challenges.

MassBlast allows the user to compare a FASTA sequence file to multiple FASTA sequence files with one

simple query and prepares the data in an exportable format. To make large-scale data easier to process, MassBlast records 4 significant units (Score, ID, Positives, and Gaps) that are used to quantify the similarity among peptide sequences in a concise format. With those values, MassBlast also generates interactive heat maps that allow researchers that allow users to view the data from both an overall and point by point basis. In its essence, MassBlast is a tool that streamlines the process of gathering and aids the analysis of proteomic data.

Schettini, Dominick

Mentor(s): Prof. Hilary Lichterman

The Great Environmental Comeback of 2021

During the Fall 2018 semester, I studied abroad on exchange at the University of Newcastle in Newcastle, New South Wales, Australia. I have always been fascinated by the unique culture, biodiversity, marine life, landscape, and ocean swells Australia contains and wanted to experience it for myself. In addition, the University of Newcastle is renowned for its engineering program and faculty, allowing me the opportunity to expand my network amongst its professors and my peers. I grew a deep interest in Fluid Mechanics and how the oceans tides can be harnessed to produce renewable energy. Conversations with my EMCH360 professor Fluid Mechanics professor inspired me to further my research in this field. I arrived in Australia imagining five months filled with surfing, hiking, and exploring, although I left the country with something way more impactful to my character and career development. After experiencing life threatening surf wipeouts on reefs and being approached by sharks spearfishing, I grew a humbling respect for the ocean. I learned a more meaningful purpose as to why we need to protect this earth we live on. I experienced a depleted Great Barrier Reef and visited the most polluted beaches on the planet in Bali, Indonesia. The deterioration I saw many times surpassed the beauty. This experience was personally significant because, at the age of 21, I had never first-hand learned how our everyday choices we make all the way in America directly affect some of earth's most beautiful landscapes on the opposite side of the globe. The five months I spent abroad was a time of self-improvement, expeditions, and new perspectives. I have cemented my passions, merging my education in mechanical engineering with my obsession with the ocean. I am confident that my educational experiences and drive to leave earth better than we found it will open doors for me to influence others and be a part of the greatest environmental comeback in history!

Schierlmann, Davis

Co-Author(s): Julia Herlong

Mentor(s): Dr. Michael Gavin, Dr. Stanley Dubinsky

Language Policy, Ethnic Conflict, and Social Media in Francophone Europe -- In this project, we study two neighborhoods, Molenbeek in Belgium and Seine-Saint Denis in France, home to demographically similar populations. This includes many people of North African Origin, often Arabic speakers. By comparing two similar groups, we get insight into the ways past language conflicts, government structure, and policy decisions are impacting present day language conflict in both nations. Through this comparative analysis, we hope to gain a better understanding of language conflict in Francophone Europe and the policies that have either ameliorated or intensified ethnic resentment. We will investigate how legislation, political events, and ethnic and nationalist sentiment are represented in news reports and social media in Francophone Europe, in French and minority languages, including Dutch and Arabic.

The project is designed in the form of a traditional research thesis with elements of data science layered in to support the qualitative research. Following Davies and Dubinsky (2018), we began with an intensive historic analysis to better understand the nature of the conflict to be used to guide the subsequent data mining efforts. This project will address several interrelated research questions. What forms

of violence (structural, physical) do language conflicts in Francophone Europe take? What have specific pieces of legislation, related to language policy and educational practice, done to ameliorate or intensify intergroup tensions? In what ways does language policy operate as a political or economic weapon? How are these issues discussed on social media? How do different social media trends differ within the context of Francophone Europe, based on what language is being used? The significance of understanding these questions goes far beyond the conflict between French, Arabic, and in Belgium's case Dutch. The language conflicts in Europe share characteristics with many others going on around the world. By understanding the drivers behind language conflict in Francophone Europe we can shed light on many more conflicts going on around the world today.

Schreiber, Daniel

Mentor(s): Dr. Sayward Harrison, Dr. Tessa Hastings

Knowledge of Pre-exposure Prophylaxis (PrEP) among Health Professional Students in South Carolina

Human immunodeficiency virus (HIV) continues to be a health crisis in the United States, with an estimated 1.1 million individuals living with HIV as of 2016, and 38,739 new diagnoses of HIV in 2017. The crisis is particularly of concern in the states of the Deep South, which account for nearly half of new HIV infections in the US, despite only accounting for 38% of the US population. To combat this issue, Pre-exposure Prophylaxis (PrEP), a once-a-day pill recommended for persons at high risk for HIV, was approved by the US Food and Drug Administration in 2012. Compelling data shows that PrEP reduces an individual's risk of HIV infection by ~99% when taken daily. However, despite the demonstrated efficacy, PrEP uptake remains slow. The barrier to the uptake and usage of PrEP this that is of most concern to this study is the lack of awareness and knowledge of PrEP among healthcare professionals, especially in the South. This project seeks to assess the PrEP-related knowledge and awareness of students in health-related professional programs at UofSC, as well as identify where and in what context such knowledge is being acquired by the surveyed students. Students' awareness of PrEP, PrEP knowledge, sources of PrEP knowledge, general HIV knowledge, and HIV-related stigma will be assessed via the completion of web-based online surveys and focus groups. We will then systematically review curriculum lists to determine any courses where HIV and/or HIV prevention may be topics and review syllabi for key phrases of relevance to the study (e.g., "HIV," "PrEP," "pre-exposure to HIV," "HIV prevention", etc.). The results of this study could be vital in developing more well-informed curriculums for health-related programs, enabling us to intercept students while they are still in a learning environment and inform them of the effectiveness of PrEP before entering the health workforce. A more comprehensive understanding of PrEP among future healthcare providers could be instrumental in lowering the rates of HIV infection, especially in a region that is disproportionately burdened by the virus.

Schroers, Faith

Mentor(s): Dr. Marketa Kubickova

Building Competency in Research Skills through Sports Science Research Testing

During my last two years of undergrad, I've worked as a Research Intern for the USC Sports Science Lab directed by Dr. Shawn Arent. When I entered college, I had a strong desire to get involved in research because I wanted it play role in my future career as a physical therapist. Moreover, I wanted to finally apply the knowledge I learned in my Exercise Science lectures in conjunction with gaining more experiences and skills in the research process. One of my main responsibilities was to aid in performing testing. The VO2max test—a measure of cardiorespiratory endurance—was one I had the opportunity to administer on a variety of athletes and myself several times. I would also regularly attend the Women's Volleyball practices to collect data on heart rate and workload using the Polar system, which would help us track the athletes' fitness levels. Out of all of the tasks I've carried out, those two have been the most impactful on

my research experience as I realized that research is a constant learning process. I became more skillful and informed through participating in the research process as opposed to simply recalling information I memorized from class. When I started, I had doubts about my capabilities as a research intern because I thought I had to be very skilled before being a part of research. My team showed me that was a common misconception. Despite my lack of significant experience in executing fitness tests and real-world application of exercise science concepts, my lab supervisor put me in the driver's seat of the test sessions to let me learn from research firsthand. Once I was in, I quickly became competent in research testing. In the future, I will eventually complete a research project as part of my Doctor of Physical Therapy degree. I will approach it with the mindset that I will continue to discover more as the field of exercise science research and sports technology evolves.

Schubert, Gabrielle

Mentor(s): Mrs. Mackenzie King

Studying Abroad in Brussels, Belgium

During my semester abroad, I studied International Business and French at the Institut Catholique des Hautes Études Commerciales (ICHEC Brussels Management School) in Belgium. As part of my International Business degree, I had long looked forward to my required semester abroad, and though it was different than I expected, it was an incredible experience. During my time at ICHEC I was able to immerse myself in the international student environment, connecting with others from around the world and expanding my cultural awareness. I took classes like Nonprofit Economics and Consumer Behavior that helped develop my professional skills at a global level and inspire my intended career path. The intermediate French class challenged me to advance my language skills both in the classroom and in the city of Brussels. Unfortunately I had to return to the U.S. earlier than expected due to the pandemic. This was nothing that could have been planned for, but it helped me become more adaptable, resilient, and to cherish every moment of my experience. Since then, I have continued to follow Belgian and European current events and keep in contact with the many colleagues and friends I made during my semester at ICHEC.

Schwab, Daria

Mentor(s): Dr. Jennifer Grier

The Effect of Interferon Stimulated Gene IFI44 on the Intracellular Immune Response to Bacterial Infection

Interferon-stimulated genes, or ISGs, are key elements in the functionality of the immune response to pathogens. One interesting ISG produced during many respiratory infections is interferon-induced protein 44 (IFI44). Studies showed that an increase in IFI44 expression correlated with increased viral replication, while inhibition of IFI44 led to increased interferon production. Severe respiratory virus infections may lead to secondary pneumonia with pathogens such as *Acinetobacter baumannii*, a bacteria commonly associated with hospital-acquired infections that is capable of rapidly acquiring antibiotic resistance. To date, it remains unclear what role IFI44 plays during this bacterial infection. A549 cells, a human lung epithelial cell line, were treated with CRISPR-Cas9 to modify IFI44. Gene knock out will be confirmed with western blot and DNA sequencing. Both the knockout cells and wild-type A549s will be infected with *A. baumannii*. RNA will be extracted over 24 hours and reverse transcriptase quantitative PCR (RT-qPCR) will be performed to measure expression of host genes, such as IL-6 and TNF α , which are involved in the inflammatory response. Viability of cells will also be assessed. If there is a significant difference in viability in the presence or absence of IFI44 following infection, we will investigate cell death pathway activation by quantifying Caspase-3 relocation to the cell nucleus, a marker of active apoptosis signaling, via fluorescent microscopy. Results from these studies will determine if IFI44 could inhibit immune signaling and promote survival of *A. baumannii* infected cells, potentially contributing to the growth and spread of an increasingly antibiotic-resistant bacteria.

Scott, Jordan

Mentor(s): Mr. Jay Pou

Learning in a Teaching Position

During the fall semester of my junior year, I was given the opportunity to serve as a peer tutor for University of South Carolina's Student Success Center. I chose to become a peer tutor because I wanted to give back to my university and help struggling students at the same time. I knew it would be a rewarding position, however the impact it had on me surpassed anything I could have imagined. In this role I dedicated 10-15 hours per week working with students in classes that I had previously taken and done exceptionally well in. This included Biology 101 and 102, Chemistry 111 and 112, and Anatomy and Physiology 1 and 2, all classes required for my Exercise Science major. Being a peer tutor meant I had to listen to students' problems with course specific material and determine an effective way to help them. A seemingly manageable task became more difficult as I realized no two students have exactly the same needs. I learned that in a tutoring setting, active listening and effective questioning are two key tools that will help to make the most out of any session. Active listening was important for understanding what type of environment the individual was learning in and they type of student they were. This helped me to tweak my tutoring style to incorporate more visual or verbal lessons, for example, depending on how the student learned best. Effective questioning led me to understanding what problems the student was having with course specific material. I made sure to ask questions about the material that warranted more than a "yes" or "no" response in order to really understand what was and was not clicking for the student. By incorporating these techniques, I was able to effectively utilize our time together and leave students feeling more confident in their classes. I will also be able to use these techniques in the future to learn and grow as a student, professional, and overall person.

Scott, Deja

Mentor(s): Dr. Song Wang

Contour-base Shape Matching and Segmentation of Cultural Heritage Objects

Within the Snowvision Project, there was a critical need to find a solution for splitting images of individual sherds from an image containing several North American Southeastern paddle stamped sherds. Utilizing this science gateway enables researchers to share information about cultural heritage objects through a web interface and gain additional insight from further analysis. The Contour-Shape matching algorithm is a data preprocessing step that will segment groups of sherds into individual images and map them to their respective depth (.xyz) image. In this context, an RGB image is a colour image taken with a traditional camera and a depth image is a 3D scan of the object.

To test the Contour-Based Shape Matching Algorithm's matching accuracy, the algorithm was tested on a data set containing 101 RGB images, each containing 1 to 6 sherds, and 136 depth images, which contained a singular scan of a sherd. Once the algorithm has been run, it identifies the shape of the individual sherds from contours produced by analyzing binary versions of the original images. These images were then compared to the contours found in the depth images with each sherd contour being compared to an individual depth contour with the lowest score of dissimilarity in the set confirming the match. For future processing, the new segmented sherd, respective depth, and the resulting image are stored in a subdirectory denominated with the sherd's identifying name. The method was improved upon by blocking out non-sherd objects with a binary mask. The results of the test indicate that the sherds were accurately matched with corresponding depth images regardless of rotation, orientation or scale of both images. Additionally, the algorithm was successfully able to separate multiple sherds from an RGB image into its own RGB image and correlate to a depth image match.

We concluded that through the Contour-Based Shape Matching Algorithm, sherds were able to be separated from their original RGB image by their contours and correctly matched to a depth image. This result will enable researchers the ability to automate cropping and mapping individual sherd to the depth image.

Selzer, Paige

Mentor(s): Dr. Jabari Bodrick

Fulfilling a Purpose

During my junior year of college, I was presented with the opportunity to attend a medical mission trip to Alajuela, Costa Rica. For seven days we set up and ran a free health clinic in a very underprivileged town called La Carpio. Throughout the trip, we served around 173 patients, working closely alongside doctors to diagnose patients. We measured vitals, recorded the patient history and participated in an injection and suture class. In addition, we were able to communicate with Spanish speaking individuals who resided in the deprived village. I decided to partake in this opportunity not only for the experience or knowledge but because of how life changing it would be. Being able to change the lives of others and get out of my comfort zone allowed me to see the world through a completely different perspective. The trip fostered compassion, selflessness and sympathy within myself. I was able to participate in this opportunity thanks to a particular organization at USC, the Association of Pre-Physician Assistant Students. I found it to be an amazing learning opportunity that truly shaped my character and vision. My presentation will discuss the insights I gained from fulfilling a purpose not only for the less fortunate but for myself. This experience ignited my inner fire, making me realize that finding a career that not only helped people medically but allowed me to build relationships was all I ever wanted. I want others to realize that being in healthcare is so much more than the facts or the knowledge of diagnosing. You can make a real difference in someone's life that reaches far beyond the physical. I'm confident that I will never forget my experiences in Costa Rica, as it reaffirmed my decision to pursue physician assistant school.

Semba, Jacob

Mentor(s): Ms. Theresa Harrison

Sustainable Global Sourcing Strategies

I applied sustainable global sourcing strategies from Management Science 487 to the University of Michigan Donald J. Bowersox Undergraduate Supply Chain Challenge in October 2019. The Supply Chain Operations Decisions Environment or SCODE Challenge Scenario was designed to mimic key strategic and tactical decisions related to managing an end-to-end supply chain including Procurement, Production, Logistics, and Distribution. My team and I were responsible for operations scheduling and supply chain management at Spartan Industries, Chemical Division (a hypothetical company). My team and I optimized a lean-supply chain by balancing strategic and operational decisions based on supplier location, facility location, market conditions, and service levels. Overall, I believe my SCODE experience will be useful to my career in operations and supply chain because it has taught me how to design a logistics network by vetting international carriers and shippers, and how to leverage data to make sustainable global sourcing decisions. Through this experience, I hope to pursue full-time opportunities with a supply chain division in a Fortune 500 company in the southeastern region of the United States.

Seymour, Hannah

Mentor(s): Prof. Jay Pou

Adventure is Out There: Why Everyone should Participate in Domestic Study Away

I believe that every adventure is an opportunity for great learning. In the fall of 2018, I was given the chance to participate in the National Student Exchange, which is a domestic study away program. While

it is possible to go on exchange to almost every state in the US, Canada, Puerto Rico, Guam, and the US Virgin Islands, I chose to spend a Semester at the University of Alaska, Anchorage. During my time away, I was able to take the engineering classes that I needed for my Mechanical Engineering major as well as some fun classes. I did not have to worry about them transferring back to UofSC, as the necessary paperwork that I filled out guaranteed their transferability. Beyond the class, I was able to see the beautiful Alaskan wilderness. Almost every weekend involved some adventure, whether hiking up Flattop Mountain, visiting the Anchorage beach, or driving to a small town nearby. What made this semester incredible, though, was the community of people with whom I did these activities. I am still in frequent contact with them and have even been invited back for their weddings. I have heard many different reasons for students to participate in the NSE, but my reason was the travel. Alaska was the furthest and longest I have ever been away from my home, but I learned how to be more independent and self-reliant. Beyond that, in a global market, being able to adapt to a different culture is a valuable skill. My NSE adventure taught me about independence, networking, encouraged me to consider graduate programs, and opened the possibility in my mind to live and work anywhere. I have a better understanding of who I am and who I want to be because of this experience. I believe that everyone should at least consider NSE, because it is a very customizable program that allows you to see the diversity within our own country.

Shabdue, Chasey

Mentor(s): Dr. April DeLaurier

Determining the role of gooseoid in craniofacial skeletal development in zebrafish

Previously, the lab of Bruce Riley at Texas A&M University generated a zebrafish mutant for the homeobox gene *gooseoid* (*gsc*) that affects the neurons of the statoacoustic ganglion (SAG), which innervate the inner ear. Results show that neurons, which originate as neuroblasts in the floor of the otic vesicle, delaminate and migrate toward the hindbrain before completing differentiation are defective. Other observations suggest that loss of *gsc* affects craniofacial development, although this was not studied in detail in the original study. In humans, short stature, auditory canal atresia, mandibular hypoplasia, and skeletal abnormalities (SAMS) are reported due to loss of GSC. In mice, GSC is detected in the brain and in postotic cranial neural crest cells and the frontonasal prominence of the first branchial arch and cleft indicating a potential role in first branchial arch (jaw) development. Dr. Riley's lab has generously allowed for us to obtain x64 *gooseoid* line to analyze this distinctive abnormal phenotype. Our hypothesis is that *gsc* is required for development of the early head and/or first pharyngeal arch skeleton in zebrafish and is a model for understanding the role of GSC in human craniofacial development. In a preliminary analysis, our lab described zygotic mutants for *gsc* with craniofacial abnormalities. We performed skeletal analysis (stained by Alizarin Red and Alcian Blue) and determined that defects are present in the first pharyngeal arch skeleton, in particular in the Meckel's cartilage. We plan on performing developmental series of RNA in-situ hybridizations, a powerful technique for localizing specific nucleic acid targets within fixed tissues and cells. This will allow us to obtain temporal and spatial information about *gsc* expression. Currently our results show a range of severity of defects from normal patterning to severe loss of midline structures. We also explore the hypothesis that *gsc* acts as an inhibitor of *wnt8a*, and that *gsc* allows normal midline development by excluding *wnt8a* expression from the midline. The findings of this study will help elucidate the action of *gsc* in zebrafish craniofacial development, which may facilitate understanding of human craniofacial disorders associated with midline defects.

Shams, Nour

Co-Author(s): Yvone Shametaj

Mentor(s): Dr. Kandy Velazquez

Involvement of Macrophage-Produced Tumor Necrosis Factor alpha on Tumor Burden in a Mouse Model of Colorectal Cancer

Macrophages release cytokines as a reaction of the immune system's response to diverse signaling including foreign agents and uncontrolled cell proliferation. One of the most important pro-inflammatory cytokines produced by macrophages is tumor necrosis factor alpha (TNF α). This cytokine has been associated with colon cancer initiation, progression, and metastasis in humans and animals. However, it is not completely understood if the deleterious effects of TNF α are mainly due to the production of TNF α by malignant cells or macrophages or the organization of its two receptors in mammalian cells. Therefore, we seek to investigate the involvement of macrophage-produced TNF α on tumor burden in a mouse model of colorectal cancer. In this study we used the cre-lox system to generate macrophage-specific TNF α -deficient mice. Male and female litter mate control mice were used in this project. TNF α flox/flox (control or wild-type), TNF α flox/flox-LyzM-cre (will not produce TNF α in myeloid cells from birth), TNF α flox/flox-Cx3cr1-cre (will not produce TNF α in colonic macrophages after tamoxifen is given to the mouse) mice were injected with the carcinogen azoxymethane (AOM, 10mg/Kg) at week 0 of the experimental design, followed by the inflammatory chemical dextran sulfate sodium (DSS, 2%) in the drinking water for seven days during week 1, and 1% DSS for seven days during weeks 4 and weeks 7. Body weight, food consumption, and water intake were measured weekly. Blood and colon tissue were analyzed for complete blood count and polyp number. In general, no significant differences were observed in food consumption, water intake, body weight, white blood cells, red blood cells, and polyp number in TNF α flox/flox-AOM/DSS and TNF α flox/flox-LyzM-cre AOM/DSS. This part of the project suggests that macrophage-produced TNF α systemically might not be playing a crucial role in tumor burden. However, we suspect that colonic macrophages might respond differently. The next step for this research project will be to finalize the analysis for the TNF α flox/flox and TNF α flox/flox-Cx3cr1-cre mice. We will also process the colon tissue to examine cell proliferation and apoptosis in all samples.

Sharpe, Sarah

Mentor(s): Dr. Denise Wellman

Finding a Mentor

In the middle of my sophomore year, I met Katie Wilson at Drip Coffee on Main Street. I had been following Katie Wilson Photography on Instagram for a while and was incredibly inspired by her work. When my photography professor assigned a human element project, I knew it was the perfect excuse to get to know Katie. From that moment on I worked with Katie. I traveled to Charleston and Greenville on multiple occasions to second shoot weddings and meet couples from across the state. I gained confidence in not only my technical skills, but also my client interaction skills. I helped her shoot large group graduation sessions and she helped me begin to book my own. As we continued to meet, she taught me editing tips, business tips, gallery delivery practices, and so much more. When I met Katie, I was second guessing visual communications as my major, through her I regained my confidence. I was able to give reason for my creative decisions when in class and pick-up work of my own. I learned that often times help doesn't come find you. If you realize there is a knowledge gap, it is your job to seek out another teacher. Katie and I still meet today. I still travel to shoot weddings with her and know that she will play a vital role in my future, all because of one in-class project.

Sheridan, Katherine

Mentor(s): Dr. Casey Giraudy

Opening Up Your Mind Abroad

When I was a second semester sophomore at The University of South Carolina in 2019, I had the privilege to study abroad for two weeks on a business aimed trip in Austria, Hungary, Czech Republic, and Slovakia. I also had the amazing opportunity to study abroad in Paris, France second semester of my junior year in 2020 for nine weeks until the pandemic cut my trip short. Both programs were academically focused on my business major, specifically the finance and international business track. I knew that I wanted to spend a significant amount of my college career abroad as I felt I was lacking in many areas such as self-sufficiency and a solid understanding of the world from multiple aspects. Coming from a small and sheltered town in the suburbs of Washington, D.C., I had little knowledge about the world around me or how beautifully diverse other cultures are. While I had been lucky enough to travel before with my family internationally, these instances were the first experiences in my life that provided two major self-growth discoveries for me. The first is learning independence and adaptability in unknown circumstances or areas of the world. The second is finally understanding how crucial it is to be open minded and immerse yourself into other cultures as much as possible.

Shikle, Hannah

Mentor(s): Dr. Susan Felleman

Video Essays in Film and Art History

The video essay has its roots in the essay film of the mid-20th century. However, it has experienced a surge in popularity over the past ten years among film scholars and critics as internet platforms have expanded from sites for sharing user-generated content to include a wide range of specialized and peer-reviewed venues. The video essay marks a significant milestone in film criticism because film scholars need no longer rely on wordy description and can use the films themselves to “show, not tell” their arguments. Professor Felleman and I set out to create video essays discussing topics in film and art history. While Professor Felleman serves as the author of the scholarly content and overall concept and I as the editor, we work together on formal and aesthetic decisions. Editing for this project includes cutting the clips, fixing the audio, creating text (including subtitles), transitioning between chapters, recording the voiceover, etc. The sources for our first video essay, “Four Ways to Be a Woman Artist According to the Movies,” include a range of films focusing on women artists in film: Artemisia (1997), Camille Claudel (1988), The Big Clock (1948), Rear Window (1954), After Hours (1985), Legal Eagles (1986), What a Way to Go! (1964), and The Big Lebowski (1998). Initially, we wanted to forego voice-over explanation and limit on-screen text to exhibit the advantages of the form of the video essay, as opposed to its written counterpart; however, after running this past a test audience, we found that it was not as self-explanatory as we intended. Thus, we added a short introduction with voiceover exposition, as well as subtitles for the clips in French. Although we were unable to escape all the conventions of the typical written essay, we were able to minimize them and truly get the most out of our medium. While the form of the video essay is not new, it is just beginning to gain ground as a respected form of academic “literature”. Our video essay, which will be submitted for peer-review, is an example of this medium being used for academic purposes.

Shirley, Callie

Mentor(s): Dr. Shan Qiao

Fostering organizational resilience in HIV care facilities in South Carolina: Lessons learned from the COVID-19 pandemic

The outbreak of coronavirus disease 2019 (COVID-19) is a rapidly evolving global public health crisis, and South Carolina (SC) has been heavily affected. Preliminary studies suggest that HIV-related services

have been unavoidably interrupted and impacted in SC. However, HIV care facilities such as AIDS Service Organizations (ASOs) have demonstrated their organizational resilience (OR) in adapting new challenges. There is no single definition of organizational resilience, but resilience in healthcare facilities is broadly defined as the ability to maintain needed health services amid rapidly changing circumstances such as the COVID-19 pandemic. Some common focal points in studying organizational resilience in healthcare facilities include preparation and planning, leadership practices, resources, communication, community support, and surveillance for possible issues. This study of organizational resilience of healthcare facilities can subsequently be applied to HIV care facilities in South Carolina by 1) analyzing existing frameworks for assessing the organizational resilience of health facilities, 2) examining empirical evidence of the impact of COVID-19 on health organizations' practices including ASOs, and by 3) analyzing qualitative data of in-depth interviews from representatives of HIV care facilities in SC to examine their adaptive strategies to the pandemic. Some preliminary findings have pinpointed factors such as communication, workforce resilience, leadership practices, preparedness, financial resources, and access to supplies as being key factors in HIV care facilities' ability to adapt to the COVID-19 pandemic. Even now, some are beginning efforts to further improve the ability to adapt to unforeseen circumstances by "working on some policies and procedures that [they] can put in place for any future pandemics or events that may alter normal business and try to be more prepared next time." This is an ongoing study that is part of a Magellan Scholar project and also part of a larger effort by the SC SmartState Center for Healthcare Quality (CHQ) to further improve HIV treatment and prevention programs in SC. Examining these adaptations will enable the development of a framework to assess the organizational resilience of HIV care facilities such that HIV care related services will experience fewer disruptions in the event of another pandemic or unexpected catalyst.

Short, Kieran

Mentor(s): Dr. April Delaurier

Discovering the effects of *tbx5b* on craniofacial development in zebrafish

Tbx5 is a transcription factor necessary for development of vertebrate limbs and hearts. To date, a mutant for the gene *tbx5a* has been generated in zebrafish and we are seeking to investigate if deletion of *tbx5b*, the duplicate of *tbx5a*, affects development. In our lab, we have generated a potentially germline mutant zebrafish for the *tbx5b* gene which we intend to analyze for heart, craniofacial, and fin phenotypes, to complement and add to the field of literature on the role of Tbx5 genes in vertebrates. First, we generated a potential mutant line by CRISPR-Cas9 and we have identified potential carriers for the *tbx5b* mutation. Next, we outcrossed confirmed F0 carriers to produce an F1 heterozygote generation. Zebrafish are ideal for this with their large egg production and quick development, so we can outcross individual *tbx5b* F1 heterozygotes to wild-type fish to generate an F2 generation. After we genotype the F2 generation we will in-cross F2 heterozygotes to characterize the nature of a mutation in *tbx5b* mutant. We will sequence mutant DNA to ensure that CRISPR edited the DNA to produce frameshift mutations. We will select mutants with frameshift mutations producing missense and premature stop codons for further analysis. Once we confirm frameshift mutants, we will generate homozygous mutants and analyze for skeletal phenotypes. Ultimately, we will hybridize *tbx5a* and *tbx5b* mutants to create a double *tbx5a/b* mutant to analyze the effects of a complete loss of *tbx5* in zebrafish. This full mutant has the potential to be a more comparable model of human Tbx5 deficiency, as humans only have one copy of Tbx5. This research can one day be used to develop ways to address mutations in the Tbx5 family of genes and diseases such as Holt-Oram Syndrome.

Shugart, Olivia

Mentor(s): Dr. Annie Bourbonnais

N₂O cycling in the Gulf of Mexico from concentration and stable isotopic data

Nitrous oxide (N₂O) is a trace gas with a warming potential approximately 300 times that of carbon dioxide. N₂O is also the primary source of atmospheric nitrogen oxides, which can deplete the stratospheric ozone layer. Marine N₂O production from bacterial processes (nitrification and denitrification) represents a significant natural source of N₂O to the atmosphere. Different pathways of N₂O production and consumption have distinct isotopic signatures due to kinetic isotope fractionation during biological transformations. N₂O samples were collected at various locations and depths in the Gulf of Mexico hypoxic zone during the summers of 2015 and 2016 to investigate N₂O cycling. We measured N₂O concentrations, the stable isotopic composition of N₂O (δ¹⁵N and δ¹⁸O) and also the site preference (SP), defined as the difference between the δ¹⁵N_a (internal) and the δ¹⁵N_b (external), to gain further insight into N₂O production and consumption processes. N₂O concentrations showed interannual variability, ranging from 6 to 16 nM in 2015 and 3 to 37 nM in 2016. Highest N₂O concentrations were associated with a relatively low δ¹⁵N near the oxycline, indicating net N₂O production. Anoxia was observed at a few stations in 2016, and δ¹⁵N of N₂O as well as SP were elevated at these depths, indicating N₂O consumption. In this presentation, we will discuss spatial and temporal changes in N₂O production and consumption in relation to physical and chemical factors.

Siegfried, Emily

Mentor(s): Dr. Richard Heiens, Dr. Ravi Narayanaswamy

An Exploratory Examination of the Impact of Customer Service Features on Conversion Rates for Online Retailers

The present study explores the link between customer service features and conversion rates for the 500 largest online retailers. Twelve distinct customer service features were examined, including auto-replenishment, co-branded credit cards, currency conversion tools, free shipping, free return shipping, in-home services such as product installation or in-person consultations, live chats, providing website content in multiple languages, next-day delivery, online return processing, paid memberships with enhanced customer services, and same day delivery. Consistent with previous studies that indicate typical conversion rates in the range of 2-4 percent, the mean conversion rate for the firms in our sample was 3.194 percent. In addition, the findings indicate that customer conversion rates were significantly higher for firms offering auto-replenishment, free return shipping, home services, paid memberships, and same day delivery. As such, managers may want to emphasize these features when developing e-commerce websites.

Silkaitis, Annelise

Mentor(s): Ms. Maegan Gudridge

Global Advocacy and Communications: A Semester in Paris

During my junior year spring semester, I had the privilege of studying abroad in Paris, France. I have studied French for the past eight years, since the beginning of high school, and had previously visited Paris twice on other trips. I wanted to study abroad to push myself outside of my comfort zone and achieve a level of fluency in the French language that I had always pursued, as well as experience full immersion in another culture and continue to work towards my academic goals. Although I was only able to spend two months abroad due to COVID-19, I treasure the time spent there and the amount of personal growth and exploration that I was able to undergo. I traveled to seven other countries, made countless friends, and pushed myself further towards my professional and personal goals. Throughout my immersion in France, I learned about the importance of being culturally aware and sensitive, and worked as a mobile journalist documenting my travels. These experiences, along with being involved in mental health advocacy on cam-

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pus, have cemented my desire to pursue a career in global advocacy and communications.

Simon, Savannah

Mentor(s): Dr. Marketa Kubickova

Enigma in the Antarctic: Investigating the Trophic Strategy Diversity in a Cold-Water Cryptophyte

For my honors senior thesis, I am researching the diversity of trophic strategies employed by *Geminigera cryophila*. Trophic strategies are the means by which organisms fulfill their energetic needs. Autotrophs, such as plants and algae, are characterized by their ability to produce organic matter from light or chemicals in the environment and play important roles as primary producers in aquatic ecosystems. Heterotrophs are not able to create their own organic compounds, so they must obtain organic compounds from the external environment by ingesting bacteria (bacterivory) or dissolved organic compounds (osmotrophy). Both autotrophic and heterotrophic species have been identified across the cryptophyte phylogenetic tree, and some cryptophytes species have also been suggested to perform mixotrophy, meaning they are capable of utilizing both heterotrophy and autotrophy. The goal of this study is to determine the diversity and plasticity in trophic strategies of an Antarctic cryptophyte species (*Geminigera cryophila*). We predict that *G. cryophila* would use a mixotrophic strategy to survive during the periods of minimal sunlight that they experience in their natural Antarctic habitat where strict autotrophy would be unfavorable. Because mixotrophic organisms expend significant energy to maintain both heterotrophic and autotrophic structures, for mixotrophy to be evolutionarily favored, it must incur a fitness advantage. In the case of *G. cryophila*, mixotrophy would allow the organism to survive in light-limited environments. Mixotrophic organisms are important organisms of study because they are able to increase energy transfer within the food web, which ultimately impacts the global carbon cycle and can play a role in climate change.

Singh, Dillon - Co-Author(s): , , , - Mentor(s): Mr. Terry Wolfer, , , , -- Professional and Civic Engagement -- During the previous two summers, I worked with AT&T in the Entertainment Technology and Product Marketing Teams. AT&T is the world's largest telecommunications company in the world and provides a vast array of modern tech products and services. AT&T also purchased DirecTV now known as ATT TV which I had the opportunity to work in during my two summers using a variety of different data analysis tools and approaches. As a marketing and risk management major at the University of South Carolina, my internship provided me with professional experience in both of my respective majors. I created dashboards that measured ROI on the capital budget for the company, and created a New Relic dashboard that analyzed dynamic real time software download progress and key metrics for customers of ATT TV. As for marketing experience, I had the opportunity to create and control all facets of an "ATT Fantasy Testing League." This rewarded AT&T TV testers with points for testing the apps in a fantasy football themed setting. Lastly, I measured affinity brands of third party app users on the ATT TV box. By completing these two internships, I got to experience how professionals use data and learn new techniques to make analysis in a corporate setting. I am fortunate to have learned so much from these industry professionals. I hope to bring some of these data skills to the Darla Moore School of Business in my senior year and beyond that. After graduation this May, I plan on continuing my work with AT&T full time in their Dallas, TX headquarters.

Singleton, Evellyn

Mentor(s): Prof. Sara Reinhardt

Internship to Career; The lessons I learned through the Target Stores Executive Intern experience that landed me a career with Target.

This past summer, I worked with Target as their Stores Executive Intern. This internship was a 6-week structured program that covered the roles of the stores Executive Team Leads. My store, Target of Lexington, had four Executive Team Leads in the areas of general merchandise, specialty sales, service and

engagement, and human resources. As a student passionate about retail with both leadership and management skills, this internship aligned perfectly with my interest and strengths. Over the course of my internship, I spent weeks with each Executive Team Lead, shadowing their management skills, while also being given the opportunity to practice mine. I learned how my management skills must cater toward each team member, and to the responsibilities each role has, in order to best serve our guests. I was also able to learn how to calculate the health of each business unit individually, including general merchandise, specialty sales, service and engagement, and human resources, as well as assess the health of the overall Target store. I noticed how the team spent their time investing in me through performance reviews, with both criticism and praise, all in an effort to ensure I left the internship a better leader than I started. The lessons this internship taught me will impact my leadership in all industry's but specifically in the field of retail management which will allow me to experience a smoother transition into the career path I've chosen. As the internship closed, I prepared for and presented a strong "Final Walk" to Target's Senior District Director and their Human Resource Business Partner which showcased my development through this internship program. I saw the payoff of the hard work of my leaders, and myself and was offered a full-time career with Target as an Executive Team Lead in Nashville, TN at the start of summer 2021. My participation in this program not only reaffirmed my passion for retail management but gave me the confidence to move forward into a career with Target.

Smith, Jacob

Mentor(s): Ms. Theresa Harrison

To Walk as the Ancients Did

As a future international human rights attorney, it is critical that I can understand other religions, cultures, and people. To aid in this goal, I traveled to Jordan, Egypt, and Turkey to better understand their cultural and religious differences to the United States and Europe. Today I have prepared an overview of the major takeaways and locations that I encountered. See how the Hagia Sophia, Pyramids of Giza, Petra, and one of the Upper Egypt coronation areas were all able to give me invaluable insight into all these civilizations' history, culture, and religion.

Smith, Emma

Mentor(s): Dr. Laura Lambdin

Practicing Ethical Business Internationally

The summer following my junior year, I worked my first internship that directly coincided with both my majors and my global experiences throughout my time at college. I was offered the opportunity to work as a Global Finance & Business Management Analyst at JPMorgan Chase & Co. This internship would potentially lead to a full-time offer at the end of the summer involving different rotations within different lines of business. The program encompassed areas of the financial firm that I never knew existed, including global outreach with non-profit organizations. At the time of accepting the offer, I understood the positive reputation of JPMorgan Chase & Co., however I was completely unaware of the ethical practices that the firm encourages across borders.

There were two major projects I was assigned as an intern to showcase my financial and global background. One of the two projects involved directly communicating with a non-profit organization located in the Democratic Republic of the Congo. This project allowed me to gain insight on the tasks that a financial firm has to fulfill in order to maintain a healthy relationship with its global partners. During the internship, I came to a realization that prompted me to further my understanding of working with non-profit organizations in international areas. After accepting my full-time offer at JPMorgan Chase & Co., I now feel the need to use my position in my workplace to facilitate more business practices that correspond with morally conscious endeavors.

Smith, Natalie

Mentor(s): Prof. Jay Pou

The Impact of Being a University Ambassador: What Campus Tours Taught Me About Being a Statistics Major

After my freshmen year, my love and passion for the University of South Carolina grew exceptionally resulting in me wanting to serve my University, therefore I became a University Ambassador which has been an incredible honor the past three years. This role allowed me to guide campus tours that influence and inform visitors. Having the platform to promote the University of South Carolina and impact so many potential students and their families has been exceptionally meaningful for me. I had the opportunity to serve as Mentor Captain for the organization my senior year. This leadership position within the organization allowed me to develop and implement an entire training process for twenty-nine new ambassadors. Being able to guide new ambassadors to give campus tours and watch as they discover how rewarding it is to be a University Ambassador has been so gratifying. My involvement in the University Ambassador organization has allowed me to develop strong interpersonal, problem-solving, leadership, and communication skills while also enhancing my confidence in myself and future goals. I have grown tremendously during my past four years at the University of South Carolina largely due to my time serving in the University Ambassador organization.

Smith, Jason

Mentor(s): Dr. Austin Downey

Multi-event Model Updating for Ship Structures

Next-generation naval ships subjected to impact and fatigue events will benefit from condition assessment technology and the ability to react appropriately. When implemented properly a digital twin model of a naval ship or ship structure can be used for informed response management that will increase ship lifespans, maintenance intervals, and survivability. These models include fatigue and load, which will be used to make decisions across the structure's timescales (Real-Time to life span). The main obstacle that occurs with multi-model data assimilation is the vast amount of data that needs to be updated into multiple models and linked to the structure's existing condition to calculate its remaining life. This data comes from a wide range of sources and locations, including strain measurements from physical sensors that are attached to a ship's structure and 3D scans from aerial drones. This paper presents a methodology that updates multiple damage cases (fatigue and plastic deformation impact) into a single FEA model. This work uses a scaled model of a structural ship component subjected to representative wave loadings. Results for model updating that tracks continuous fatigue crack growth and plastic deformation caused by impact will be presented and discussed.

Smith, James

Mentor(s): Dr. Xiaomei Zhang

Using Cybersecurity Data Science to Detect Malicious URLs

The objective of this research is to study how data science can be used to provide new insights and methodologies for addressing cybersecurity problems. First, we would like to do a literature study on the existing work of using data science in cybersecurity. Second, we would like to develop a project to apply data science methods to address one specific security problem – detecting malicious URLs

Smith, Emily

Mentor(s): Dr. Robin Dawson

University Ambassadors and the Impact on Nursing Students

Background: The University of South Carolina (UofSC) University Ambassadors program began in 1994, and since then, hundreds of student volunteers have had the opportunity to guide Gamecocks home. Every year, University Ambassadors host hundreds of tours with parents and prospective students, serving as a “welcoming and informative” first impression to UofSC.

Purpose: As a nursing student, I wanted to explore how serving as a University Ambassador helps develop skills beneficial to a future nursing career.

Methods: I developed a qualitative interview guide consisting of five questions relating to specific skills that the National Association of Colleges and Employers deem as “key competencies” for those entering the workforce, including: 1) oral and written communication, 2) teamwork, 3) professionalism, and 4) problem solving. I then conducted video interviews with two nursing students also in the University Ambassador program about their experiences. Videos were then analyzed using a process similar to qualitative thematic analysis to develop themes and identify salient quotes.

Results: Each interviewee shared personal clinical stories and related how they applied specific skills they had learned as a University Ambassador to the clinical situation. Themes included: Practicing communication skills; The importance of teamwork; Critical thinking and problem solving; and Professionalism with a strong work ethic. Video footage was then edited using quotes representative of each theme. Finally, contextual footage (e.g., video of the Horseshoe), music, and voiceovers containing information related to the University Ambassador program, including my personal reflection, were added. The final video will be available on the University Ambassadors webpage.

Conclusion: Service in a professional organization like University Ambassadors is beneficial in developing and practicing skills that will be useful in nursing practice.

Smith, Kate

Mentor(s): Mx. Caleb Morris

Techniques for Conflict Resolution from an Orientation Leader

In the summer of 2019, I helped welcome over 3,000 new students as an Orientation Leader for the University of South Carolina. This was an experience I knew I wanted to do since my freshman orientation because I wanted to help incoming students feel the same welcoming atmosphere on campus I received while transitioning to college. The Orientation Leaders spent months attending weekly trainings and workshops which helped educate us on the history of the university and how to foster an inclusive environment especially during discussions. As the summer progressed, I found implementing the theories we had learned during training always led to an open discussion where all opinions were heard. Because the conflict resolution techniques we used always sustained a substantial conversation, I believe it is beneficial for me to share some of the techniques we used because many employers want employees to be able to handle conflict resolution but rarely designate training to it.

Smith, Rachel

Mentor(s): Prof. Rebecca Boyd

Space People Only: Documentary Production

The UFO Welcome Center is a handmade, wooden spacecraft in Jody Pendarvis’ backyard, built to wel-

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come aliens to Earth. At first glance, it is a mere local oddity; the work of an eccentric man in an otherwise quiet town. However, a second look reveals something more: Pendarvis' work has withstood hurricanes, tension with local government, and now a pandemic. It remains a South Carolina staple and steadfast reminder that an individual can have a profound impact on a community. The purpose of the UFO Welcome Center is to provide a space for aliens to rest after what was presumably a very long journey to arrive here, but humans are also welcome to visit. The UFO Welcome Center is a case study on the impact a single individual can have on an entire community. What was first a wooden spacecraft built on Bowman, SC property in the 1990's is now a famous tourist destination. Our project aims to explore the economic impact of his work for the town, as well as serve as an example how you can follow an unusual route and still find success.

Snider, Blair

Mentor(s): Prof. Ambra Hiott

Learning, Responsibility, and Relationships

As a Retail Management major with a minor in Business Administration, I have had plenty of opportunities to grow as a student, daughter, sister, friend, and person. As an individual, I have struggled with anxiety, an eating disorder, and body dysmorphia, but all of these experiences have helped shape me into the strong, confident individual I have become today. This understanding of the impact an eating disorder has on one's mental and physical health, introduced the problem that is prevalent around Carolina and college campuses around the country, which is mental health and subsequently one's body image. With my knowledge, I believe there can be strides to improve this problem around college campuses. With this problem in mind, these past experiences influenced the creation of my key insights. Through my key insights of the key to grow is by learning, the importance of responsibility, and the significance of fostering relationships, I have the ability to portray the experiences here at the University through these insights. Within my time at Carolina, I have had the chance to grow as a professional through my practicum and internship, while using the knowledge from my past experiences to shape my future. Through my leadership roles not only at the University of South Carolina but beyond, and the experiences I have had, I have learned a great deal of not only how to become a better leader and grow as an individual, but how to use the lessons learned from my past experiences for future endeavors.

Snieszek, Michael

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 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. Recruitment depends upon larval settlement and post-settlement growth and survival. We examined larval settlement and post-settlement success in populations of the mussel *Mytilus edulis* in Southwest England. We assessed the spatial scales of settlement and post-settlement growth and survival across a region expected to be interconnected by larval dispersal. We found that different sites had variation in the timing of settlement and large differences in the quantity of settlement. Post-settlement growth rates were surprisingly consistent (15-18 microns/day). We conclude that the processes controlling larval delivery to the shore operate at fine spatial scales that are uncoupled from processes operating at much coarser spatial scales that regulate post-settlement success.

Songer, Kirsten**Mentor(s): Mr. David Deweil****Orientation Leader**

The summers following my freshman and sophomore years, I was an Orientation Leader. The second year, I progressed in my role to serve as a team leader and was a guide to the new Orientation Leaders. In these roles I served, guided, and welcomed over 6,000 newly admitted students along with their parents and guests to the University of South Carolina. I played a key role in assisting new students in their transition into the first year of college by demonstrating my knowledge of the university services and campus resources through facilitation of small groups, performing in skits about social issues, and directional and general support. Becoming an Orientation Leader greatly enhanced my college experience by providing me with lifelong friendships, allowing me to develop my leadership skills, and providing an avenue for me to mentor others. This experience educated me in areas such as diversity and inclusion, conflict resolution, communication, and problem solving. My presentation will explore the insights I gained from my time as an Orientation Leader and what I learned about myself and my leadership abilities.

Sorbie, Jaden**Mentor(s): Prof. Maegan Gudridge****Service Before Self**

During my time at the University of South Carolina, I have been a part of many organizations that I'm proud to have contributed to. What I'm most proud of, is my military service in the South Carolina Air National Guard. Working in the Air Force as an Aviation Resource Manager has been the most fulfilling job over the last 4 years and has been an important part of my college experience. Serving while in college has taught me the importance of service before self, attention to detail, and being a true leader. Through this job I have had the chance to work in multiple states and countries to gain experience working with diverse groups in high stress environments. Being an Aviation Resource Management Specialist has allowed me to expand my knowledge in the aviation field and build social and professional engagement skills while working with over 70 F-16 pilots. While my military service initially was intended to only last through college, my experience within the South Carolina Air National Guard, as well as my time at the University of South Carolina, have inspired me to continue my career in the Air Force as a pilot. My presentation will discuss the experiences I have had within the Air Force, and the impact my job has had on my college experience, and vice versa.

Speer, Ethan**Mentor(s): Dr. Kelly Goldberg****The Link Between Humans and Neanderthals**

Research into human origins and ancestry can not only help consolidate our modern scientific understanding of ourselves, but it can assist us in making beneficial social decisions. For decades, anthropologists have believed that hundreds of thousands of years ago, Neanderthal and modern human lineages diverged, leading to speciation. However, relatively new research into the genome of Neanderthals and humans has called this traditional belief into question. Because of the discovery of small amounts of Neanderthal DNA in the modern human genome, scientists believe that some ancient humans may have produced offspring with Neanderthals, seemingly shattering the modern understanding of speciation and the human phylogenetic tree—some scientists even hypothesize that Neanderthals may be the same species as us. Taking from modern studies into the relationship between modern human and Neanderthal DNA, this presentation will investigate this hypothesis. The research presented in this presentation invites scrutiny and criticism, but also hopes to evoke scientific introspection, especially in the field of anthropology.

Spicuzza, Jacob

Mentor(s): Dr. Kelly Goldberg

Clearer Homo Denisovan Relationship to Modern-Day Humans

Who are we and where do we come from? Who do we come from? These questions form the base of anthropological study. Recent evidence suggests that Homo Denisovans remained one of the last humans on Earth along with homo sapiens and share a significant percentage of DNA with modern-day humans. In this report, I explore the similarities and differences between Homo Denisovans and other recent human species. By examining fossils of Homo Denisovans, I explain fundamental changes to humans over time as well as the relationships between Homo Denisovans and other humans. The research in this report contributes to the understanding of how humans came to be what we are now.

Sprankle, Keegan

Co-Author(s): Dawson Strawbridge, Cameron Waring

Mentor(s): Dr. John Gerdes

Creating websites for UofSC projects

We are adding to a website for the UofSC Noyce Scholars program which is under the “Teach science and math” organization in collaboration with the University of South Carolina College of Education.

Stallings, William

Mentor(s): Dr. Stanley Dubinsky, Dr. Michael Gavin

Sub-National Identity and the Development of Nationalism in Basque Country and Catalonia

This research looks into the relationship between Spain and two of its regions, the Basque Country and Catalonia, and looks to discuss how each of the regions showcases a symbiotic relationship with Spain. Each region ultimately shaped the other in terms of their development of identity. Through the development of Spanish identity and its imposition on the whole of the nation throughout the 18th century and onwards, each region was given a framework against which to react. Catalonia’s strong economic development outpaced the rest of Spain and this created a dissatisfaction that was expressed in regionalist and then in nationalist terms in the 19th and early 20th centuries. The Basque Country, in contrast, developed civic and ethnic nationalist factions that ultimately merged under one party but ultimately failed to find long-term success until the 1930s.

These nationalisms coalesced into their modern forms during the Francoist regime, where suppression of regional identity solidified the association between language and nationalist ideology that had been previously in motion in both regions. While Catalonia expressed it largely in cultural protest through movements such as La Nova Canco and the revival of Catalan literature, the Basque Country expressed it largely through political means, notably through support for the terrorist group Euskadi Ta Askatasuna during the 1960s and 1970s. After the end of the Francoist regime and the return to democracy, the need to accommodate these regions in terms of their distinct linguistic and cultural identities necessitated the creation of the system of autonomous communities throughout the country, a system of symmetric federalism that replaced the previously asymmetric systems that benefitted regions such as the Basque Country and Catalonia periodically throughout the centuries.

Today, the two regions have had very different outcomes. While the Basque Country has, again, become incorporated under this system (despite calls for more autonomy), Catalonia has broken out into a decade-long struggle for outright independence that has regularly put it at odds with the overarching Spanish government.

Stalls, Kendall**Mentor(s): Dr. Marj Pena, Dr. Kristen Hogan, Ms. Niti Jani****The Effects of Early Life Exposure to Antibiotics on Tumor Burden and Gut Microbiome Composition in a Mouse Model of Colorectal Cancer**

The incidence and deaths from colorectal cancer (CRC) in young adults, also known as early onset CRC, has been increasing in the last few years, however the underlying mechanisms are not fully understood. The gut microbiome represents the millions of organisms that reside in the intestines that are necessary for proper gut and organism function. However, many environmental factors can cause an imbalance in the microbial populations resulting in dysbiosis that can lead to disease such as CRC, for which there has been abundant evidence. By identifying the resident gut microbes and understanding how they affect the intestinal microenvironment and tumor development, we can develop methods to identify individuals at risk for CRC and strategies to minimize these risks by rebuilding the gut microbiota through readily accessible methods such as dietary and probiotic interventions after each exposure to antibiotics. The overall goal of the project was to determine if exposure to antibiotics during gestation or in early development can affect the likelihood and susceptibility of developing early onset colorectal cancer CRC, by altering the founding strains of the gut microbiome. We tested the hypothesis that prenatal and early life exposure to antibiotics alters the composition of the gut microbiome, the intestinal immune microenvironment, and tumor development in *Apc/Min+* mice. In this study, I determined the effect of early life exposure to antibiotics that are commonly used to treat bacterial infections in children, such as middle ear infections, strep throat, pneumonia, and other childhood ailments, on the development of tumors in *ApcMin/+* mice. We utilized two antibiotics, Amoxicillin and Erythromycin, among others based on their use in clinical practice.

Stalls, Kendall**Mentor(s): Prof. David Deweil****Changing Carolina: Promoting Health on Campus**

One of the most monumental experiences I have been a part of as an undergraduate student is my time as a Changing Carolina Peer Leader. The Changing Carolina Peer Leaders work closely with Student Health Services to provide health education to college students. As a Peer leader, I presented “Take the Risky out of Frisky” and “Healthy Gamecocks” presentations to freshman in order to better educate them on safe sex practices and healthy habits. I assisted with the implementation of numerous campus events such as the weekly farmer’s markets, De-stress fest, and the Get Yourself Tested festival. As a peer leader, I learned about the importance of communication skills and the methods that you use to present information. Before this experience, I had an immense fear of public speaking. This organization challenged me to step out of my comfort zone and utilize my leadership skills in order to educate my peers on the importance of establishing healthy habits. At the conclusion of my college experience, I can proudly say that I have gained enormous confidence in myself and my public speaking abilities that I am certain will enable me to succeed in future endeavors.

Staviski, Brina**Mentor(s): Mx. Caleb Morris****My Experience with Capstone Connectors**

My experience in the Capstone Connectors Program, as both the Co-Director of Intake and a mentor has been extremely beneficial for my personal and professional development. Being a mentor to two freshman students as well as overseeing six mentors, helped me to develop meaningful relationships with each of them as well as develop my time management skills. I developed these skills through biweekly meetings with my mentees, monthly meetings with the mentors I oversaw, biweekly directorate board meet-

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ings, and monthly grading of the required writings. I learned more about myself and the people around me in those two years than I ever had, I learned the intricacies of people and how they handle different situations. The impact I was able to have on both the mentors I oversaw, and the mentees within the program is what kept me going.

Steels, Leana

Mentor(s): Dr. Kenneth Roberts

Bone Regeneration through Electromagnetic Field (EMAG) Stimulation

Bone regeneration through electromagnetic (EMAG) field stimulation is an ongoing research to provide a new way to help promote bone growth from injuries, diseases, and genetic disorders. It is believed that bones have a natural dielectric field and when impacted by trauma, this natural field gets disrupted. This leads to breakage, deformities, and other issues that can greatly impact a patient. This has led to studies and experiments by testing the effects of EMAG fields on bones to see if these fields can restore the dielectric field and thus promote Mesenchymal Stem cell differentiation (MSC) to create new bone cells. Different methods of EMAG technology have been discovered such as direct current, capacitive coupling, and pulsed EMAG. It has been hypothesized that all these methods can promote the development of MSC differentiation and even help promote important proteins, such as Bone Morphogenetic Protein 2 (BMP-2). My research project approached this topic by studying specific scholarly papers that have performed experiments with EMAG fields. The project had three goals and that was to investigate the mechanisms behind MSC during EMAG stimulation, create a working theory based off that, and make mathematical models that support the working theory. This approach discovered that EMAG stimulation can promote particularly important proteins responsible for MSC from analyzing the preliminary papers. Results through mathematical models are incomplete but it has been hypothesized that the models will show an exponential growth of bone cells using EMAG stimulation. If this is true, then the theory that EMAG stimulation can restore the dielectric field of bones to promote MSC differentiation will be accepted.

Stephens-York, Darius

Mentor(s): Mr. Jerome Scott

“Somewhat an activist”

One of the perks of going to a flagship institution in a typically conservative state is the ongoing opportunity for student activism. Walking across a campus that just 58 years ago, I would not have been allowed on, has motivated me to be more than just a number for diversity requirements. Upon arrival, I felt a responsibility to not just learn as much as I could, but to honor those that fought for my opportunity to learn at this institution that I grew up loving. Throughout my time at the University of South Carolina, I took advantage of my opportunities to advocate for changes that I thought were necessary; that would improve the experiences of all UofSC students. My roles in Student Government and my membership in Alpha Phi Alpha Fraternity, Inc. helped me to bring my seat to the table and make my voice heard on issues that impact students and develop the next generation of Carolinians. I planned initiatives, delivered speeches for rallies, joined my fellow students in counter protests, and lobbied on students' behalf while employed as a Legislative Page in the South Carolina House of Representatives. Regardless of the action, I was filled with pride knowing that I was committed to making a positive impact for students that attended the university for years to come. Being taught by civil rights activists such as Cleveland Sellers, rubbing elbows with state legislators and political candidates, and navigating college with my peers helped me to develop into what I would call “somewhat an activist” myself. Student activism is the heartbeat of political activism, and an integral part in bringing changes to any institution of higher learning.

Sterrett, Nancy

Mentor(s): Dr. Casey Giraudy

Diversity & Social Advocacy: The Effect of Immersive Experiences on Stereotypes of Muslim Moroccan Women

Throughout my time spent at the University of South Carolina, I have focused my learning opportunities on the concepts of diversity and social advocacy. I have completed out of the classroom experiences such as a Capstone Medical Mission trip to Nicaragua, volunteering, attending talks and presentations and an immersive study abroad trip to Morocco with Preston Residential College. I believe that all of these experiences greatly affected my decision to pursue graduation with leadership distinction and diversity and social advocacy, but the most important educational opportunity was my trip to Morocco. I believe that all students, in an effort to become more Global Citizens, should experience daily life cultures customs and beliefs of other countries. In order to prove how influential educational abroad experiences are, I conducted a study on the students participating on the trip. The purpose of the study was to show the effect of immersive experiences on Western stereotypes a Muslim Moroccan women. While in country before the trip began and the students had any structural education of Muslim Moroccan women, I asked had each of them fill out a questionnaire. The purpose of this questionnaire was to further understand preconceived notions and their origins. While in the country students took part in homestays classes with other Moroccan students and other cultural activities and excursions. After the trip was concluded, the students filled out the same questionnaire and reflected on any pre-existing stereotypes. After analyzing the results of the study, I drew the conclusion that all students who participated gained a further understanding and cultural awareness of the Moroccan population. This allowed for a statistical recognition of a positive connection between immersive cultural experiences and the dismantling of incorrect stereotypes of minority populations. Ultimately, this research greatly promotes the idea of Education Abroad as a tool for both social advocacy but diversity exposure for university students.

Stevens, Alex

Mentor(s): Dr. Michael Gower

Development of Drug-Loaded PLG Nanoparticles and Delivery to Adipocytes In Vitro

Local drug delivery directly to a drug's intended tissue has been shown to be an effective method to reduce off-target side effects associated with systemic delivery. This local delivery is often achieved via the use of biodegradable polymer microparticles. Microparticles can be administered to a tissue in liquid suspension and release their payload as they degrade into biocompatible degradation products. In the case of the commonly used poly(lactide-co-glycolide) (PLG), the polymer degrades via hydrolysis into readily metabolized lactic and glycolic acids. However, microparticles are not a suitable drug delivery device for the adipose tissue because they are too large to be internalized by adipocytes. This suggests that if nanoparticles can be made from the same PLG polymer, simply by being smaller than microparticles, they could be internalized by adipocytes.

The nanoprecipitation technique was used to fabricate nanoparticles. PLG was dissolved in acetone to form the solvent phase, and this was injected slowly into a stirring water (nonsolvent) phase. Upon contact with water, the polymer spontaneously formed nanoparticles. The suspension was filtered to remove any polymer that didn't form particle and dialyzed overnight to remove residual acetone. Dynamic light scattering (DLS) was used to determine the product size distribution, which revealed that particles were consistently approximately 240 nanometers. Following fabrication of blank nanoparticles, it was also confirmed that coumarin 6, a commonly used fluorescent model drug, could be successfully incorporated into the nanoparticles by adding coumarin 6 to the solvent phase.

The next objective was to determine if nanoparticles could be internalized by adipocytes. 3T3-L1 fibroblasts were differentiated into adipocytes, and a cold-binding study was performed. Coumarin 6-loaded nanoparticles were administered to differentiated adipocytes, and bright field and fluorescent microscopy

images were obtained to determine particle location within the cell. The results suggested that particles were internalized by the adipocytes and were localizing to the lipid droplets.

Lastly, all-trans retinoic acid (ATRA) was successfully internalized in the nanoparticles, demonstrating that the nanoprecipitation method is suitable for encapsulating different types of drugs. The next step will be to determine the effects of delivering ATRA-loaded nanoparticles to the adipocytes.

Stewart, Sierra

Mentor(s): Mr. Timothy Lewis

By Culture and By Merit: Cultivating Leadership Through Sisterhood

In 1908, Alpha Kappa Alpha Sorority, Incorporated was founded as the first Greek lettered organization for African American women. Since this time, the sorority has been dedicated to developing leaders and serving others. This organization is one that I have known about my entire life, and I knew that once I started school, I would want to be a part of this. To me, my purpose is to leave an impact on the world and in a better place than I found it, and the last part of Alpha Kappa Alpha's purpose is "to be of service to all mankind." Over the past two years, these purposes have cultivated my mission to serve others in everything that I do. Through our work, we have been able to raise awareness for many issues throughout the world, while also helping members of our own community. Serving as chapter president this past year has been an eye-opening experience for me. Managing the business of the Theta Gamma Chapter of Alpha Kappa Alpha Sorority, Incorporated taught me what truly running a business is like. The "incorporated" on the end of our sorority's name means that our organization is a business. I have learned how to work with multiple budgets and thousands of dollars. I developed my conflict resolution skills by working with sisters of many ages and personalities. I cultivated my leadership skills by updating our organizational structures and procedures. The experiences that I have had over the past two years has allowed me to grow in my service and servant leadership. When I became a chapter president, I made a commitment to not only my organization but also my sisters. I would lead our organization to reach the potential that I know our members have, and I would lead through trust and transparency. The lessons I learned through our conflicts and triumphs are ones that I can carry for the rest of my life. I will continue to serve the community and my work in Alpha Kappa Alpha Sorority, Incorporated through my life-long membership.

Stone, Benjamin

Mentor(s): Dr. MVS Chandrashekhar, Dr. Glenn Weaver, Dr. Bridget Armstrong

A transducer agnostic method for frequency domain detection of heart rates for long-term health monitoring

Purpose: Heartrate is an important indicator of physical activity energy expenditure. PPG is a simple, non-invasive optical technique that measures volumetric changes in peripheral blood circulation. A variety of consumer wearable fitness trackers traditionally worn on the wrist incorporate Photoplethysmography (PPG) to estimate HR. However, placement of PPG on the wrist has been shown to produce inferior estimates of HR due to motion artefacts from rapid movement of the arm. The purpose of this proof-of-concept study was to examine the comparability of chest placed PPG against a gold standard ECG estimated heartrate.

Methods: Heartrate was estimated from PPG and ECG simultaneously on four participants (20-37years old, 100% white, 3 male) at 45hz for ~15 minutes while in a seated position. Heartrate trace data was processed via Fourier analyses for both the ECG and PPG via a 20 second rolling epoch in order to produce PPG and ECG estimated heartrate (i.e., beats per minute). Single absolute intra-class correlation coefficients examined relation of PPG and ECG estimated heartrate. Root mean squared error (RMSE) and absolute mean bias were calculated and Bland-Altman plots were constructed to assess mean bias for PPG heartrate estimates when compared to ECG estimates. A priori limits of agreement were set at 5%.

Results: A total of 154,272 PPG and ECG heartrate traces were collected. Mean PPG and ECG estimated

heartrate was 84.0 (SD=10.2) and 85.6 (SD=10.4) beats per minute, respectively. ICCs examining the association between ECG and PPG estimated heartrate were strong 0.83 (95% CI = 0.82, 0.84). Mean bias between PPG and ECG estimated heartrate was 1.5 beats per minute. Absolute mean bias between PPG and ECG estimated heartrate was 4.2 and RMSE was 5.9 beats per minute. A total of 70% (n=107,214 of 154,272) of the heartrate estimates of PPG were within the 5% a priori limits of agreement.

Conclusions: This proof-of-concept study shows that chest placed PPG has the potential to accurately assess heartrate. Future validation studies that examine PPG in a broad range of activity intensity levels and in a large and representative sample of participants are warranted.

Storlazzi, Sophia

Mentor(s): Mrs. Emily Jones, Mr. Mitch Nettesheim

UofSC Bike Refurbishment and Redistribution Feasibility Study

Some of the most obvious yet most overlooked areas in need of improvement around our campus are bike-related. Abandoned bikes left on bike racks and other objects such as street posts, benches, rails, and trees are both visually detracting and hazardous. In 2018, preceding my attainment of the Sustainable Magellan Grant, I conducted a campus-wide Needs Assessment consisting of two volunteer days which analyzed the availability of bike racks. It was found that an overwhelming percent of bike racks were consistently occupied, likely forcing cyclists to park illegally in alternative places as mentioned above. This provided evidence for the need of 1) removing abandoned bikes and 2) installing new bike racks.

This Bike Rack Project would enhance campus life by promoting healthy behaviors of physical activity, provide a basic resource to enable sustainable transportation, and align with the campus aesthetic excellence. Following the success of the Bike Rack Project, it became evident that this project should not end here -- an additional initiative should be constructed. To be environmentally, financially, and socially sustainable, the bikes should be refurbished and redistributed back to their original community: UofSC students. Doing so would reduce waste and provide more resources to students. This realization was the inspiration for the UofSC Bike Refurbishment and Redistribution Feasibility Study, which was the focus of this Sustainable Magellan Grant.

This Feasibility Study was conducted to determine if it is within South Carolina State Laws and University Policies to refurbish the abandoned bikes collected from around UofSC campus in order to redistribute them back to students. Through extensive outreach, collaboration, coordination, surveying, and investigation, favorable results were found to support the successful implementation of this initiative. An emphasis was placed on establishing key resources and campus stakeholders which would enable the sustainable longevity of this initiative. The following presentation will address the research process used, specific findings, and suggestions on ways to ameliorate the life cycle of bicycles at UofSC.

Striebich, Maria

Mentor(s): Dr. Jessica Klusek, Dr. Katherine Bangert

Association between language production ability and FXTAS symptomology in mothers with the FMR1 premutation

FXS is an inherited genetic disorder on the FMR1 gene, and the leading cause of intellectual disability. Due to heritability patterns, mothers with children with FXS are carriers of a premutation on the FMR1 gene, if not FXS. The presence of a FMR1 gene premutation has been associated with a neurodegenerative disorder, Fragile X-Associated Tremor/Ataxia Syndrome (FXTAS) which is diagnosed in 16.5% of women with the premutation over 50 (Bredin-Oja et al., 2021). FXTAS is characterized by uncontrollable tremors, decline in coordination, and loss of cognitive function that progresses more quickly than in typical aging (Hunter et al., 2014). Previous investigations have found early indications of the disorder may be present

in these mothers' language profiles. Specifically, the rate of language dysfluencies presented throughout a speech may be indicative of early cognitive-linguistic decline (Sterling, Mailick, Greenberg, Warren, & Brady, 2013; & Klusek et al., 2018). Language dysfluencies are interruptions in the flow of speech, such as pauses, fillers (e.g. like or um), or repeated words. Looking at mothers' dysfluency rate could be used to determine the future presence and severity of FXTAS in female premutation carriers.

This study focused on the number and type of dysfluencies found in mothers of children with FXS and who carry the FMR1 premutation, as well as correlations between the dysfluencies and motor skills of these mothers. Our specific research question was:

1. Do the dysfluencies demonstrated in the mothers' language profiles relate to symptoms of FXTAS, including motor decline and lower levels of cognitive functioning?

113 mothers of children with FXS participated in this study. The standard five minute speech sample (FMSS) procedure was performed by the mothers as they talked about their child with FXS. The samples were transcribed, and the dysfluencies were determined by these transcripts and coded into categories. We predict a higher level of dysfluencies to correlate to a more severe rate of motor symptoms and neurological decline, especially within cognitive processing and executive functioning, as the aging process continues. Data is currently being analyzed, and results will be presented at the conference.

Stringfellow, Isabel

Mentor(s): Dr. Cynthia Corbett

Patient Perceptions of Post-Hospital Discharge Medication Adherence: A Meta-Synthesis

The Centers for Disease Control and Prevention reports that 7.9% of Americans experience overnight hospital stays every year. In addition, the percentage of people using at least one prescription drug in the past 30 days in the United States was 48.4%. Proper medication adherence has benefits such as controlling patients' chronic conditions and preventing further health problems. Approximately 50% of patients do not take medications as prescribed which leads to increased morbidity and mortality and costs up to \$100 billion per year. Many factors impact a patient's ability to take their medication, such as cost, side effects, or time management necessary to take all medications at the prescribed times. The goal of this study was to evaluate and synthesize published research results on patients' perspectives regarding why they do and do not take medicines as prescribed after being discharged home from the hospital. The Joanna Briggs Institute Model of Systematic Reviews is being used to conduct a meta-synthesis of existing qualitative literature. PubMed, CINAHL, and PsychInfo databases were searched for full-text articles published between 2010 and 2020 that focused on qualitative studies of patient medication usage post-hospital discharge. The search yielded 94 total data-based articles with 28 relevant, non-repetitive articles. Common themes and exemplars will be identified via low inference content analysis among two primary investigators and three secondary readers. The initial findings from the search and categorization of the articles revealed clear differences in findings from international and domestic publications. In addition, preliminary results indicate that themes affecting post-hospital medication adherence include access to the medicine, perceived side effects of the medicine, and perceived positive effects on the chronic illness. Final study results are expected in March 2021.

Stroup, Trent

Co-Author(s): Scarlett Pho, TJ McCoy, Julia Lane Herlong, Shang-Yi Peng

Mentor(s): Dr. Sanjay Ahire, Dr. John Jensen

Improving the Time To Activation for Cancer Clinical Trials at Medical University of South Carolina – Hollings Cancer Center

Medical University of South Carolina (MUSC) has enlisted our Operations and Supply Chain (OSC) Center Consulting Team to improve the Cancer Clinical Trials Planning and Approval Process for Hollings Cancer Center (HCC). The process is characterized by numerous administrative and technical steps spanning

multiple departments within HCC and across MUSC Research Administration offices. The primary goal of the project is to help HCC reduce the “Time To Activation” for cancer clinical trials.

The project is following the DMAIC Lean Six Sigma framework for process improvement as follows:

Define Phase: Understanding the scope of the process, types of clinical trials, and resources (offices, people, and systems/technology); Defining client’s priorities for deliverables

Measure Phase: Mapping of the entire process from industry-sponsor offering clinical trial proposal to final approval for proceeding with patient recruitment. We have mapped more than 450 different steps, decisions, hand-offs, and delays across 14 different groups/offices through hundreds of hours of focus group interviews and development of a comprehensive swim lane map. We also collected secondary data on more than 100 clinical trials to identify time-stamps of various milestones.

Analyze Phase: We are currently developing analytical and statistical models of “Time To Activation” metric and its determinants. We will be using the statistical analysis to conduct root cause analysis of excessive TTA, and develop recommendations in terms of: reducing handoffs, reducing delays caused by lack of quality, and reducing rework across various steps in the process.

Improve and Control: We will pilot some of the recommendations and develop a robust plan to implement, monitor, and sustain the improvements.

This project is being sponsored by the Vice President of Research at MUSC and the Dean of Medical College of MUSC, and will be evaluated for Sonoco-UofSC Lean Six Sigma Green Belt Certification through UofSC-Operations and Supply Chain (OSC) Program.

Sultz, Julia

Mentor(s): Dr. Andrew Kaczynski

Motivations and Constraints to Youth and Minority Visitation to sites in the National Park Service

The National Park Service (NPS) has often been called “America’s Best Idea” and over 400 areas are preserved and protected by the United States NPS for the public’s enjoyment. When examining current visitor trends throughout the NPS, vast differences exist in the number of White versus racial/ethnic minority visitors, as well as a lack of youth and young adult visitors to the parks. As the United States demographics shift to include a larger proportion of minorities, and current youth grow older and have the financial ability to visit areas in the NPS, it is important to examine how the NPS will change to attract these visitors. The overall goal of this project is to better understand visitation to NPS sites by college students from diverse demographic groups. This study was conducted with participants from the University of South Carolina undergraduate population. We used department listservs and organization email lists to distribute the survey. Ethnicity (Hispanic or Latino) and race (Caucasian, Black or African American, Native Hawaiian or Pacific Islander, Asian, Native American or Alaska Native (with options for other and multiple races)) of participants was captured using questions from the United States Census. Factors that influence participants’ visitation to NPS sites were measured using scales representing motivations and constraints. For motivations, we evaluated the importance of 10 items (e.g., nature, exercise, wildlife) and for constraints, we assessed the salience of 10 factors (e.g., transportation, cost, language accessibility). Both dimensions were measured on a Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). Survey data were collected from a total of 459 students. Multivariate analysis of variance (MANCOVA) will be used to explore differences in motivations for and constraints to NPS visitation according to race/ethnicity, controlling for other key covariates. The study will be one of the first to analyze NPS motivations and constraints specific to young adults. Findings from this study will be used to make rec-

ommendations for the NPS on how to attract both young and minority visitors.

Surface, Lauren

Mentor(s): Ms. Sara Reinhardt

Psychological Development in Elementary Aged Children

Throughout my college years I had the privilege of working at an afterschool program for Charleston County School District. I worked specifically at Charles Pinckney Elementary school as a counselor and then was promoted to lead counselor. I worked with children ages third through fifth grade and engaged them in many learning activities, helped them with their school work and got to be a team leader among other employees. I chose this job because I have always loved children and have always wanted to help make a difference and be a role model. I was able to get connected with this job through a fellow peer in high school and worked on my breaks during my time in college as well as full time during the summer. During my time in this job I was able to relate many concepts I learned in my developmental psychology class back to the things I saw during my time. One example of this is Erikson's psychological stages of development. I was able to see how elementary aged children begin to grow their skills in the academic and social world, and just how early specific pressures and comparisons grow about t a young age. This was important to me as I took developmental psychology as a pre-requisite for nursing school at MUSC, which I will be attending this fall. I also want to go into pediatrics, so this was really important to me to learn a lot about children during this job. I was also able to become CPR and first aid certified in infants, children, and adults. I was also able to have experiences on other school sites during my time working for Charleston County. This included some title I schools, which was also important to me given I hope so someday work as a nurse with children and families that do not have the same access to health care as others. I learned a lot about diversity and just how quickly children develop ideals at a young age, I plan to take this into my career as a nurse.

Sutherland, Riley

Mentor(s): Dr. Woody Holton

Amazons and Angels: Army Women in the American War for Independence

During the American War for Independence, more than one thousand lower-class women accompanied Patriot troops. They contributed to the army's success, and earned rations and wages by washing laundry, mending clothes, cooking, nursing, spying, guarding baggage, aiding artillerymen, and facing enemy fire alongside male soldiers. These army women increasingly saw themselves as essential workers and demanded adequate compensation by petitioning for higher wages and sometimes even going on strike. After the war, several applied for pensions—and with them, recognition of their citizenship. Male printers, editors, statesmen, and soldiers viewed the army women's actions as a threat to their power. Although they described the women in ambivalent terms during the war, in response to women's post-war acts of defiance, they deliberately constructed the "camp follower" myth: the belief that women burdened the army by taking rations and offering little in return. By portraying army women as lewd and disorderly, men denied that they had contributed to independence, thus undermining their demands for citizenship. The "camp follower" myth not only solidified class and gender hierarchies in the early United States but also continues impacting historiography.

In short, my work draws upon soldiers' journals, pension applications, newspapers, and military service records to reinterpret ordinary women's experiences of the American Revolution and unpack pervasive, post-revolutionary myths that continue obscuring our historical memory.

Sweat, Sedrick

Mentor(s): Dr. Hilary Lichterman

How Business perpetuated my Passion

I may be a business major, but what if my true passion does not reside in that field? My experiences in college such as engaging in extracurricular activities, working internships, and obtaining education in the Darla Moore School of Business (DMSB) have opened my eyes and perspective to my true passion. My extracurricular activities have allowed me to obtain a new perspective that have strengthened me through my leadership responsibilities in college. My education in the DMSB taught me how to apply business intellect in different types of environments and taught networking skills that have acquainted me with the top staff in all of UofSC. My internship brought forth those leadership, networking, and educational skills where I was offered an opportunity to obtain a national sponsorship gaining campus-wide attention. My determination fuels me to achieve such touchstones and a testament to my determination has always been being admitted to UofSC as a Gamecock Gateway student and working my way up to being a student in the Honors College. With these feats, I inevitably earned my position in the Marketing Scholars Program within Darla Moore, which acquainted me with Lionsgate and brought forth my true passion for the entertainment industry.

Swinton, Lea

Mentor(s): Ms. Sara Reindhart

Mass Media's Influence on Community Service

For the past two years, I have served as the Lead Graphic Designer for the Student Government Communications Team here at the university. Applying for this position was largely associated with my desire to put a spotlight on the service opportunities and initiatives that the organization put on. I felt that this was necessary as opportunities for service often get lost in translation when it comes to college students and their many obligations. Organizing and planning for intentional advertisement, would not only make the student population here more informed of issues that were going on, but also allow for a normalized culture where it is expected and usual to serve the community around us. My role in allowing for this included meeting with respective parties to create a common idea or plan that could best advertise their event or initiative and then going on to create content that encompassed these ideas in the form of flyers, Instagram stories, and other graphics. It was interesting to see the impact that this approach because generally we saw an increase in turnout for many Student Government events, service related or not. This is due to the ability to repost digital content and reach a broader audience beyond those who may follow the Student Government social media pages. This entire experience showed me that service needs to be advertised just as much as an upcoming trend or app if we hope to have the majority of our communities giving back one day.

Tabassum, Nishat

Mentor(s): Ms. Tiffany Conde

Influence of work experience on life

As I started my college at USC as computer engineering major, I believed USC opened a lot of opportunities for my educational and career growth. Being in a field so vast made me question a lot of theories and core concepts of computers. One of the experiences that led me to apply as Information Technology Assistant at Biology and Chemistry department, was one of my professors was having problems with the projector while connecting through the laptop. For me it seemed like an easy fix which made me interest to troubleshoot problems, that landed me the position as IT Assistant. As I started my work there, I realized how much I was interested to work with troubleshooting faculty laptops and computers as well as maintain the computer labs which were for students. I was able to do software updates, installed Big Fix

software by IBM, restored disk from an image on the server using Clonezilla which helps in disk cloning, created specific groups and admins group for users to log in the specific groups. All these experiences help me gain more industrial or real-life knowledge. My primary tasks were to maintain the computer labs as well as troubleshoot faculty and students' problems. I believe I made the right choice when I started this professional job which helped me grow as an individual as well professionally. I was able to understand the meaning of work life balance from this job experience. My interest or passion might have started with an insignificant experience, but I started to grow more interest each day due to the fact that I get to learn new skills each day. I was able to learn how helping someone when they are in a time constraint makes me feel like I have accomplished something good for the day. This experience has left a good impact for personal and professional growth which will help me in the longer run in life. Some of the soft and hard skills that I was able to learn through this experience I was able to apply that to my professional life.

Tavakoli, Navid

Mentor(s): Dr. Parastoo Hashemi

Environmental and Pharmaceutical Effects on Serotonergic Transmission

Serotonin (5-HT) is a key molecule in the brain responsible for regulating processes including mood and cognition. Irregularities in the serotonergic system and subtle changes in neurochemical levels can result in profound behavioral impairments and are thought to underlie psychiatric disorders. The Hashemi lab has pioneered the use of fast-scan cyclic voltammetry (FSCV) for the measurement of in vivo 5-HT, specifically in the context of understanding depression. FSCV possesses the spatial and temporal resolutions necessary to monitor the transmission of neurochemicals in the brain while causing minimal disruption to surrounding tissue. Recently, we have expanded our investigation of the 5-HT system to better understand how exogenous agents and environmental exposures influence 5-HT transmission. Environmental factors, such as pesticides and lead exposure through drinking water have been linked to altered levels of 5-HT in the central nervous system. Other exogenous factors that have been shown to alter 5-HT levels are pharmaceuticals with off target effects. One family of pharmaceuticals of particular interest is statins which are cholesterol lowering drugs and represent one of the largest groups of prescription medicine in the US. In this work, we investigate the effects of the previously mentioned exogenous factors on the mouse serotonergic system via fast voltammetric methods. This study will help further the understanding of the interplay between environmental exposure and disposition to psychiatric disease.

Taxon, Erin

Mentor(s): Dr. Thomas Owens

Calibration of Automated Crustal Thickness Estimation Methods

The EarthScope Automated Receiver Survey (EARS) was launched in 2005 with the aim to stack seismic events and calculate bulk crustal thickness estimates, at all broadband seismograph stations worldwide in real time. While initial testing during EARS' launch showed robust results, checks have not been done over the last decade to assess the performance as the database has grown. EARS uses the receiver function Hk stacking method from Zhu and Kanamori (2000). Receiver functions calculate the Earth's structure by the timing and amplitude of P-to-S converted phase reverberations created at layer boundaries (Crotwell, 2007). The Hk stacking method converts these phases to amplitude as a function of thickness and V_p/V_s ratio. To determine the robustness of EARS' data, we compared it to the focused experiment called RISTRA (Rio Grande Rift TRANsect) from Wilson and Aster (2003). RISTRA was a short term seismic experiment with dense station spacing, that collected data from a transect that spanned the southwestern United States. RISTRA used the Kirchoff migration method and made crustal thickness estimates. By looking at the bulk crustal properties estimated by EARS to the RISTRA results, we evaluate the robustness of EARS and the effects that V_p parameterization has on the crustal thickness estimates. Due

to the noise in the seismograms and trade-offs in Hk space, it is possible to have multiple maxima in Hk space. In several examples, EARS “first choice” maxima do not agree with RISTRA estimates, however, there are secondary maxima in EARS spectrograms that do correlate with RISTRA estimates. Additionally, there were stations in EARS which were near RISTRA but deployed for longer time periods, where the generated maxima do not appear in the RISTRA results, due to a higher quantity of events in the Hk stack. We compare RISTRA results to the EARS global and local maxima to assess the overall performance of EARS.

Taylor, Alexandria

Mentor(s): Ms. Gina Spence

Bridging the Gap: Leadership in Non-Traditional Forms

In pursuing Graduation with Leadership Distinction: Community Service, I created an ePortfolio that showcases my process as a non-traditional student pursuing Public Health at the university. This continuous process is full of experiences in and out of the classroom that has shaped my presence in the spaces I take up. In this presentation, I will focus on a Key Insight from my ePortfolio: Empowering Leaders in Non-Traditional Forms and discuss the potential of its progressive impact. The purpose of this work is to describe my non-traditional processes and use of theoretical ideas to understand how we can create environments that ignite and support all future leaders while also demonstrating my process of becoming more aware of myself, things that I have learned, and how I understand them. This work is a byproduct explaining and reflecting on my experiences and how that has led me to further my individual and professional development and growth. This Key Insight discusses the Social-Change Model, Leadership theories, and other concepts learned through coursework and applied beyond the classroom leading to the idea that everyone can win and lead. However, first, we must all be willing and able to sit at the table to better ourselves individually and collectively to progress. Overall, I will demonstrate how I learned the importance of bridging leadership gaps and advocating for students at USC and community members; so that they all may have a seat at the table which creates better experiences and outcomes for everyone’s future.

Teresi, Jessica

Mentor(s): Ms. Maegan Gudridge

Promoting Student Mental Wellness as a Changing Carolina Peer Leader

The transition to higher learning involves drastic changes that impact a student’s mental wellbeing. While these changes often motivate students to seek opportunities or engage with people different than themselves, it is naïve to ignore the large range of challenges college students experience inside and outside of the classroom. Since joining the Changing Carolina Peer Leaders in January of 2018, I have been dedicated to making a sustainable impact on the health and well-being of the Carolina Community. From my Certified Peer Education training, I have facilitated presentations and learning opportunities to peers during University 101 presentations and created campus-wide events along with my peer leaders to educate on various wellness topics and their associate campus resources in areas of mental health, general wellness, and sexual health. From engaging with students at these events, I learned valuable lessons and perspectives that enhanced my empathy and open-mindedness. In turn, this has driven me to educate the Carolina Community on various mental health topics and encourage the Community to adopt strategies to support their mental health that fit within their individual needs. One of my most significant contributions was striving to establish an innovative and inclusive program to encourage help-seeking behaviors for students. Many students feel that their experiences are not valid or worth sharing which can lead to negative mental health behaviors. Through thinking critically how to decrease this barrier, my efforts led me towards developing I Feel UofSC, a campaign to encourage students to validate their emotions through a platform we all can relate to, such as music, to inspire help seeking and open sharing of experiences with vulnerability and resilience. In this presentation, I aim to promote mental wellbeing resources by sharing

how my experiences as a Changing Carolina Peer Leader contributed to the development of my leadership abilities and personal attributes during my time at UofSC.

Thomas, Todd

Mentor(s): Mrs. Ambra Hiott

My Barcelona Experience

In the Spring of 2020, I had the privilege of traveling to Barcelona, Spain for a study abroad experience at the University of Barcelona. While in Barcelona, I studied Hispanic Studies and International Business and also stayed with a host family in the Gràcia neighborhood. Having the opportunity to travel to Spain and live with a host family provided me with a unique perspective about the rich history and culture of Barcelona, Spain and Europe as a whole. What motivated me to go to Spain specifically was the fact that I am a Spanish and Business minor at USC, and wanted the opportunity to explore other countries in Europe as well. This experience was the first time I travelled to Europe and the first time I was forced to really use my Spanish skills in real world applications outside of the classroom. What I learned the most from this experience was how beneficial it is to be uncomfortable and adaptable. While in Europe, I was immersed in a culture much different than my own. This required me to step out of my comfort zone and adapt to the new norms that were initially uncomfortable to me. There were multiple times where I was having conversations in Spanish and I wasn't totally sure what the other person was saying. This was frustrating initially, but what I realized is that is ok. What I discovered while in Spain is that it is ok to be uncomfortable, because true growth only occurs in a state of discomfort. Although my time in Spain got cut short because of Covid-19, I am grateful for the time I did have. The lessons and memories I got while travelling around Europe are priceless and something I wouldn't trade for anything.

Thomason, Aidan

Mentor(s): Dr. Andrea Tanner, Ms. Kim Overmier

Taking Honors Online: Evaluating Faculty and Student Expectations for the Honors Experience

Working with South Carolina Honors College staff, this poster will present on a study that explored student and faculty experiences of planned online learning in the fall of 2020 and examine how students and faculty experienced these environments to see the impact of online learning on an honors community. Previous research on honors online courses almost exclusively focused on the initial transition to online learning in March 2020 and not on the long-term ramifications of learning online during the fall 2020 semester. An abundance of concern was placed on the lack of community in online honors courses, which are typically marked by stronger, more intimate interaction in the classroom, and the impact of this missing element of community on students' mental wellbeing. Additionally, the obstacles to cultivating lab and beyond the classroom experiences that are typically part of an honors experience in an online setting were noted in the existing research.

Through qualitatively coding faculty and student responses, this project identified key values and assumptions driving the honors experience. Students expected honors courses to involve intensive discussion and engagement, academic rigor, and small classes with motivated students. Faculty emphasized synchronous instruction, intentional online discussion, and group work as critical to maintaining the sense of community expected from an honors course. This project proposes the student and faculty reflections on their Fall 2020 online honors courses hold interesting insight into what honors classes may look like after the pandemic. All seemed to agree online honors courses are doable after the end of the COVID-19 pandemic but pointed out that maintaining the level of engagement expected is difficult in an online setting. Online or hybrid honors courses after the end of the COVID-19 pandemic may offer attractive alternative options for students with busy schedules or professors who would like to engage with long-distance guests in the classroom, but it seems that an online environment cannot consistently cultivate the same level of community and classroom engagement that is intrinsically part of in-person honors classes.

Thompson, Isabel

Mentor(s): Mrs. Gina Spence

Transformative Learning and the Pursuit of Global Citizenship

Throughout my four years of undergrad, I had the opportunity to study abroad on three separate occasions to Thailand, Japan, and the Netherlands. These enriching experiences shaped my global perception and helped forge the life and career path I'm exploring after graduation. One of the leading concepts of my ePortfolio is intercultural competence and the pursuit of becoming a 'global citizen': achieving acceptance and understanding through the idea that one's identity transcends borders, and that our rights and responsibilities come from belonging to humanity. This can be best translated through the key insight I'll be discussing, "The Global Citizen". Within this I detail the first internship I had in a corporate setting at Southeastern Grocers, and a specific course I took while abroad in the Netherlands, Diversity Management- the concept of supporting a diverse and inclusive workplace, school, home, etc. The connectivity between the two expanded my understanding and passion for multiculturalism significantly and through frequent engagement with others of varying cultures and backgrounds, I've found this to be crucial from classroom to corporation. Achieving higher communication, especially in cross-cultural settings, is imperative for helping the divisiveness within the global community. These transformative experiences within and outside the classroom have ultimately left a lasting impression on my personal and professional identity and prepared me for my future endeavors in pursuing my Masters in Intercultural Communication at the University of Manchester this fall.

Thoppil, Julia

Mentor(s): Dr. Kimberly Becker, Ms. Wendy Chu

Evidence-Based Strategies Used to Address Multidimensional Barriers to Mental Health Treatment Engagement

Low treatment engagement is a pervasive problem in mental health services. Given that it is associated with poor treatment outcomes, a nuanced understanding of engagement barriers and the solutions that can be used to address these barriers is needed. One framework to conceptualize treatment engagement is the REACH framework, which outlines 5 domains of engagement: relationship, expectancy, attendance, clarity, and homework. Some studies indicate that coordinated action, or using the appropriate strategies for a given barrier or problem domain, may contribute to improved treatment engagement outcomes. Using the REACH framework, the current study aimed to describe (1) the frequency of engagement barriers encountered by mental health providers, (2) the strategies used to address engagement barriers, and (3) the strategies most commonly used in a specific REACH domain. Participants (N = 38) were mental health providers who were surveyed about their encounters with 20 engagement barriers and utilization of 23 strategies. Specifically, providers indicated the extent to which barriers interfered with youth and caregiver engagement on a 5-point Likert scale (1 = Never, 5 = Always) and how often they used specific engagement strategies in their first five sessions with a new client on a 6-point Likert scale (0 = Never, 5 = 5 sessions). Results revealed that providers reported encountering homework barriers (M = 2.71, SD = 0.61) and using homework strategies (M = 3.07, SD = 0.73) most frequently. Results also revealed that for providers who frequently experience barriers in relationship, attendance, or clarity domains, the most common strategies they used were in the homework domain (Ms = 3.15–4.81, SDs = 0.64–0.96) and thus were not of the same domain. In fact, for these three domains of barriers (i.e., relationship, attendance, clarity), strategies of the same domain were used the least often of all the strategies (e.g., relationship strategies were used the least often for providers who frequently experienced relationship barriers). Findings support continued research utilizing a multidimensional approach to understand mental health treatment engagement. Additionally, they highlight the need for improved coordination of engagement strategies, particularly for barriers related to relationship, attendance, or clarity.

Todd, Molly

Mentor(s): Mr. Rico Reed

Embrace Change

In the past four years as a student at the University of South Carolina I have learned a lot about myself through my experiences inside and outside the classroom. I have grown through being exposed to new cultures and environments. I was fortunate enough to study abroad in Brisbane, Australia last spring at Queensland University of Technology when the COVID-19 pandemic hit, and I was unable to visit China. In Australia, I was able to test my own limits in adaptability, cultural immersion and professionalism. By constantly pushing myself outside my comfort zone, is how I can best grow and perform beyond UofSC into the workforce. In this presentation I will touch on my insight of adaptability and resilience I've learned throughout my time at UofSC.

Tollison, Kelley

Co-Author(s): Katelyn Shindler

Mentor(s): Dr. Jena Chojnowski

Shell-less Chicken Embryo Development

Scientists and students can witness and manipulate embryonic development in a visible environment by way of shell-less chicken embryonic development. This method of development refers to incubating the embryo outside of the shell. The research project focused on multiple layers including engineering a homemade incubator, manipulation of time for initial incubation temperature relating to viability, and outreach programs to bring this project into local high-schools. We engineered the homemade incubator out of cost efficient products including a styrofoam cooler and heating lamps. Two dozen fertilized chicken eggs were incubated in the shell for two different durations of time, one dozen for fifty-five hours and one for seventy-two hours, to test which time period allowed for optimum removal of the shell. It was found that at seventy-two hours the embryos are more likely to be successfully transplanted from shell to artificial vessel. Findings from the research were presented to May River High School's AP Biology class in Spring 2020 in the form of an interactive lab. Students witnessed the development of chicken embryos at various stages of gestation and gained hands on laboratory experience. The method of incubating the embryo outside of the shell allowed for the learning and visualization of chicken embryonic development.

Towery, Grace

Mentor(s): Dr. Emily Mann

Social and Cultural Factors Shaping Contraceptive Attitudes and Use among Latinx Immigrants in South Carolina: Results from a Community-Based Study

Access to and use of effective contraceptive methods has increased in the United States in the past decade due to a variety of private and publicly funded initiatives; however, for recent Latinx immigrants, multiple social and cultural factors constrain their capacity and willingness to use contraception, which can exacerbate reproductive health disparities. This study used a community-based approach to examine social and cultural factors shaping contraceptive and use among Latinx immigrants in South Carolina, a newer destination state for this rapidly growing population. Qualitative data analysis of individual interviews conducted with 28 participants revealed that structural factors such as racial and anti-immigrant discrimination, cost, lack of health insurance coverage, lack of Spanish interpreter services at clinics, absence of culturally tailored information about different contraceptive methods, and an inability to take time off of work to visit a clinic are significant barriers to contraceptive use. Participants' attitudes towards contraceptive methods were shaped by numerous community-level and interpersonal factors, including social stigma about contraceptive use, their current relationship status, stage in the reproductive life cycle, prior experiences with contraceptive use, stories they had heard from friends, family members, partners,

and social media, beliefs that hormonal contraception is harmful and unnatural, concerns about negative side effects, and the perceived effectiveness of different methods. The study findings reveal that, like all people of reproductive-age, multiple social and cultural factors influence this populations' contraceptive and use, which are then compounded by structural barriers specific to their status as immigrants. A multi-pronged approach, including expanded access to healthcare, is needed to ensure that Latinx immigrants are able to fully informed decisions about contraceptive use by eliminating logistical barriers to contraceptive use and facilitating access to culturally appropriate contraceptive care.

Trinh, Jasmine

Mentor(s): Mr. Jay Pou

Project Management turns into Life Management: My Takeaways from an Internship at a Farm Credit Bank

In my role as a Project Management Intern at AgFirst Farm Credit Bank, I am responsible for providing updates on multiple Bank projects regarding the scope, cost, duration, and any changes that may impact the projects. On a weekly basis the Project Execution and Advisory Committee meets to discuss these details, addressing any impediments and providing guidance to project owners to ensure a successful project. Throughout my time in this role, it has become clear that proper planning, frequent communication and attention to small detail changes can be the difference between a successful/unsuccessful effort. I have been able to apply these concepts to tasks and projects in my personal and professional life to get the best return on my efforts.

Troy, Catherine

Co-Author(s): Ashley Brunson

Mentor(s): Dr. Daniela Friedman, Dr. James Hebert

Internet Search Trends Analysis to Demonstrate Relationships Between Cancer Incidence and Search Volume Index (SVI) for Cancer Related Information

The purpose of this study is to analyze relationships between internet search trends using search volume index (SVI) for cancer related information and the cancer incidence rates across South Carolina counties. Internet activity will be evaluated from 2005-2017 using Google Trends. Google Trends is a free online service that provides data on the volume of search results for a given query that is normalized to the time and geographic location of the query. This value, which is normalized to a scale ranging from zero to 100, is known as the Search Volume Index (SVI) and will be used in our statistical analysis. Tables and maps of South Carolina cancer incidence and mortality data generated from the South Carolina Department of Health and Environmental Control (SCDHEC) will then be used to evaluate both in situ and invasive cases of cancer that have occurred for South Carolina residents in each county for each year being examined. SAS will be utilized to conduct statistical analysis to determine associations between the change in SVI and cancer incidence rate for each South Carolina county over time. A Partial Pearson Product Moment Correlation and Partial Spearman Rank-Order correlation analyses will be performed to determine the statistical relationship between the SVI for cancer symptom, cause, and treatment searches compared to cancer incidence data. These three queries were determined through Google Trends, which classifies search queries into "Related Topics" allowing them to be sorted by relevance with the highest search frequency topics being listed as most relevant. Partial correlations will be performed on the SVI and SCDHEC cancer incidence data by county, and further partial correlations will be performed so that census data with population demographics for each county can be used to control for all possible variables that are accessible. The partial correlation will allow us to determine if any of our control variables influence the association between SVI and Incidence. The data will be aggregated to provide a statewide overview of the association between the longitudinal change in search volume index for the target search terms and the cancer incidence data.

Truesdale, Tre'Quon**Mentor(s): Dr. Florencia Cornet****Growth through McNair**

The Ronald E. McNair Postbaccalaureate Achievement Program engages scholars in an intensive six-week session of hands-on research with the support of a faculty mentor who is from their major field. The program also prioritizes preparation of the scholar for success in transitioning into and attending graduate school. This past summer I was a part of the scholarly McNair 2020 Cohort, an experience amongst the biggest of my achievements at the University of South Carolina. Through a spectrum of engaging activities, the McNair Program granted me new relationships that broadened both my social and professional network. My abilities in research saw a positive surge as I gained firsthand experience in developing my very own topic and collected data to support it. I saw major improvements in my ability to manage time as well as organize and present research. I intend to not only center my presentation around the work that I did in McNair, but also to discuss the ways in which it benefitted me. I plan to discuss the exceptional growth in my skillset, both inside and outside of the academic setting.

Tucker, Savannah**Mentor(s): Dr. Alissa Armstrong****Determining the Role of High-Sugar and High-Fat diets on ovarian function using *Drosophila melanogaster***

Adipocyte dysfunction is associated with many metabolic diseases, such as obesity, diabetes, and various comorbidities, and it has been linked to diets high in fats and sugars. Previous studies have shown a connection between high-sugar diets and decreased egg production and ovary size in the *Drosophila melanogaster* by mimicking insulin resistance and the associated diseases (Brookheart, 2017). By analyzing ovary and fat body tissue of the *D. melanogaster* fed high-sugar and high-fat diets through ovary morphology analysis, germ-line stem cell (GSC) and cap cell (CC) counts, vitellogenesis studies, and lipid-drop-let analysis, the influence of diet on oogenesis and adipocyte dysfunction can be further characterized. The nutrient sensing pathways between the ovaries and fat body, more specifically the insulin signaling pathway, can also be analyzed using a GFP reporter line to indicate insulin signaling activity under the high-sugar and high-fat diets. The goal of my project is to characterize how obesogenic diets influence oocyte development and adipose tissue nutrient sensing.

Tucker, William**Mentor(s): Dr. Abbi Lane-Cordova****Associations of Sodium Consumption and Endothelial Function in Women 6 months – 3 years After Delivery**

Introduction: Increased sodium consumption is strongly associated with decreased endothelial function in both animal and non-pregnant human models. Pregnancy is characterized by profound and lasting cardiovascular adaptations, so this relationship in the early years after pregnancy is unclear.

Purpose: The purpose of this investigation was to determine whether self-reported sodium consumption was associated with endothelial function in women 6 months to 3 years after giving birth.

Methods: Dietary sodium consumption was assessed using a validated, scored sodium questionnaire and categorized as high or low based on established cut points. Blood pressure was obtained with a sphygmomanometer after a 5-minute rest period by averaging two measurements. Venous occlusion plethysmography was used to assess forearm reactive hyperemia following a 5-minute occlusion and forearm vascular conductance (flow/mean arterial pressure) as validated surrogates for endothelial function. T-tests were used to test for differences in endothelial function between sodium categories.

Results: 42 participants completed the study (mean age=34±1, mean BMI=26±1, 20.9% African Ameri-

can). There was no difference in reactive hyperemia (10.9 ml/tissue in high versus 10.1 ml/tissue in low sodium groups, $p=0.31$) or vascular conductance (0.13 ml/mmHg in high versus 0.12 ml/mmHg in low sodium groups, $p=0.57$) between categories.

Conclusion: Our lab has previously found blood pressure to be insensitive to sodium during pregnancy, and these preliminary data indicated difference in endothelial function between categories of sodium consumption in the 6 month - 3-year post-partum range. These results bolster the evidence for the possibility of “carry-over” effects from pregnancy which mitigate the effects of sodium on the cardiovascular system in pregnant and recently pregnant women.

Turbeville, Ben

Mentor(s): Prof. Timothy Lewis

Growing as an Individual Toward a Career to Support Others

During my undergraduate career, I served as a mentor to other students as an Orientation Leader with the Office of New Student Orientation. As a transfer student coming from a small technical college, my intentions entering campus were to get acclimated to my new environment and make friends to help with my transition to a new institution. Little did I know that becoming an Orientation Leader would be one of my most transformational extracurricular experiences, which would provide me with two summers doing an occupation involving my passions: working with and assisting students and their families. As an Orientation Leader, I welcomed thousands of incoming students and their families to the University of South Carolina. As the first person of contact and the face of the school, I shared university history and helpful advice with students on how to navigate their freshman year. After receiving a promotion to the Lead Team for my second year, I mentored the new Orientation Leaders and prepared them for their role and the upcoming summer. After the COVID-19 pandemic resulted in a last-minute switch to a completely virtual format, I learned and helped assist the new Orientation Leaders with adaptability, flexibility, and valuable problem-solving skills.

I never expected the impact becoming an Orientation Leader would have on me. I learned a plethora of different skill sets such as public speaking, team building, and effective conflict resolution and as a future social worker this will only benefit my role as I maintain and assist client cases throughout my career. Orientation and a plethora of my other leadership development opportunities have provided me with the resources to excel in the social work profession. Experiences like this have allowed for personal and professional growth throughout my time here at the University of South Carolina.

Turk, Brooke

Mentor(s): Dr. Laura Jelsone-Swain

The Effect of Acetaminophen on Brain Activity During a Pain Observation Task: An EEG Study

Motor resonance is a system network of regions in the brain that regulate theory of mind, the perception of another's actions and sensory experiences which can produce brain activity very similar to if oneself were to have the same experience. While observing electrical activity in the brain, when an individual performs a motor action or when he/she visualizes performing a motor action, mu wave patterns are suppressed. Therefore, increased mu suppression positively correlates to increased motor resonance activity, which can ultimately produce stronger feelings of empathy towards others. Acetaminophen, the active ingredient found in Tylenol, is among the most common pain medications consumed. However, there is new evidence that suggests this common analgesic may also dampen empathic processes and prosocial behavior. Further, this relationship has not been examined in the context of neural oscillations, as measured by EEG. We recruited 49 (14 males, 35 females) participants who were randomly assigned to either an experimental or control group in a double-blind experimental research design. Participants in the experimental group were administered 1000mg of Acetaminophen or placebo (each divided into three capsules) an hour before beginning the EEG task. During this hour, participants were asked to com-

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plete the Empathy Quotient, a demographic survey, and a bias check to make sure they were unaware of their group assignment. We hypothesized that participants in the experimental group would have less mu suppression while observing others in action-based painful situations, while the placebo group will have more mu suppression. This decrease of motor resonance in the experimental group supports the suggestion that acetaminophen interferes with the neural response associated with the observation of others in pain. The results of this study followed our hypothesis that the placebo group would have more mu suppression and the acetaminophen group would have less mu suppression. Furthermore, this supports the belief that acetaminophen may interfere with brain processes involved in seeing others in pain, hence and thus, dampen our empathic response. The implications of these findings may redefine how we administer this common drug.

Turner, Samantha

Mentor(s): Dr. Charles Pierce

GLD Professional and Civic Engagement Internship Presentation

Going to a new school was something new to me already, but being able to learn something new at my internship was even better. After transferring from my technical college in 2019, I saw an opportunity to gain experience in relation to my environmental studies major as well as in my future career plans by applying to this internship my first year. At the beginning of my junior year of fall 2019 and continuing into my current year as a senior, I've been working with the South Carolina Department of Natural Resources (SCDNR) as a GIS Analyst Intern. SCDNR's mission is to serve as the principle advocate for South Carolina's natural resources. My duties as a data intern vary from scanning historic data into digital format and general data entry for me or updated rare, threatened, and endangered species, to responding to species review requests for potential development projects across the state. Furthermore, a defining moment I had was getting the opportunity to work on a big project on my own. In a span of 1-2 weeks, I was able to scan in original paper copies of Heritage Trust Registration Agreements and SCDNR Conservation Easements as well as locate and digitize their boundaries in GIS. From this expedient work, SCDNR employees are now able to easily search for these locations online and view them on their phones while conducting site visits in time for the upcoming season. Lastly, my internship provided me with first-hand experience in learning a new skill and having the responsibility of working independently. I learned how to use GIS from scratch and saw my progress in understanding the application better and I saw the trust I've gained from my boss when he let me start a big project on my own. This experience made me realize that I am a quick learner and that I have the ability to adapt to change easily since this was my first intern learning something new. This unforeseen opportunity has made me realize more about myself overall.

Upadhyaya, Anjali

Co-Author(s): Shiv Patel

Mentor(s): Dr. Cheryl Armstead

The impact of Informal Student Caregiving on Heart Rate Variability and Emotional Regulation -- This research tests the impact that informal student caregiving has on a student's emotional regulation and their ANS. An informal student caregiver is someone who assists in the care of any relative, partner, friend, or neighbor who suffer with a chronic or disabling disease. Very little research is currently available on the long term physical and mental health effects of informal caregiving among college students. This study could help in providing information on how to keep the students healthy while they are acting as a caregiver for a close one. It was hypothesized that students would be more susceptible to a poorer mental and physical health as a result of the caregiving stress, showing a lower heart rate variability at rest. First, the students will complete questionnaires about experiences regarding racism, experience with microaggressions and their demographic information on Qualtrics. Next, their heart rate would be recorded

through a heart rate monitor during rest. “Welltory” application will be used to record their resting HRV. The methods of survey and online heart rate monitors have been used for previous research experiments as well.

The assumption is that there will be a lower heart rate variability, meaning a slower recovery from the variations in heart rate of student caregivers as compared to non-caregivers, which would indicate a poorer mental and physical health possibility.

Heart rate is regulated by both sympathetic and parasympathetic branches of ANS, which relates it to HRV. It would mean that the heart rate variability in student caregivers would be lower than it is seen in non-caregivers, which would implicate that their sympathetic and parasympathetic nervous system, which are responsible for decreasing and increasing HRV respectively, are not working as quickly as they normally would. This could lead to further complications over the years and indicates current stress in student caregivers. We could use these findings to further conduct a study on how the mental stress could be reduced in caregivers to ensure better health.

Varanasi, Sreeja

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

Exploring Visual Social Attention between On-Screen and Real-Life Interactions in Preschoolers with Autism Spectrum Disorder

Autism spectrum disorder (ASD) is a complex neurodevelopmental disorder mainly characterized by difficulties in social communication and interaction (Falck-Ytter, 2013). Individuals with ASD also have deficits in social attention, evidenced by their reduced attention to relevant stimuli, such as faces (Guillon et al., 2014). Rather than social attention, individuals with ASD will often instead direct their attention to background objects, displaying non-social attention (Chawarska et al., 2012). Importantly, both reduced social attention and increased non-social attention have been shown to hinder socio-cognitive development in children with ASD (Leppanen & Nelson, 2009; Pascalis et al., 2015). Although the attention patterns of individuals with ASD have been thoroughly studied, the extent to which attentional patterns measured experimentally translate to practical daily scenarios involving social and non-social attention is not clear. The current study examined the correspondence between the social attention in a real-world social context versus an experimental eye-tracking paradigm in preschoolers with ASD. It was hypothesized that experimental social attention will correlate with eye contact in a real-life context, while non-social attention will not correlate with eye contact during a real social interaction. Participants were evaluated for experimental social attention through a spontaneous social orienting eye-tracking paradigm. The eye-tracking paradigm consisted of a 3-minute long video depicting an actress sitting at a table with mechanical toys placed behind her. Out of the four conditions presented in the video, the Dyadic Bid and Moving Toys conditions were used in the present study. To evaluate social attention in a real-life setting, participants were assessed for eye contact during the first minute of social interaction with an assessor using the Social Approach Scale. Preliminary results suggest that there is a trend between social attention in an experimental setting and eye contact in a real-life social context for individuals with ASD but not for the typically developing group, while non-social attention is uncorrelated with real-life eye contact in individuals with ASD. Results from this study will contribute to the understanding of the attention patterns in individuals with ASD and efficacy of current social attention measurement tools.

Varanasi, Sreya

Mentor(s): Dr. Jeffrey Schatz, Ms. Sarah Bills

Inattentive and hyperactive/impulsive symptoms in pediatric sickle cell disease

Introduction: Youth with sickle cell disease (SCD) often develop impairments in attention and executive functioning due to cerebrovascular complications, which correspond to symptoms of attention-deficit/hyperactivity disorder (ADHD). Other medical conditions associated with brain abnormalities (e.g., trau-

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matic brain injury) are similarly associated with the onset of inattentive-type symptoms, typically in the absence of the hyperactive/impulsive symptoms often associated with ADHD. There is evidence to suggest that the presentation of ADHD in pediatric SCD is predominantly characterized by attention difficulties; however, there is limited research exploring the association between inattentive and hyperactive/impulsive symptoms and other executive function deficits associated with ADHD in pediatric SCD. We hypothesized that inattentive symptoms, but not hyperactive/impulsive symptoms, would correlate with greater deficits in two components of executive function: emotion regulation and cognitive control.

Methods: This study evaluated 68 children with SCD ($M = 6.43$, % female = 51.5, % high-risk genotype = 60.3) as part of a larger developmental screening program. The Behavioral Regulation and Meta-Cognitive Skills subscales of the Behavior Rating Inventory of Executive Function (BRIEF), a parent-report scale of executive functions, were used as measures of emotion regulation and cognitive control, respectively. Higher scores on the BRIEF are indicative of greater difficulties in a given domain. Correlational analyses were performed to explore associations between inattentive and hyperactive/impulsive symptoms and measures of cognitive control and emotion regulation.

Results: Correlational analyses revealed a significant association between inattentive symptoms and cognitive control ($r = 0.257$, $p = 0.034$), such that increased inattentive symptoms predicted poorer cognitive control. No significant correlations were shown between inattentive symptoms and emotion regulation or hyperactive/impulsive symptoms and cognitive control and emotion regulation.

Conclusions: The hypothesis was partially supported; inattentive symptoms were significantly correlated with difficulties with cognitive control, a facet of executive functioning associated with ADHD. There was no relationship between hyperactive/impulsive symptoms and measures of executive function, suggesting that inattentive-type symptoms may better characterize ADHD than hyperactive/impulsive-type symptoms in pediatric SCD. This indicates that screening for ADHD among youth with SCD may benefit from a focus on inattentive symptomatology.

Veilleux, Charles

Mentor(s): Dr. AKM Jahangir Majumder

A Smart Cyber-Physical System to Detect IoT Security Threats Through Behavioral Power Profiling

As the number of Internet of Things (IoT) devices in the world rapidly rise, integrating increasingly with various aspects of people's lives, security for IoT devices is as important as ever. Often, IoT devices are set up and forgotten, with security vulnerabilities going unpatched for prolonged periods. The limited user interface, coupled with the closed-source nature of many IoT devices, leaves users in the dark with no way of knowing whether a device has been compromised. The proposed method seeks to develop a cyber-physical system that uses behavioral power profiling to detect security threats. To accomplish this, collected IoT device power data is broken down into set intervals of time. This data is then analyzed and used to develop an artificial neural network (ANN) model. Though the developed ANN model for security threat detection only had slight success, we hope the continued research and development have the potential to improve the accuracy so that the system could have real-world applications.

Venezia, Grace

Mentor(s): Mrs. Maureen Grewe

Lessons from a Former Vice President of Finance in Greek Life

The main purpose of Greek life on campus is to bring a group of individuals that share similar values together in a community. My Greek life experience has certainly given me a community on campus, and it has connected me with lifelong friends, great memories, and opportunities to grow personally and intellectually. My experience was enriched by being the Vice President of Finance for my chapter, Pi Beta Phi. In this position my responsibilities included: management and creation of a \$1.6 million budget, completion of daily operations such as collection and disbursement of funds, maintenance of bank accounts, and

education on positive personal monetary practices. I wanted to serve the chapter in this way to increase my involvement within Pi Beta Phi while expanding my knowledge on business practices. Specifically, business skills applicable within the classroom and in my future career, such as budgeting, fraud and theft prevention, and leadership of peers. These skills, among others, translated into a deeper understanding of the concepts and reasons behind their importance. Throughout the year-long position, I was able to learn about dependency in teamwork, brevity in communication and the value of finance education. Through these lessons, I have become a more dynamic and understanding team member, a stronger written and oral communicator and an improved teacher.

Verma, Mansi

Mentor(s): Dr. Douglas Wedell, Mr. William Hayes

Decoy Effects in Choice Under Cognitive Load

Decoy effects occur when the addition of a third option to a set of choices changes the relative preference for the other choice options. For example, the attraction effect occurs when the addition of an option clearly dominated by one of the alternatives in a choice set increases preference for the dominating alternative. The compromise effect occurs when the addition of an extreme option increases preference for a middle alternative in a choice set. Previous research has found that an ego depletion manipulation increases the magnitude of the attraction effect and decreases the magnitude of the compromise effect. The current study investigated whether similar results would be found when cognitive load rather than ego depletion was manipulated in a within-subjects design. Participants ($n = 85$) were asked to choose between grocery options based on their price and quality while memorizing a 7-digit number on half the trials. Memorizing the 7-digit number was a manipulation of cognitive load, which reflects the taxing of attentional resources. Results indicated that load did not modulate the magnitude of either the compromise or attraction effect, despite both decoy effects being robust. A manipulation check found that participants rated the choice task as significantly more difficult under load, so that the load task did appear to be taxing attentional resources. Overall, our findings suggest that the attraction and compromise effects may depend on automatic processes that are not always susceptible to interference from concurrent tasks.

Vista, Jane

Mentor(s): Dr. Sheryl Wiskur

Analysis of Electrostatic Cation-Pi Interactions

Molecular interactions are at the core of all chemistry. They dictate whether a chemical reaction will progress or not, with what rate it will progress, and the nature of the product at the end. Many of these interactions rely on electronic attractions or repulsions that are guided by the presence or absence of electrons, or negatively charged particles. One such interaction is the cation-pi interaction. Cation-pi interactions are attractions between a positively-charged molecule, the cation, and an electron-rich molecule, the pi system. These interactions are useful in the Wiskur research group for their ability to align the pi system with different substrates (cations) and produce enantioselective products, or products of a single orientation in 3D space. To study this interaction, novel thiourea catalysts were synthesized and purified through recrystallization and column chromatography. These catalysts were placed in reaction with a chiral alcohol pi system and a protecting group, where the catalyst would become charged and interact with the pi system. The concentration of each enantiomer in the product was measured with Nuclear Magnetic Resonance spectroscopy to determine the ability for our catalysts to sterically hinder reactions on one "face" of the pi system. This study aids the research in producing pure chiral products in pharmaceutical synthesis in order to prevent unwanted side effects and adverse reactions in patients.

Voehringer, Alexandra
Mentor(s): Dr. Ambra Hiott
Peer Leadership

The goal I set for myself before attending the University of South Carolina was that I would make the most of the opportunities presented to me. In my mind, this meant that I would strive for academic achievement and get involved with clubs or organizations to enrich my experience and add to my resumé. However, I truly never expected to grow as a person and a leader as much as I have during my four years at Carolina. I never imagined I would have the opportunity to serve on the executive board of my sorority, receive a research grant, or have a hands-on experience working with children in suboptimal situations. These experiences, along with my enriching classroom education, shaped me into not only a successful leader, but a truly well-rounded individual. Without them, I would have never been able to acquire the knowledge I have about how personalities impact behavior or how the context of a situation is imperative to conflict resolution. Being both a leader and a member of a team gave me the chance to apply these skills to real world scenarios that I never would have encountered without the amazing opportunities that I have been afforded. The key insights I have gathered will undoubtedly prove invaluable in my future career endeavors and will allow me to succeed in the field of family law. My presentation will highlight these insights and the specific ways they will serve me past my time as a student at the University of South Carolina.

von Klar, Alexander
Mentor(s): Dr. Hilary Lichterman
Collaboration, Community and Connection: Lessons from University Housing

My most significant contribution to the University of South Carolina has been the work I have done as a Resident Mentor with University Housing. As a RM, I was responsible for supporting first-year and returning students throughout their experience as on-campus residents. I helped build relationships and develop a sense of community in residence halls across campus. This work was extremely rewarding to me because of the personal and professional connections I made in my time with University Housing. However, the time I spent attempting to help others proved to be more valuable to me than I ever could have imagined when I started in the role. Serving as a Resident Mentor gave me a variety of essential skills, including the ability to manage a crisis, plan events, work alongside a team of my peers and communicate effectively. I would not be the leader I am today without this experience. However, I have also done work to improve the methods and processes through which we support our residents. As the President of the Resident Mentor Council, I worked alongside Resident Mentors from all residential communities to ensure that they were adequately prepared to face any challenges that the role can bring, especially with concerns related to COVID-19. In this role, I learned to lead meetings and represent a diverse coalition of student employees with a unified voice. I hope to continue the work I started in University Housing to build community and create connections between people as I attend law school and join the legal profession this fall.

Vossberg, Raeann
Mentor(s): Dr. Elizabeth Crouch
Defining Septicemia Incidence and Mortality in South Carolina Through Access to Health Care, Behavioral Health, and Low Socio-economic Status

This study aims to provide an in-depth view at septicemia mortality and incidence in the state of South Carolina through the lenses of socio-economic factors, access to healthcare, and behavioral health factors. This study was conducted using data from the South Carolina Revenue of Fiscal Affairs, utilizing their Hospitalization, Inpatient, Emergency Department, and Outpatient data, along with additional data

sources for support (see works cited). We hypothesize that the higher rates of septicemia mortality and incidence in the southeastern United States, as well as in South Carolina in particular, could be associated with rurality, low socio-economic status, and risky behavioral health choices. Bivariate analyses were conducted with SAS 9.4. We found higher rates of septicemia mortality among residents in rural areas, minority residents, and areas with high economic inequality.

Waddell, Lauren - Co-Author(s): Carly Yates, Anisah Reed, Boyce McCool

Mentor(s): Dr. John Gerdes

IIT Internship Database

The aim of this project was to create a functional database for the IIT Department's Internship Director, Tony Dillon so that he can manage internship data. This project will allow the the IIT Department to maximize on opportunities provided by visiting companies or guest speakers while they are on campus. Upon completion, this project will make Mr. Dillon's job easier as he will be able to compile and sort through diverse data types. Expected results are a complete database with pre-made forms and queries for quick insertion of data and information seeking.

Wagner, Koby

Mentor(s): Mrs. Anna Oswald-Hensley

Amazing Life of Koby Wagner

In this presentation you will see the steps that I have taken towards being a leader in my pathway of Professional and Civic engagement along with who I am. In my first beyond the classroom experience I was a Ranch hand for a local ranch called Stanton Ranch. This was hard and consistent work however it taught me a lot. While working at the ranch I learned a lot of responsibility like making sure the animals were taken care of, but also the equipment. This job gave me great leadership skills as I was the lead man on the job, and making sure everyone did their part, along with keeping the place together. Along with leadership lessons this job allowed me to take pride in all that I do, whether that be picking up horse crap or doing my assignments, and I feel that is the biggest take away for me. The next beyond the classroom experience is being a team captain for my soccer team at Lakewood highschool. This role allowed me to really step towards being a leader for my peers. As the captain I kept everyone in line in terms of making sure they are giving it their all along with showing each other respect. I feel this was a huge step for me towards my pathway goal because it allowed me to grow as a leader and it gave myself confidence knowing that I could lead my peers. When looking into my presentation you see that I am huge about sports, along with school and family. I take a lot of pride when it comes to my athletics and academics. In this presentaint you will get to see some of my most memorable moments during my times in highschool and USC Sumter with my friends and family.

Wagner, Amanda

Mentor(s): Ms. Tiffany Conde

Strength in Seeking Perspective as a Leader

Starting my sophomore year at the University of South Carolina, my most significant contribution occurred within the Association of Pre-Physician Assistant Students (APPAS). The organization aims to provide pre-physician assistant (PA) students with the resources necessary to be competitive applicants – including, but not limited to: interview preparation, application and personal statement workshops, guest speakers, and a collaborative environment. During my time in the organization, I gained many perspectives having been a member my sophomore year, the Vice President my junior year, and am currently President of APPAS. Each position has allowed me to gain the knowledge to improve myself as a pre-PA student, as well as seeing how to help other pre-PA students. As I transitioned through all of these roles, it

allowed me to see the areas in which the organization was thriving and where some small changes could allow for better exposure to the PA profession. As a member, I saw how I could continue to grow my own knowledge of the profession, but by immersing myself within the executive board, it enabled me to help others in the growth of their knowledge. Throughout this experience, my leadership skills have improved by allowing for different perspectives to shape me as a leader.

Wakser, Cayla

Mentor(s): Dr. Jessica Klusek

Age and Syntactic Complexity in Mothers with the FMR1 Premutation

Introduction: The Fragile X Mental Retardation Protein is essential for cognitive development and function. The Fragile X Mental Retardation human gene (FMR1) codes for this protein. Around 1 in 151 women carry the FMR1 premutation. Mothers pass this mutation to their children, which may cause fragile X syndrome, a common cause of intellectual disability. Although these mothers are not considered to have fragile X syndrome, this premutation can cause a variety of symptoms that may affect their communication abilities starting around 30 years of age. Syntactic complexity is a characteristic involving the use of grammatical rules of language. In this longitudinal study, the relationship between age and syntactic complexity of mothers with the FMR1 premutation was analyzed. Methods: Five-minute speech samples were recorded for 163 FMR1 carriers and transcribed using SALT guidelines. Examiners asked participants to speak about their child continuously for 5 minutes without interruptions. Data were then analyzed using Coh-metrix to measure syntactic complexity. Results: Age was negatively associated with syntactic complexity. This means that with an increase in age there is a decrease in syntactic complexity over time. Conclusions: Therefore, this data calls attention to the necessity of more advanced clinical strategies or therapies that may help combat this decline to maintain the quality of life of the mothers and children involved.

Wallace, Rose

Mentor(s): Ms. Tiffany Conde

The Need for Reform in Early Childhood Education

Many young children, all over the United States, are sitting in a classroom that was not built for them. Instead of attempting to mold and conform their adolescent mind to fit the norm, educators need to change and reach children where they are. In order for the mental and academic success of all children, teachers and schools are the ones that need to adapt. It has been the other way around for far too long. This spring, I was placed at Bradley Elementary School for my student teaching internship. Bradley Elementary School serves about 400 students and their families. Ninety-six percent of students are Black and all students are eligible for free or reduced lunch. Their math and reading scores are below South Carolina average. When you hear these statistics- fight the urge to have a deficit mindset. My students are dynamic and brilliant. Through classes in the Urban Cohort and my internship, I have learned the importance of culturally relevant pedagogy in the classroom. This includes quality books, centering culture, and having an inclusive classroom setting with children of all skill and ability levels.

Walls, Katherine

Mentor(s): Dr. Sanjay Ahire

The Resource Allocation Optimization of 501(c)(3) Nonprofits in South Carolina

The work of 501(c)(3) nonprofit organizations helps serve some of the most urgent needs in the community. However, they are rarely studied in operations management literature. We analyze the objectives and process of a typical nonprofit organization and the challenges they must face in comparison to for profit business. We then suggest how nonprofit organizations can utilize operations management techniques to optimize their resource allocation strategies towards outreach initiatives. Faculty and students from

the Darla Moore School of Business worked closely with four South Carolina nonprofits to develop linear programming models to determine how many instances of each unique outreach initiative the nonprofit should conduct in order to ultimately maximize their mission. The models consider resource capacities and cost, as well as managerial preferences. Using the recommendations from the model, these nonprofits are able to provide more meals to the community, yield more clients, and increase public awareness about their mission compared to their current operation statuses. The goal for this research is for the knowledge transfer to other nonprofits in South Carolina and beyond so they can discover how they can implement this work to serve more people in urgent, dire need of their resources. We also hope to inspire more operations research and application into the nonprofit sector, as they often are in need of creative solutions to their most pressing challenges.

Waltz, Hanna

Mentor(s): Dr. Kelly Goldberg

Pedagogical Analysis of Biological Anthropology: Remote vs. Traditional Instruction

The COVID-19 pandemic has contributed heavily to recent unprecedented changes in academia. Over the past decades, the mechanisms of education have remained largely unchanged; a traditional lecture-style classroom environment has been widely assumed to be the most effective method for learning. However, social distancing guidelines and other restrictions surrounding COVID-19 have forced educators at all levels to reevaluate their course delivery methods. The instructional mode of many courses at the university level abruptly shifted to online in March 2020 without adequate time for instructors to prepare. Financial constraints and public health concerns have contributed to many courses remaining online since then, including laboratory sciences. However, there is limited data on the efficacy of laboratory sciences taught online, especially given that many lab courses traditionally include a tactile and/or practical component. This pilot study investigated the recent shift to digital delivery with two primary objectives: 1) to evaluate the pedagogy of online and traditional delivery of the lab sections of Introduction to Biological Anthropology: Human Origins (ANTH 161) at the University of South Carolina, and 2) to identify the perceptions of both students and professors regarding student mastery of material when utilizing an online learning environment. ANTH 161 professors and teaching assistants were interviewed using a semi-structured format, and anonymous surveys were conducted with both current and previous ANTH 161 students. FERPA-compliant final grades from current and previous semesters provided quantitative data. Conclusions drawn from this pilot study will inform future remote education policies and facilitate student success in this new learning environment.

Wang, Anna

Mentor(s): Dr. Jabari Bodrick

Stepping Outside of My Comfort Zone, Into the World

For two and a half years, I had planned to study abroad in China the spring of my junior year. As an International Business student studying the Chinese language, I was excited to immerse myself in Chinese culture and improve my language proficiency. Unexpectedly, my program was cancelled a couple weeks before the start date due to the spread of the coronavirus in China. After a complete change of plans, I took a leap of faith and ended up studying abroad at Queensland University of Technology in Brisbane, Australia. With these sudden changes and the onset of the coronavirus pandemic came a lot of uncertainty and discomfort. However, from my IBUS 310: Globalization and Business class, I had already learned how to step outside of my comfort zone and persevere in times of difficulty. The skills I learned from being cold-called in class and the advice to keep going when faced with rejection allowed me to make the most out of my study abroad experience. While Australia was completely different from China, I was still able to improve my Chinese proficiency level after finding a rigorous Chinese language class, a class I was only able to take due to my perseverance in getting registered for it. This class came with its own set

of difficulties, as it consisted of all native-Chinese speakers, cold-calling, and on-the-spot translating. To succeed in the class, I reminded myself of the course's importance and became okay with my discomfort. Beyond my class, I also had a wonderful time in Australia meeting new people from across the world and experiencing Australian culture. This largely positive experience highlighted the importance of stepping outside of my comfort zone—had I not been willing to change my plans last minute and go to Australia, I would have missed out on the trip of a lifetime. Much of the success that I have had during my time at the University of South Carolina can be attributed to leaving my comfort zone, a skill that I will continue to use far into the future.

Ward, Matthew

Mentor(s): Dr. Jabari Bodrick

Uniting a Community

Belongingness is a key factor in adjusting to college life. Without a shared sense of community, it can become extremely difficult for students to settle in and succeed academically. For queer students in the South, this is especially true—which is why promoting the visibility and safety of transgender students at UofSC has been so important to me. Whether these students were binary trans men or trans women, non-binary folks or queer folks, each one deserved to know they were not alone.

As the Social Media Manager, and then President of the Trans Student Alliance (TSA), I have helped sustain the student organization as a trans safe space. Yearly events such as Trans Day of Remembrance and Trans Day of Visibility are crucial to campus life; they both normalize queerness and educate those outside the community about issues affecting transgender people. During my time on the Executive Board, TSA meetings have been the sites of discussion, education, celebration, and connection. Our regular meeting announcements across social media—many of which I posted—have allowed trans and gender-nonconforming Gamecocks to find us within the larger sphere of the university.

In the context of COVID-19, these connections between trans students have become even more significant. Many queer students, transgender and cisgender, lost access to the physical spaces where they could be visible when lockdown started. Some ended up trapped in hostile home environments, which added a huge amount of extra stress to a population already at high risk of suicide. While online meetings and group chat activity are no replacement for in-person gatherings, I feel confident in saying that the work I put into creating TSA's virtual channels of communication has paid off. Despite the pandemic, trans UofSC students have preserved that sense of community and belonging.

Washburn, Caroline

Mentor(s): Dr. Subrahmanyam Bulusu, Dr. Corrinne Trott

Investigating the Response of Temperature and Salinity in the Agulhas Current Region to ENSO Events

The Agulhas Current is a critical component of global ocean circulation and has been shown to respond to El Niño Southern Oscillation (ENSO) events via its temperature and salinity signatures. In this research, we use sea surface salinity (SSS) from the National Aeronautics and Space Administration's (NASA) Soil Moisture Active Passive (SMAP) satellite and sea surface temperature (SST) observations from the Canadian Meteorological Center (CMC). Sea surface height observations are from altimetry and data is correlated with the Oceanic Niño Index. We see warming and high salinities after El Niño and cooling and fresher surface waters after La Niña and a stronger temperature response than that of salinity. About one year after the 2015 El Niño there is a warming of the entire region except at the Antarctic Circumpolar Current. About two years after the event, there is an increase in salinity along the eastern coast of Africa and in the Agulhas Current region. About two years after the 2016 and 2018 La Niñas there is a cooling south of Madagascar and in the Agulhas Current. There are no major changes in salinity seen in the Agulhas Current, but there is a highly saline mass of water west of the Indonesian Through flow about two

years after the La Niña events. Wave coherence analysis finds that SSS and ENSO are most strongly correlated a year after the 2015 El Niño and two years after the 2016 La Niña. Changes in SSS and SST following ENSO events during 2015-2020 are furthered studied in this work.

Weatherspoon, Kaylee

Mentor(s): Dr. Joshua Cooper

Chromatic Number of Disks in the Plane

We take a new approach to the Chromatic Number of the Plane, a central problem in graph coloring which has been unsolved for over 70 years. The Chromatic Number of the Plane is the number of colors required to color the infinite two-dimensional plane so that no two points at distance 1 from each other have the same color. The chromatic number of the plane is known to be at least 5 and at most 7, and the most recent improvement on this bound was achieved in 2018 by a computer-generated 1581-vertex unit-distance graph. (We define a unit distance graph as a collection of vertices and edges such that each vertex is unit length). We examine the disk radii associated with the transitions from one chromatic number to the next ("transition numbers"), hoping to develop some intuition as to when/if the transition from chromatic number 5 to chromatic number 6 occurs. We show that the chromatic number of the disk increases from 1 to 2 and also from 2 to 3 at a radius of $1/2$. That is, the chromatic number of the disk increases from 1 to 3 when the radius of the disk reaches $1/2$. We establish upper and lower limits on the radius associated with the transition from chromatic number 3 to chromatic number 4. We also present results developed in our work on classifying all maximal unit distance graphs, including a limited number of graphs from which we can build non-rigid maximal unit distance graphs.

Webb, Adriana

Mentor(s): Dr. James Pinckney, Dr. Annie Bourbonnais

Effects of swamp DOM on phytoplankton growth in North Inlet estuary, SC

Extreme rainfall events are expected to significantly increase along the east coast in coming decades due to a rise in global temperatures, leading to increased terrestrial runoff and, consequentially, rises in terrestrial dissolved organic matter (DOM) additions to coastal waters. Yet, little is known about how swamp water DOM inputs will affect phytoplankton growth. This project tested the hypothesis that swamp water DOM inputs from drainage inhibit phytoplankton growth in North Inlet Estuary, SC. As part of this project, we performed bioassays to compare the response of the phytoplankton community growth and composition to DOM and ammonium additions at three monthly intervals during spring 2021. Ammonium is a highly labile form of dissolved inorganic nitrogen. Seawater samples for our experiment were collected at Oyster Landing in North Inlet Estuary. Three different treatment additions were added to phytoplankton samples, as well as a control, and the samples were preserved at specific time points over the course of 72 hours. These treatment additions included swamp water DOM, ammonium, and swamp water DOM plus ammonium. We analyzed the phytoplankton community composition as well as organic and inorganic nitrogen concentrations and isotopic composition after each series of bioassays. Our data provided insights on the possible inhibitory effect of swamp water DOM on phytoplankton growth and community composition. Preliminary results indicate a mild negative effect of swamp water DOM additions on estuarine phytoplankton community structure and function.

Weeks, Molly

Mentor(s): Dr. Hilary Lichterman

The Power of Finding Leadership through Community

Campus and community involvement have been an integral aspect of my growth through college. Over the past four years, I have had the opportunity to rise as a leader in Dance Marathon, the largest student-run

philanthropic organization at UofSC. Through this, I have mentored six members extremely closely, I have planned Covid-safe events for our fifty-person team, and I have lead recruitment committees. I am committed to my leadership position in Dance Marathon because the power of hundreds of college students backing one philanthropic cause creates a strong community. To thrive in my position, I fell back on the concept that empathy is the key to being a good leader that I learned in two of my courses, EDLP 520: The Teacher as a Manager and MGMT 371: Principles of Management. The courses I took allowed me to see the bigger picture as a leader and be able to think clearly about what my team needed from me. My experiences as a leader to my peers have taught me valuable lessons that I will be able to implement as I begin my career in hotel operations.

Weidner, David

Mentor(s): Dr. C. Nathan Hancock

Egg specific expression of ORF1 and Transposase in Arabidopsis.

The overall goal of this project is to develop a method for inducing tissue specific transposition of the mPing transposable element in *Arabidopsis thaliana*. Transposable elements are DNA fragments that can jump to different places in the genome, creating mutations. The transposable element mPing is mobilized by ORF1 and Transposase proteins that bind to the element and catalyze movement through a cut and paste mechanism. We hypothesized that inducing transposition in the egg cell would be an efficient method for inducing germinal mutations, without inducing somatic mutations. We made a pHEE 401E plasmid construct designed to induce egg cell-specific expression of ORF1 and TPase proteins. We predicted that this would mobilize mPing only during reproduction. The egg-specific plasmid was transformed into *Arabidopsis* plants that already contained an mPing:GFP reporter, which fluoresces when mPing is excised. Using fluorescence microscopy, 7% of the first generation of plants with egg-specific expression showed GFP, while 92% of plants expressing ORF1 and TPase from a constitutive 35S promoter showed GFP. This was expected as the egg-specific promoter should not be expressed in most tissues, while the control construct is expressed in all tissues. In the second-generation progeny, we observed no whole plant GFP expression from plants with the egg-specific construct, while 66% of our constitutive control plants produced whole plant GFP. This indicates that heritable transposition is not occurring in the egg cell despite using an egg-specific promoter. Together this suggests there is delay between transcription and mobilization mPing. This is consistent with transport of the Transposase protein into the nucleus being delayed, separating the time between translation and transposition.

Weiner, Julia

Mentor(s): Dr. Matthew Childs

Sponsorship: Coming Home to UofSC

My sophomore year of college, I took on the role of Sponsorship Chair for UofSC's Homecoming. Going into this position, I knew I was dedicating a year of my time to an organization, but I did not realize how grand the week of events quickly becomes. My job involved reaching out to local and national companies to obtain both in-kind and monetary donations to enhance the experience for the students, faculty, staff, and alumni. While these sponsorships were benefitting us, they were also benefitting the companies involved. We were responsible for promoting them by putting their logos on things and also announcing their names at events. This falls into the realm of brand recognition, which has to do with someone's ability to identify a brand through a visual or auditory mean, without a name attached to it. Little did I know; this term would be further brought to light in a class I chose to take during my junior year. My junior year, I signed up for SPTE 450, better known as Sales in Sport and Entertainment. While the title of this class can be misleading because sponsorship and marketing are not in the title, we spent the majority of the semester learning about sponsorship and even presenting a project to the Chief Marketing Officer of British Petroleum where we gave them our opinion on who they should put their money into sponsoring.

Brand recognition was one of the largest terms our professor emphasized, especially when thinking about incorporating the BP logo into various situations, such as on jerseys, in video game ads, and on banners in stadiums, which is something I happened to be familiar with. While these experiences quickly became one in the same, they both have also contributed to the path that I plan to take in the future which ties sponsorship back into the world of sport.

Weiss, John

Mentor(s): Prof. Sirivatch Shimpalee, Prof. John Regalbuto

Pyrolysis of Cobalt-based Electrocatalysts for the Oxygen Reduction Reaction

With global carbon emissions on the rise, the scientific community is on a quest to find cleaner, more sustainable solutions for our worldwide energy needs. The polymer electrolyte membrane fuel cell (PEMFC) has shown promise as a clean and renewable energy source for a wide range of transportation vehicles and is well-positioned to replace existing combustion engines. However, due to high loadings of precious metals on the cathode catalyst, PEMFCs suffer from high production costs that prohibit commercial implementation. This research investigates cheaper, non-precious metal alternatives to catalyze the sluggish oxygen reduction reaction (ORR) on the cathode of PEMFCs. A Zeolitic Imidazolate Framework (ZIF-8) synthesis method has been applied to produce structure-specific active sites, consisting of coordinated cobalt and nitrogen species embedded in a carbon matrix. The pyrolysis step of the ZIF-8 synthesis procedure was specifically investigated due to its dual purpose of leaching zinc species to optimize mass transport qualities while protecting nitrogen species to optimize ORR kinetics. Pyrolysis was performed at several combinations of temperature and hold time: 900°C for one hour, 900°C for three hours, 1000°C for two hours, 1100°C for one hour, and 1100°C for three hours. Voltammetry results indicated optimal ORR activity for the catalyst pyrolyzed at 900°C for one hour, with a resulting half-wave potential of 0.83 volts. This cobalt-based ZIF-8 catalyst compares well to precious metal catalysts for ORR which tend to exhibit half wave potentials between 0.85 and 0.90 volts, and when compared to other non-precious metal catalysts, this catalyst has the highest recorded half-wave potential to date.

Wendel, Travis

Mentor(s): Dr. Lee Morris

Survey of Crayfish Species in Union County

By removing detritus, managing aquatic plants, keeping invertebrate populations in check and aerating the soil through burrowing, crayfish are linchpin species in their environments. There are approximately 37 species of crayfish found in South Carolina. Species survey maps from the South Carolina Department of Natural Resources (SCDNR) show crayfish species in counties surrounding Union, yet these species are not reported for Union, creating an obvious blank spot on the maps. This suggests that there has not been an extensive survey of crayfish in this area. There is a strong possibility of at least nine to eleven species of crayfish could occur here. To confirm that these and other potential species do exist in Union County, we are conducting a survey of this area. We are using several capture techniques to sample species with differing natural histories. This includes: hand and hand net catching, crayfish barrel traps, artificial refuge traps (ARTs), and bird-netting entanglement traps for burrowing species. Initial samples will be collected by hand and net at all sites to determine if crayfish are present, although only smaller individuals are likely to be found with this method. Barrel traps are intended for the larger specimens and will be deployed into deep-water for 24 hours before checking. ARTs are pan-flute styled traps made using various sizes of PVC pipe riveted to a metal frame and tied off with some rope. The ARTs will be placed in shallower and sandy areas with the intention that smaller crayfish species will seek shelter in the tubing. These traps will be deployed for a week to allow the crayfish to become accustomed to and take refuge in them. Bird-netting is intended for burrowing species of crayfish. The netting is folded over on itself and tied to a stake before being inserted into the opening of the burrow and allowed to sit for a few days.

During this time, the crayfish will try to remove the obstruction and become entangled in the netting. All data will be ultimately shared with state officials.

Westendorf, Avery

Mentor(s): Prof. Theresa Harrison

Health Equity

The overarching problem - that is also the root of the many issues surrounding health - are the social determinants of health that are causing health inequity. The experiences I have had have pushed me into wanting to work in global health to help people all over the world get access to the necessary health care they need. I started working at the SAFE Coronavirus testing sites at the University of South Carolina which has helped me gain hands-on experience in the field of public health. This opportunity has been especially beneficial at this moment in time since the world is experiencing a pandemic. I can be a part of something that is relevant and can help many people in my community. I have learned how to run a testing site, conduct registration and collection of samples, and protect myself while being put at risk for exposure. These are essential skills that are needed to have a career in global health and infectious disease epidemiology. Furthermore, I believe that all people should have access to high-quality health care because it is what every person deserves. I have seen the difference that the SAFE Coronavirus test has made because it is free and available to all students. By understanding the social determinants of health and learning about how culture, traditions, and religions play a role in an individual's health care, and adjusting how we treat people based on these aspects, and creating accessible healthcare, can lead to the ultimate goal of health equity.

Whitehead, Camden

Mentor(s): Dr. Nikolaos Vitzilaios

Simultaneous Localization and Mapping Using an Intel D435i Depth Camera on a Customizable, 3D-Printed Quadrotor UAV

Unmanned Aerial Vehicles (UAVs) and specifically drones in the area of Micro Aerial Vehicles (MAVs) have been growing in capabilities and uses, especially in the field of autonomy. Ground autonomous systems have been developed for quite some time, while UAVs are relatively newer and have numerous increased challenges, such as movement in the third dimension versus the two-dimensional movements of the ground and size and weight cost factors that play into the design capabilities. These additional challenges have left drones to remain largely dominated by the commercial sector in which the tech company DJI controls approximately 70%. Commercial drones leave little room for customizability or use outside of their intended purpose, leaving a large void in the expansion of UAV capabilities and uses. Another challenge proposed by UAVs is that of autonomy and how to incorporate sensors due to their cost, weight, and added benefit for the small footprint of the drone. This project will aim to prove the capabilities of a customizable, open-source, 3D-printed UAV to use Visual Simultaneous Localization and Mapping (V-SLAM) to autonomously navigate and map buildings. The use of 3D printing and rapid prototyping were used to greatly increase the availability and customizability of the created UAV. Being able to work independently of GPS control, this could be useful in disaster site surveillance and mapping and to check structural integrity of buildings or if there have been faults or collapses.

Wickman, Owen

Mentor(s): Dr. Stanley Dubinsky

Emotes, cypastas, and other metalinguistic innovations in the chat rooms of Twitch.tv

Twitch.tv is a rapidly growing livestreaming service owned by Amazon. Within this platform, anywhere between one and over 100,000 participants gather in "chats" to watch livestreams of other people play-

ing video games. The language on Twitch is often full of vulgarity and obscenity, but it contains unique linguistic features unlike any other language variety found on the internet. This presentation will analyze the nature of these multifaceted utterances and the bevy of text-coded emotes that feature in these chats, focusing on emotes, cypypastas, and other Twitch.tv-specific innovations. Previous research on the subject of Twitch has included analysis of chat speed (Ford et al. 2017), of broadcaster culture and evolution of the media of video game livestreaming (Taylor 2018), and corpus-based analysis of chat features (Olejniczak 2015). The present research expands upon Olejniczak 2015 by further describing the use of the emote feature in spoken speech (both spoken aloud by streamers and written in chat rooms by chatters); their phonological and morphological structures, as well as their grammatical functions. Emotes are defined as picture emoticons or emojis that are brought forth by typing a specific string of letters and numbers, such as PogChamp or ResidentSleeper. Emotes are characterized as being typically distinct from traditional emojis and emoticons, though there is some overlap. This presentation will compare and contrast these differences, as well as offer some history on the traditional use and evolution of these features. Additionally, pragmatic features of the language such as attention grabbing, cypypasta, and trolling will be shown to be a common feature of Twitchspeak. Cypypasta involves the use of a seemingly innocuous message that is then copied and pasted by other users to achieve different effects. These features all combine to form a sort of ‘chat arena,’ which this presentation will demonstrate to be a very unique linguistic space and a variety of internet language unlike any other.

Wigmore, Cameron

Co-Author(s): Ritwik Nag

Mentor(s): Dr. Krishna Mandal

Crystal Growth, Characterization, Fabrication, and Evaluation of Cadmium Zinc Telluride Selenide (CdZnTeSe) Semiconductor Detectors for Nuclear Radiation Detection

Currently, there is a great need for ‘direct read-out’ semiconductor based nuclear radiation detectors. For this purpose, in recent years, Cadmium Zinc Telluride Selenide (CdZnTeSe) has emerged as a high-performance nuclear detector at room temperature (RT) operation. There is a strong need for nuclear detector grade crystals that can be grown and fabricated in large area devices at high yield and at a lower cost. CdZnTeSe, a wide bandgap (~ 1.6 eV at 300K) semiconductor that is an ideal candidate to satisfy the requirements of nuclear radiation detections and imaging devices. Through the Magellan program, we have grown CdZnTeSe single crystals using a vertical Bridgman method. The grown crystals have been characterized thoroughly for structural, optical, electrical, and electronic charge transport properties. X-ray diffraction analysis (XRD) revealed the zinblend structure and determined the lattice parameters of the grown CdZnTeSe crystals. Optical absorption measurements confirmed the bandgap of 1.6 eV at 300K. Current-voltage (I-V) measurements determined the resistivity of the grown crystals to be $\geq 10E10$ Ohm-cm and revealed low leakage currents which contribute to low detector noise.

Williams, Hannah

Mentor(s): Mx. Caleb Morris

Fighting Food Insecurity with Gamecock Pantry

Through my experience as a PantryPal volunteer for the Gamecock Pantry at UofSC, I learned how to fight the stereotypes and stigmas on food insecurities and advocate for my community for access to an affordable healthier lifestyle. After discovering Carolina’s campus was classified as a food desert, I decided to join the pantry to help students on campus receive the resources they need from fruits and vegetables to toilet paper and toothbrushes. In addition, I wanted to advocate for those working hard to finance an education on their own. I wanted to find a way to help ease the financial challenges for these students, so I applied to become a volunteer in the Pantry. I picked up donated meals weekly from the Dodie after lunch and dinner times, and then dropped them off at the pantry. These meals would have been thrown away,

but the pantry provides a second chance for these meals to also practice not being wasteful. While in the pantry, I restocked shelves, helped customers, kept up inventory, wrapped donated bread from Panera, etc. While volunteering for the pantry, I discovered that there is no shame in receiving additional help when needed. I learned that the Carolina community can fight food insecurity by joining together. This is a collaborative effort, so it is important to connect donations from the Carolina Garden, the fresh meals from the Dodie, bread that when have been thrown away from Panera, and from the endless donations sent through the mail to the pantry from various locations. This means that food insecurity in the Carolina Community can be diminished as we all continue to advocate for college students to receive proper nutrition in order to establish suitable health promoting behaviors. Furthermore, by practicing not being wasteful and providing second chances to meals for students who need them, the pantry serves as a means to alleviate the financial stresses on students.

Williams, Chaselyn

Mentor(s): Prof. Rico Reed

Leadership Awareness

Having leadership awareness plays a big part in being a successful leader through being able to connect to your audience. Knowing that those that you are leading come from many different backgrounds and sometimes hold different beliefs from one another is a key aspect of awareness as a leader. As a student leader, I have had the opportunity to serve as a Resident Mentor on campus where I work directly with students who are ethnically, religiously, and fundamentally different in their own ways. It is my job to lead them to make positive connections with one another in the residence hall and beyond. Knowing that I am leading a diverse and inclusive community on my floor has pushed me to think deeply about what I can do to help each of my residents individually. In this way, becoming a Resident Mentor has allowed me to understand how to properly support individuals and has immensely enhanced my college experience at UofSC by challenging me on being mindful of how I am portraying myself to others. I also can better understand how to communicate effectively and professionally, and I recognize that leadership strategy preferences can vary from person to person. My presentation will be focused on discussing the insights that I have learned while working and being a part of a professional environment within and beyond the classroom which has helped mold me into the leader I am today.

Williams, Jill

Mentor(s): Dr. Dawn Wilson, Mr. Colby Kipp

The Role of Cognitive Factors and Perceived Stress on Weight-Related Outcomes in African American Adolescents

African American adolescents and their families experience a high prevalence of obesity and daily chronic stressors such as caregiving responsibilities, food insecurity and financial strain. Interventions that are commonly used to target obesity focus on common factors like improving diet and exercise. This research project evaluates how cognitive factors and perceived stress may be important for understanding weight-related outcomes in African American adolescents in the National Institutes of Health-funded Family Improving Together (FIT) Weight Loss trial. A total of 138 overweight African American adolescents (

Williams, Seth

Mentor(s): Dr. Dawn Wilson, Mrs. Asia Brown

Examining the Profiles of Stress and Socioeconomic Factors on Physical Activity and Body Mass Index in African American Women in the FIT Trial

With the increasing concern about physical inactivity in the United States and the poor health outcomes

related to this behavior, pinpointing factors that affect physical activity (PA) adherence is important. The goal of this project is to compare how socioeconomic status (SES) and self-regulation (e.g. self-confidence for PA) play a role in understanding two groups of African American women, those whose perceived stress leads to an increase in PA and those whose perceived stress leads to a decrease in PA. Secondary outcomes included examining the impact of these profiles on body mass index (BMI). Participants took part in the National Institutes of Health-funded Family Improving Together (FIT) Weight Loss trial. A total of 138 overweight African American women (

Williams, Michal Claire

Mentor(s): Dr. Philip Busbee

AhR expression on both Rorc-expressing immune cells is essential for I3C-mediated protection against colitis

Colitis is a type of inflammatory bowel disease (IBD) which is characterized by chronic inflammation in the colon, and can eventually lead to the development of colon cancer. Colitis development is linked to alterations in the luminal microbiota and dysregulation of the immune system. Indole is a compound which is naturally produced by luminal microbiota and indole-3-carbinol (I3C), a compound commonly found in vegetables and ligand for the aryl hydrocarbon receptor (AhR), was shown reduce inflammation in the colon and prevent colitis-associated gut dysbiosis in an interleukin-22-dependent manner. AhR can be found in a variety of cell types, including immune cells, and is responsible for immune cell regulation. Immune cell regulation is imperative in the colon for preventing inflammation. In this study, we investigated how I3C treatment of colitis is affected in conditional AhR knockout mice, which have AhR depleted in Rorc-expressing immune cells (AR mice). A dextran sodium sulphate (DSS) colitis mouse model was used in this study to mimic the effects of colitis and treatments of I3C were given as previously published using wild-type (WT) mice. Results showed that compared to WT mice, AR mice induced with colitis no longer responded to I3C. I3C in previous experiments was shown to reduce colitis through induction of IL-22 via innate lymphoid type 3 cells (ILC3s), but in AR mice after I3C treatment during colitis, protective IL-22 production by ILC3s was lost. Lastly, AR mice no longer were able to prevent colitis-associated microbial dysbiosis, thought to be linked to IL22 production. The results of the project showed that AhR knockout in Rorc-expressing immune cells prevents I3C-mediated beneficial effects against DSS induced colitis. The project also proved that AR mice resist production of IL-22 by ILC3s after I3C treatment on DSS-induced colitis, and loss of this potential protective cytokine prevents I3C-mediated beneficial alterations in the gut microbiome.

The studies were supported in part by NIH grant P20GM103641.

Wills, Madlyn

Mentor(s): Dr. Melissa Nolan

Leveraging Veterinary Partners to Tackle Tick-Borne Diseases in South Carolina

Tick-borne diseases occur when tick-borne pathogens are passed to humans from the bite of an infected tick. These pathogens have the ability to cause multiple diseases, resulting severe illness and sometimes even death. Ticks can feed on a wide variety of hosts but one of the most common hosts are canines. Many of the ticks that can cause disease in humans, also feed off of canines. The hypothesis for this study is that canines are infested with pathogen carrying ticks in the state of South Carolina. With canines being potential hosts of these pathogen carrying ticks, humans are at a greater risk of encountering these ticks as well as developing a tick-borne disease. For my independent study, I have recruited 18 animal shelters to assist with the collection of ticks from canines around the state. As these shelter locations encounter ticks on a host, they collect them in a jar of ethanol and record the type of host as well as the number of ticks collected per host. We anticipate the shelters will encounter and collect numerous ticks from canines all across

the state. These ticks will then be identified and recorded in order to better understand what species of ticks are prevalent throughout different areas of the state. Understanding the prevalence and distribution of different tick species in the state will help to better address tick-borne disease in South Carolina.

Wilson, Rachael

Mentor(s): Prof. Elise Lewis

The Final Piece

During the summer of 2019, I went to the Philippines on a medical mission trip for the entire month of June. My interest in becoming a nurse and the connections I had with the Foundation for International Medical Relief of Children (FIMRC) Chapter at the University of South Carolina inspired me to take a dive into the unknown. While abroad, I shadowed medical students in the clinics, helped create a health club in the local primary school, observed doctors giving vaccinations, obtained vital signs of patients, and, most importantly, I shadowed midwives. This experience shaped my career path and provided the final piece of the puzzle in terms of my future. Before this experience, I knew that I wanted to go into the healthcare field, but I did not know where I would fit in. When I shadowed the midwives, I got to bathe, dress, and hold a baby who was barely eight hours old. After delivering the baby boy back to his mother, I knew in that moment that I wanted to be a midwife and help mothers through their experience of pregnancy and birth. After that summer, I decided to take classes on Global Women's Health and Women's Health to learn more about the disparities and inequalities of women internationally and locally within the United States to provide more insight of what being a midwife entails. My presentation will discuss the insights I gained through my time in the Philippines as well as the impact it has had on my senior year of college, graduate school, and my future career.

Wilson, Sarah

Mentor(s): Mr. Jay Pou

Student by Day, Healthcare Provider by Night

I was preparing for 2020 to be the most fun, successful, and insightful year that I had lived. However, the universe had something different in store for me. The Coronavirus pandemic swept the world within the first few months of 2020, while I was supposed to be sweeping UofSC's campus by storm in my last year of undergraduate studies. My name is Sarah Wilson, and I am in my eighth semester here at the University of South Carolina's Honors College, majoring in Mass Communications. One year ago, I was stressed about starting my Honors thesis, working three part-time jobs, and trying to rope down a summer internship. However, I was sent home in March of 2020, left without any idea of what my thesis would be, out of work completely, and completely unsure if the world would be standing by summer time. I quickly picked up where I left off in my hometown of Watchung, New Jersey, volunteering as an Emergency Medical Technician for my town as well as our neighboring town, Warren Township. During the pandemic, the Watchung Rescue Squad and the Warren Township Rescue Squad were extremely short staffed due to fears of the pandemic. I had to step up to ensure that these agencies were prepared for the worst. I was volunteering at least 72 hours of my week in addition to taking classes fully online. Since March of 2020, I have stayed in New Jersey, working as an EMT and picking up more healthcare jobs along the way. My background in Mass Communications has made capacities as a leader much stronger, in addition to proving myself as a key personnel around town due to my increased knowledge of strategic planning, also attributed to my studies at UofSC. One year later, I reflect on my undergraduate experience as a student by day, and a healthcare provider by night.

Wilson, Brooke

Mentor(s): Dr. Abbi Lane-Cordova

Gestational Weight Gain Not Associated with Arterial Stiffness in Post-Partum Women

Introduction and Purpose: The purpose of the study was to examine the relationship between gestational weight gain (GWG) and arterial stiffness (PWV) in mothers 6 months to 3 years post-partum. During pregnancy, GWG is positively associated with arterial stiffness in women at high risk of hypertensive disorders. In addition, there is some evidence supporting that excess GWG is predictive of future CVD events. Consequently, we hypothesized that women who gained greater amounts of weight during their most recent pregnancy would have greater PWV than women who gained no weight or comparatively less weight, during the immediate post-partum period.

Methods: Fifty-five women who had delivered a singleton infant 6 months to 3 years prior to data collection and were not smokers, had type 1 or 2 diabetes, or used steroids or protease inhibitors, were included in the study. The primary variables of interest were gestational weight gain and arterial stiffness (PWV), but BMI, age, blood pressure, heart rate, and race/ethnicity were also examined. PWV was measured by carotid-femoral applanation tonometry, while GWG was self-reported. GWG was examined as both a continuous measure and as a categorical measure. Participants were classified according to the Institute of Medicine guidelines as having had “inadequate,” “adequate”, or “excessive” GWG based on a combination of BMI and extent of weight gain.

Results: The study sample had a mean GWG of 32.43 lbs and a mean PWV of 6.11 cm/s. When controlling for BMI, age, and resting heart rate, continuous GWG and PWV were not significantly associated ($p=0.856$). When grouped according to IOM guidelines, GWG and PWV no between group differences were detected as $p = 0.5557$ ($\alpha=0.05$). BMI and PWV were significantly associated ($p=0.021$).

Conclusion: GWG is not an effective predictor of post-partum arterial stiffness; at this point in the lifespan, BMI appears to be more indicative of arterial stiffness. The temporal relationship between GWG and CV function and remodeling after pregnancy requires further examination.

Witt, Kathryn

Mentor(s): Dr. Tracy Skipper

Gamecock in Bangkok

Spring semester of 2019 I studied abroad through a partner program, CIS Abroad, at Mahidol University in Bangkok, Thailand. As a public health major pursuing a career in global health, I wanted the opportunity to travel this particular region of the world and experience a culture vastly different than my own. I took four courses at Mahidol's International College alongside fellow international and Thai students that expanded my knowledge of Thai culture and built upon my public health coursework at UofSC. I explored a large portion of Southeast Asia through my travels to Cambodia, Laos, Vietnam, Indonesia, and throughout Thailand in which I gained a better understanding of Southeast Asian culture. I experienced cultural and socioeconomic differences that were sometimes uncomfortable and unfamiliar but forced me to grow and learn. This experience was significant to me because, prior to this, I had only left the country once and was largely unfamiliar with Asia or Asian culture. I made the decision to study abroad alone, without any friends, to challenge myself and truly step outside of my comfort zone. This allowed me to grow immensely as an individual during my four months in Thailand. I gained self-confidence, independence, and most importantly, ignited my passion for travel and my future career goals in global health.

Wojciak, Bailey

Mentor(s): Dr. Nicole Zarrett

Examining Non-targeted Effects of the Connect Through PLAY Intervention on Adolescent Internalizing Symptoms

In the U.S., 3.1% of adolescents have diagnosed depression (CDC, n.d.). Physical activity (PA) has shown to benefit physical health and recently has shown to improve mental health. However, research has shown both decreases in PA and increased risk and incidence of internalizing disorders through adolescence, each of which have been shown to increase risk to other mental and physical health-related problems. This covariance of PA and mental health has implications for developing cost-effective behavioral interventions that are effective at addressing both targeted and secondary areas of health and well-being. In particular, interventions within key youth settings, like after-school program (ASP) interventions that target vital health behaviors (e.g., PA) can have cascading effects on other areas of health and well-being if we can identify and target change in key social and behavioral intervention mechanisms supporting this impact.

This study aimed to examine the non-targeted effects of Connect Through P. L. A. Y, an after-school PA intervention, on improvements in adolescent mental health (internalizing symptomology). This intervention aims to increase daily PA accrual within ASPs by positively impacting social-motivational factors within ASPs identified as advantageous for PA. We hypothesize that these targeted social mechanisms for improving PA, specifically focusing on improving student-staff relationship, will also improve youth mental health. Previous research showed that ASP staff make significant contributions for supporting the physical and mental health of students and, although understudied, may be an important mechanism to include within health interventions for improving mental health in addition to its positive impact on physical health. Using baseline and post-intervention youth surveys and systematic observations of the ASP social-motivational climate of 6 ASP sites (3 intervention; 3 control; N=338 youth), the current study first tests whether youth in the PA intervention have greater reductions in internalizing symptoms as compared to youth in the control from baseline to post-intervention. The second aim of the study examines whether positive improvements in staff-youth connection within intervention ASPs (compared to controls), measured as observed improvements in staff communication, encouragement/praise, social support, involvement in program activities, and management of the program, will account for improvements in youth internalizing.

Wolfe, Sarah

Co-Author(s): Renard Willoughby, David Porter

Mentor(s): Dr. John Gerdes

Mobile App Prototype for the UofSC Visitor Center

Sharon Gumina, Instructor at the Department of Integrated Information Technology in the College of Engineering and Computing at the University of South Carolina, has tasked us with creating a prototype for the University Visitor Center. She wants us to implement the website features in a mobile application in order to increase engagement with the Visitor Center.

The final product will be a partially functional mobile application prototype for IOS and Android devices. The application will allow students and visitors to access information found on the Visitor Center website, such as maps of the campus, an event calendar, and athletics information. Visitors will be able to access the application without an account, and they can take virtual tours of the campus using their smartphones. If the visitors are on campus, they can play a game on the application where they increase their experience level by visiting buildings and landmarks, which allows them to evolve from an egg into a Game Cock. Not all of these functions will be fully implemented within the prototype, but we expect our final product to appear as though it were fully functional.

The mobile application is ultimately meant to increase engagement with the UofSC Visitor Center during the pandemic. Since contact is limited and guided tours have either been greatly reduced or cancelled altogether, it's a good way to allow prospective students to explore the campus in an interesting, engaging manner.

Womack, Sydney

Mentor(s): Dr. Shayne Barlow

Development of a Screening Procedure to Reduce Aggression Among Group-Housed Male Laboratory Mice

Group-housed male laboratory mice often exhibit aggressive behaviors when two or more dominant males are placed in the same cage. Previous data-sourcing literature has proposed that an average of about 3% of all mouse cages exhibit aggression-related injuries among mice, with some laboratory animal facilities reporting greater than 13% of total cages with an aggression-related injury. In addition to physical injuries, fighting among dominant males can lead to social stress for other mice in the same cage, and these behaviors almost certainly lead to disruption of research studies. Considering this, financial savings and improved study efficacy as well as animal welfare serve as practical incentives to explore this problem. Prior work has shown a positive relationship between mRNA expression of brain-derived neurotrophic factor (BDNF) in the hippocampi of male laboratory mice who exhibit dominant behaviors. This project seeks to determine a similar relationship between BDNF protein expression in the hippocampi and dominance. 10 mouse cages of 5 mice per cage were tested for relative dominance using a tube dominance test. In a tube dominance test, two mice are placed at either end of a clear tube and observed. If a mouse pushes another mouse out of the tube within a certain time frame, that mouse has "won" the interaction. Dominance rankings per cage were established based on total "wins" over time and were also measured using David's score, a statistical method that accounts for each mouse interaction within the tube. Following a 4-week behavioral testing period, mice were euthanized, and hippocampi were collected. Total protein extraction and concentration confirmed existence of protein within the samples. Enzyme-linked immunosorbent assays will be used to measure BDNF protein expression in each sample, and these results will be compared with dominance rankings. Results will be used to draft a hypothetical screening procedure for ideal male laboratory mouse housing conditions, based on BDNF as a dominance marker as well as literature reviews and conversations with laboratory animal technicians.

Workman, Lauryn

Mentor(s): Dr. Holly Crocker

De-centering Whiteness and Connecting Minoritized Communities

It's important that we open ourselves up to sharing cultures and decentering whiteness as the ideal. Anti-racism begins with addressing the violence done to our minoritized communities and ends with us appreciating what we all have to offer and growing within that. Discussing migration and refugees in the classroom and then experiencing those communities during a service trip were especially important in the pathway of global learning as it allowed for both a personal and analytical view of what it means to be a refugee and how we can better interact with that community. It also allows for global relationships to be built as people from all over try and live out their lives in our country. Moreover, ensuring development projects across the globe are sustainable is significant to the pathway of global learning because it shows hypothetical and real world applications of what it means to be in the development sphere. Additionally, the Warwick Economic Summit was held at the University I spent the year abroad in, thus showing the education that can happen in beyond-the-classroom experiences abroad. Finally, blackness shared in solidarity by both Black Americans and Asian Americans can allow for a dismantling of global anti-black racist systems. These experiences were critical to my time at the University and my journey on the global

learning pathway because it allowed me to gain a different level of cross cultural competency outside of my language learning. They also give me an advantage going into my professional career as I try to make sense of the complicated intra relationships between communities of color. Additionally, I was made to think critically on diaspora politics and the effects of American hegemony in the “global south”.

Workman, Lauryn

Mentor(s): Dr. Holly Crocker

Telling Our Story

How stories are told are critical to diversity and social advocacy. Having Dr. Hendricks, a black woman, and distinguished scholar of history, as my professor my freshman year helped to affirm my place at this university and in the major, I had chosen. Moreover, being taught the foundational level skills of being an historian through this lens allowed for me to appreciate the diversity of history more fully as discipline. When I attended the Student Diversity and Leadership Conference, I was asked by one of my peers “what was I doing there?”. Ironically even at this conference with diversity in the title, I was still seen as an outsider. But, even with that question heightening my sense of imposter syndrome, I learned so much from that conference and how to better myself as a leader. On top of that, seeing other people that looked like me presenting and teaching made me feel like I did belong - at this university and as a student leader. Minority has come to mean something similar to persons of color. It is important to note, however, that these people have been minoritized by the systems in play. Being careful with the distinction allows me to be more precise in describing the link between various ethnic groups. In my role as Chair of the Inclusion and Equity Committee in the 111th Student Senate I was able to propose legislation and advocate for the minoritized communities at our University.

Wright, Courtney

Mentor(s): Dr. Ana Pocivavsek

Prenatal Kynurenine Elevation in Rats Elicits Sex-Dependent Changes in Hippocampal Kynurenic Acid, Glutamate, and GABA during Adulthood: Implications for Psychotic Disorders

Prenatal insults are causally linked to neurodevelopmental disorders, including psychotic illnesses like schizophrenia (SZ), which are clinically characterized by severe cognitive dysfunction. Impairments in cognition in individuals with psychosis have been attributed to increased kynurenic acid (KYNA), a tryptophan-derived endogenous antagonist to $\alpha 7$ nicotinic acetylcholine ($\alpha 7$ nACh) and NMDA receptors. Presently, we induced a prenatal insult, the embryonic kynurenine model (EKyn), by feeding pregnant rats chow laced with kynurenine (100 mg per day), to stimulate prenatal KYNA elevation from embryonic day (ED) 15 to ED 22. Control dams (ECon) were fed unlaced chow. Plasma and brain tissue from young adult (postnatal day 56) ECon and EKyn male and female offspring were collected at zeitgeber time (ZT) 6, in the middle of the light phase, and ZT 18, in the middle of the dark phase to assess kynurenine pathway metabolites. In separate animals, in vivo microdialysis was conducted in the dorsal hippocampus to assess extracellular KYNA, glutamate, and gamma aminobutyric acid (GABA). Biochemical analysis revealed no significant impacts of prenatal treatment or ZT on tryptophan, kynurenine, or KYNA in the plasma. Brain KYNA levels were significantly increased only in male EKyn offspring at ZT6, but not ZT18. A significant sex X treatment interaction was present in cortical KYNA in the light phase only. Analysis of microdialysates revealed a significant effect of ZT and a significant ZT x treatment interaction on extracellular KYNA in the light phase only in EKyn males. Extracellular KYNA levels remain unchanged in EKyn females compared to controls. In EKyn male offspring, extracellular levels of the neurotransmitters glutamate and GABA were significantly reduced in compared to controls during the dark phase, and in female EKyn offspring, only extracellular glutamate was reduced during the dark phase. During the light phase, irrespective of prenatal condition, we determined a main effect of ZT on extracellular neurotransmitter levels. Taken together, our results support the EKyn model as a viable tool to study KYNA dysfunction and

neurotransmitter abnormalities relevant to the study of SZ preclinically, highlighting the importance of evaluating the sex and experimental time of day in analysis.

Yanders, Rachel

Mentor(s): Mr. David Deweil

GLD Abstract- Observing Culture During A Pandemic

For my study abroad requirement of my International Business major, I studied on exchange the Queensland University of Technology (QUT) in Brisbane, Australia. I had been studying international business for three semesters by the time I figured out where I would be studying abroad and at that point I had found an interest in the Asian-Pacific markets and business practices. QUT offered a class in international business in Asia-Pacific that would introduce me to the concepts within these markets and as well as an insight into the different cultures. Unfortunately, my study abroad was cut short and I learned more about culture through my experiences of handling a pandemic and travel within an unfamiliar place. During my 6 weeks in Australia I found that time management is not the same within schooling and scheduling across all cultures. I had to learn to be flexible and navigate the challenging cultural puzzles. Being adaptive was especially important towards the end of my 6 weeks when I had to travel home in a pandemic and continue to take Australian courses while in the United States with a 15-hour time difference. Through these experiences, I had to apply my international business and cultural concepts from previous classes in order to understand the Australians and myself. I feel that I am now confident in my ability to preserve and self-reflect on any challenge that may come my way. I am also certain in my cultural competence and ability to convey this knowledge to my future career in finance.

Ybarra, Dante

Mentor(s): Mx. Caleb Morris

Taking my Career to New Heights

I first started at the University of South Career Center in September of 2019. I was hired on to work as an office assistant at the satellite office in Swearingen Engineering Center. While I was there, I mainly just worked the front desk, checking in students and helping my coworkers around the office. A year later I was offered a new position at the main office in the Thomas Cooper Library for a Career Studio Peer Educator. I decided to take this position because I felt like it would help to advance my skills, so I went for it. I attended training on how to conduct meetings and to learn the nuances of resumes, cover letters, and other career related topics. I was also taught how to interact with students and how to properly relay feedback. I have now worked this new position for over six months and in that time, I have learned better communication, leadership, and presentation skills. As a senior in chemical engineering, these skills will and have proven to be invaluable. I am very thankful to the career center that I was given the opportunity to be a part of this program that has a positive impact on students' lives.

Yen, Ho

Mentor(s): Ms. Hilary Lichterman

Expanding Capabilities Through Civil Engagement

Coming to college was a unique opportunity for me to learn and explore my strengths and weaknesses. I was determined that applying knowledge theoretically on homework and exams is not enough, I had to apply the knowledge in the real world. Various STEM courses I took at UofSC prepared me for the knowledge and skillsets needed for not only research but also internships and employment. I actively looked for jobs and positions where I could challenge myself and apply my scientific knowledge while acquiring new skillsets and certifications. The employment opportunities such as being a Business Calculus Supplemental Instruction peer leader through the Student Success Center and a teaching assistant for the Chemistry

department not only strengthened my academic knowledge in their respective area but also enhanced my leadership skills such as time management, self-evaluation, lesson planning, communication, and conflict resolution. The internship opportunity at Prisma Health as a Personal Touch Volunteer taught me importance of hygiene, hard work, and compassion. The research I conducted allowed me to learn more about the underlying mechanisms for cancer proliferation and treatment. These opportunities also trained me for certifications such as FERPA, Hazardous Waste Competency, Biosafety Level 2, etc. All of this knowledge and the accompanying skillsets presented me with a new outlook of career and academic opportunities.

Ylagan, Vincent

Mentor(s): Dr. Jessica Bradshaw

The Relationship between Infant Behavioral Inhibition, Respiratory Sinus Arrhythmia, and Parent Social Anxiety

Social anxiety disorder (SAD) is one of the most frequent comorbidities with autism spectrum disorder (ASD), with a 50% prevalence rate in the ASD population, compared to 7-13% in the general population. A prominent feature of SAD is behavioral inhibition (BI), with markers representative of BI present even in infants. The overlap between ASD and SAD symptoms can complicate diagnosis and treatment of both disorders. One biomarker used in ASD research is respiratory sinus arrhythmia (RSA), a measure of heart rate variability regulated by the parasympathetic nervous system. Low RSA is associated with difficulties in emotional regulation (common in anxiety disorders), as well as the presence of ASD features. Based on previous research, we hypothesize that there will be a negative correlation between parent social anxiety and infant RSA, a positive correlation between parent social anxiety and infant BI, and a negative correlation between infant BI and RSA. Participants in this study were from a larger study that followed infants from early infancy to three years to study their social development. Parents completed the Liebowitz Social Anxiety Survey (LSAS) to measure severity of social anxiety symptoms. The Fear subscale of the parent-reported Infant Behavioral Questionnaire – Revised (IBQ-R) was used to measure infant BI. Infant RSA values during a short interaction between parent and infant at 3-, 4-, or 6-months were calculated using ECGs obtained from participants using a portable heart rate monitor, and any artifacts in ECGs were corrected using the program CardioEdit. Results indicated that parent social anxiety and infant BI were not related. A negative correlation was found between parent social anxiety and infant RSA during the withdrawal portion of the interaction (when the parent stopped interacting with infant) and approached significance. An infant's lowered RSA during the withdrawal portion may indicate they are self-regulating to the stressful situation, and infants of more socially anxious mothers may be better at soothing themselves when faced with distress as a result of socially anxious mothers' parenting behaviors.

Yommer, Madison

Mentor(s): Dr. Denise Wellman

Life is Dynamic

During the summer of 2020, I was able to participate in a virtual internship with the engineering consulting company Kimley-Horn. I first learned about Kimley-Horn at the STEM Career Fair at UofSC. I was able to participate in a design challenge with four other interns from different offices over four weeks, and I shadowed professional engineers and listened to presentations about past projects. In the design challenge, I worked on the stormwater and construction phasing of the project. I applied what I learned from my internship at a construction company the previous summer, and my knowledge of the AutoCAD software I learned in ECIV 111, Intro to Graphics, for the internship. I designed the site we were developing using AutoCAD software. I discovered that I am a quick learner, and I learned how to connect with others without ever meeting face-to-face. The internship was supposed to be in person but due to the spread of COVID-19, it was switched to an online format. This made it harder to connect with the people

I was working with, but at the same time, we were able to get to know each other and work together on the design challenge. This experience better prepared me for ECIV 470, Senior Design, which I took the fall after the internship. Senior Design is a class centered around one, real-world civil engineering project that a group of students and I had to design. I was better prepared for the class after my internship with Kimley-Horn, because I learned how real-world projects are done and how to work well with others. For my professional goals in the future, I will be working with Kimley-Horn working on site development projects in Charlotte, NC. I am motivated to be involved with Kimley-Horn because I want to be involved in designing sites with sustainable infrastructure. This experience taught me that life is constantly changing, and plans may never go the way I think they will, but I must keep going and I will learn and grow in the process.

Young, Jake

Mentor(s): Mx. Caleb Morris

My Engineering Experience

During my time as a college student, I worked as an intern over the summers at KEMET, a company that manufactures complex microelectronic components namely capacitors. There I worked as a process engineering intern where I worked alongside a team of engineers in solving production problems and developing process improvements. I used these internship rotations to learn how an engineer operates on a daily basis and learn about some of the challenges they must face. Every project and rotation gave me additional perspective on what being an engineer really means as well as what is expected of them. With each assignment I found myself not only working on problems that I faced in my chemical engineering class, but problems that I as a chemical engineer had not trained for. I found myself having to write financial reports and communicate our projects to none engineering persons. I learned that being a good engineer is about more than just problem solving, but includes both a business and people aspect as well.

Zarsadias, Sydney

Mentor(s): Dr. Xueying Yang, Ms. Sarah Matthews

HIV in MSM: Facilitators and barriers for ART adherence, seeking care, and retaining care

Human immunodeficiency virus (HIV) is a virus that harms the body's ability to fight infection and affects 1.2 million people in the United States. According to the CDC, in 2018, 69% of the new HIV diagnoses in the United State were among men who have sex with men (MSM). HIV is a virus than can be transmitted both intravenously and sexually. Once a person contracts HIV, it is key that they seek and retain care, as well as maintain adherence to their antiretroviral therapy (ART), medications that treat HIV infection in the body. The purpose of this study is to determine which factors create barriers to ART adherence and ability to seek/retain care as well as which factors facilitate ART adherence and ability to seek/retain care. This study began with several interviews with those living with HIV in the MSM community. The interviews were then coded into several categories relating to the interviewees' ability to adhere to their ART and ability to seek/retain care. Finally, after examining the coding thoroughly, frequent themes and concepts were outlined and supported with interview excerpts in a document. This was done in order to develop a more comprehensive understanding of the barriers and facilitators for ART adherence as well as ability to seek/retain care. A preliminary review of the interviews, coding, and major themes suggest the following: Lack of support and lack of insurance/finances are barriers to ART adherence; support, self-motivation, and good case management are facilitators of ART adherence; lack of support, lack of HIV disclosure, and fear of HIV stigma were barriers to seeking/retaining care; and support and well trained medical staff were facilitators of seeking/retaining care.

Zarsadias, Sydney

Mentor(s): Ms. Amanda McRell

Potential Contributing Factors of Mental Health in Honduran Children

Honduras has high rates of corruption, violent crime and poverty. These issues contribute to prevalent mental health problems in Honduran children. Mental health (MH) directly influences happiness and quality of life, especially for adolescents living in low- and middle-income countries (LMICs), like Honduras. The global MH literature states that poverty, social support and education are related to child MH in LMICs. To determine how these factors impact Honduran child MH we examined child-reported data on Honduran children (n=2,495) ages 13 to 17 from the Honduras Violence Against Children Survey (VACS). Child MH was measured by the Kessler Psychological Distress Scale (K10). Using the K10, each child's MH was categorized into "good MH" or "mild or greater MH symptoms."

First, we ran descriptive statistics to examine how poverty impacted child MH. The children were asked, "Do you think your household has enough money for food?" Children responded "yes" or "no." 88.6% of children who responded "yes" reported having mild or greater MH symptoms and 80% of children who responded "no" reported MH symptoms.

Then, we ran descriptive statistics to examine how social support impacted child MH. Children were asked "How much do you talk to friends about important or personal matters?" Children responded "a lot," "some," "not very much," and "not at all." 84.7% of children who responded "a lot" reported MH symptoms and 88.1% of children who responded "not at all" reported MH symptoms.

Finally, we ran descriptive statistics to examine how education impacted child MH. Children were asked "Have you ever attended school?" to assess the child's education. Children responded "yes" or "no." 86% of children who responded "yes" reported having MH symptoms and 84.6% of children who responded "no" reported having MH symptoms.

Poverty, social support, and education are related to child MH; however, in our study they did not directly indicate MH. Findings suggest that simple demographic analyses of poverty, social support and education cannot explain disparities in the MH of Honduran children. More in-depth research is needed to determine the complex causes of mental health symptoms in Honduran children to aid future interventions.

Zimmerman, Dabriel

Mentor(s): Dr. John Richards

Evaluating the Underlying Structure of the Default Mode Network in Adolescents

The Default Mode Network (DMN) is a group of functionally connected brain regions exclusively activated during periods of rest. The DMN is largely involved in introspection, as well as episodic memory. Differences in structure and function of the DMN has been related to bipolar disorder, schizophrenia, and depression in adults as well as significant involvements in ADHD and autism in children. It has been hypothesized that these differences are related to the underlying structural integrity of the DMN. Thus, studying the developmental trajectories of regions included in the DMN in children provides opportunities to relate structure and function to the etiology of psychopathologies implicated in DMN dysfunction. This is supported by findings that some regions in the DMN reach maturity between the ages of seven and nine which lowers the window where development can be studied.

The purpose of this study is to examine differences in the structure such regions between and within groups of adolescents. Data for 40 subjects was derived from the Human Connectome Project - Development (HCP-D) for subjects 9 years old (n = 20, male = 10) and 13 years old (n = 20, male = 10). Six regions of interest (ROI) were examined utilizing structural neuroimaging analysis methods including voxel based morphometry (VBM), diffusion tensor imaging (DTI), and probabilistic tractography to include: cingulate cortex (CG), precuneus, angular gyrus (AG), hippocampus, parahippocampal gyrus (PHG), and medial prefrontal cortex (mPFC).

Preliminary results support previous evidence showing the posterior CG to be an immature DMN node in

children as nine year olds had significantly more gray matter than 13 year olds whereas the mPFC, hippocampus and AG showed no gray matter differences. Further investigation will elucidate differences in mean fractional anisotropy in the white matter tracts within these regions as well as within tracts between regions. Evidence from this study will support the use of structural analysis methods in the evaluation of the DMN in healthy children which could be used to create a comparative base for children at risk for developing psychopathologies later in life.

Zinn, Marlana

Mentor(s): Ms. Sarah Matthews

Survivors, not Victims. You are more than an assault.

Uncertainty and unrest are two commonplace feelings that plague marginalized identities and communities. Through my volunteer work with Sexual Trauma Services of the Midlands (STSM), I learned that sexual trauma survivors are less likely to report their assault when they believe they are alone in their circumstance. With the current national statistic of 1 out of every 6 women has been the survivor of an attempted or completed rape, sexual assault is dangerously prevalent in communities. I chose to volunteer for STSM, with encouragement from the Business and Community Leadership Fellows, because the chances that you or I know someone who has been sexually assaulted are incredibly high, and there is more risk to women of college-age. When volunteering with STSM, I assisted the Director of Development in contacting donors, researching Church communities to engage, calling local vendors for event donations, and supporting their Walk A Mile in Our Shoes event. To increase visibility of STSM's services, I have created a Sexual Assault Awareness resource packet that has been distributed to colleges across South Carolina. Many underfunded or minority colleges do not have the resources that USC is able offer their students, such as support and healthcare after a trauma but STSM offers these resources. By distributing my resource packet of flyers, outlining statistics and services of STSM, they are able to reach the key demographic of college students that are experiencing sexual assault at a higher rate and form relationships with the colleges that will withstand the two or four-year turnover of students. Through my volunteer experience, I learned how prevalent sexual assault is in our own communities, particularly for my own age group. This is important because sexual assault is preventable with prevention education from an early age, followed by empowering survivors with support and resources. As my time with USC and STSM comes to an end, I will look for ways that I can support sexual assault survivors through donations, volunteering, or fundraising in my post-graduation community. This mission has deeply inspired me to help, in any capacity, to reduce sexual assault rates and support survivors.

Graduate Student presentations

Abdulla, Osama

Mentor(s): Prof. Prakash Nagarkatti, Prof. Mitzi Nagarkatti Nagarkatti

Using single cell RNA sequencing to understand the nature of myeloid-derived suppressor cells in healthy and tumor bearing mice

Several chemicals and drugs have been shown to induce non-Hodgkin's lymphoma which consists of a heterogeneous group of immune cells including T cells that have undergone transformation into a malignant form. EL-4 is a murine T cell lymphoma induced in C57BL/6 mice by 9,10-dimethyl-1,2-benzanthracene. The tumor microenvironment (TME) is very heterogeneous and is comprised of different cell types. Myeloid-derived suppressor cells (MDSC) are one of the vital components of the TME. Also MDSC are associated with tumor growth, angiogenesis and enhanced metastasis. The aim of this study was to compare MSDCs isolated from TME, splenic MDSCs from tumor-bearing hosts (TBHs) and splenic MDSCs from naïve mice by using single cell RNA sequencing (scRNASeq). For this reason, C57BL/6 mice were injected with 1×10^6 EL4 cancer cells subcutaneously to induce tumor growth and 14 days later, cells isolated from these three groups were assessed by flow cytometry and scRNASeq was performed. The flow cytometry results showed increase in MDSC recruitment in the spleen from TBHs in comparison with spleens from naïve mice. Analysis of scRNASeq showed most of the genes upregulated in MDSCs from TME and spleens of TBHs were responsible for generation, recruitment and proliferation of MDSCs. These included Lgals5, CXCL10, Alox5ap, CCL6, Il1 β S100A8/A9/A11, CCL4 and CCL5. Furthermore, we found several genes such as Lyz2, Plac8, Ifitm3, Vim, S100A6 and Crip1 overexpressed in MDSCs promoted the proliferation and migration of cancer cells as well as tumor formation. In addition, we found some genes have anti-tumor effects by suppressing T and B cells (Lgals5, Ly6c2). In summary, these studies demonstrated that MDSCs from TME and splenic TBHs have unique features for immunosuppression, and also for recruitment and expansion of MDSCs in TBHs, which make these cells critical for targeting a new mechanism for immunotherapy. (Supported by NIH P01AT003961, P20GM103641, R01AI129788, R01 ES030144 and R01AI123947)

Adhikari, Aakriti

Mentor(s): Dr. Sanjib Sur

SpiroMilli: Bringing Ad-hoc Spirometry to 5G Devices

The rapid evolution of the telehealth industry, accelerated recently by stay-at-home directives, has created a demand for more ubiquitous health-sensing tools. One such tool is the Spirometer. Spirometers have been used in traditional clinics to measure lung capacity (volume) as well as airflow (flow rate) and have wide applicability in the diagnosis of Asthma, COPD, and other pulmonary diseases. In addition, they can be used to diagnose Dyspnea, i.e., shortness of breath, one of the symptoms of the COVID-19 virus. Several spirometers are available commercially for home-use, but they are either costly, cumbersome or provide limited flow information. We propose SpiroMilli, a low-barrier means to performing spirometry at home using the millimeter-wave (mmWave) technology in 5G-and-beyond devices. To perform a test, users will hold the device in front of their mouth, fully inhale, then sharply exhale. The system will then output seven key indicators, e.g., Forced Vital Capacity (FVC), Peak Expiratory Flow (PEF), etc., along with a flow-volume curve.

Aladhami, Ahmed

Mentor(s): Dr. Reilly Enos

Inducible Overexpression of Skeletal Muscle Estrogen receptor alpha mitigates the obese phenotype in estrogen deficient high-fat-diet fed mice

Introduction: Menopause puts a female at risk for several chronic diseases, including an increased risk of obesity. This increased risk of obesity is largely attributed to estrogen deficiency. Estrogens have the ca-

capacity to regulate metabolic processes via the periphery (e.g. adipose tissue, heart, skeletal muscle, liver, etc.) and the central nervous system (e.g. brain). However, the tissue that is most important for regulating estrogen's beneficial metabolic effects remain poorly understood.

Purpose: The purpose of this study was to determine if inducible overexpression of skeletal muscle estrogen receptor alpha (ER α), the estrogen receptor most responsible for regulating estrogen's impact on metabolism, could rescue the obese metabolic phenotype resulting from estrogen deficiency.

Methods: Male RTTA-HSA+/- mice were bred with female Tet-ER α +/- to produce female mice which overexpressed ER α specifically in skeletal muscle upon doxycycline treatment. Mice were ovariectomized at 10 weeks of age and were placed on a purified high-fat diet (HFD) or low-fat diet (LFD) control for 12 weeks. Doxycycline was placed in the water in order to overexpress the ER α transgene upon the initiation of dietary treatment. Body composition as well as metabolic tests (glucose and insulin tolerance tests) were performed after 11 weeks of dietary treatment.

Results: Skeletal muscle overexpression of ER α significantly reduced body fat percentage, decreased visceral adipose tissue, and improved glucose metabolism in both ovariectomized HFD and LFD-fed mice.

Conclusion: Targeting of skeletal muscle ER α may of therapeutic interest to combat the increased risk of obesity associated with estrogen deficiency.

Alhameed, Hanaa

Mentor(s): Prof. Jamie lead Dr. Geoffery Scott

Uptake, bioaccumulation, and toxicity silver nanoparticles to bivalves

UPTAKE, ACCUMULATION, AND TOXICITY OF SILVER NANOPARTICLES IN ENVIRONMENTALLY RELEVANT EXPOSURE TO MARINE BIVALVE CLAM *MERCENARIA MERCENARIA*

Hanaa Alhameed

Abstract

Due to the rapid development and production of manufactured nanoparticles, silver nanoparticles (AgNPs), their uptake and toxicity in the aquatic organisms and environment represent a major concern. AgNPs coated with either citrate (cit. AgNPs) or polyvinylpyrrolidone (PVP; PVP-AgNPs) were exposed to bivalve mollusks juvenile hard clam *Mercenaria mercenaria* at a range of concentrations (1–100 $\mu\text{g L}^{-1}$). Transformations of the AgNPs, along with their uptake and biological effects were measured. DLS and TEM measurements indicated an average particle size of (23nm) for both particle types in ultrapure water (UTPW). A multi-method approach showed that both particle types underwent rapid and concentration-dependent dissolution and agglomeration. The result of the study confirmed that clams tissues accumulated Ag in all treatments. Acute toxicity tests 24h showed that AgNPs enhanced the toxicity of AgNPs. The mortality data showed that juvenile hard clam *M. mercenaria* are highly sensitive to AgNPs and ionic Ag. Chronic exposure result showed less mortalities percent's among clams. The result of the study confirmed that clams tissues accumulated Ag in all treatments. The accumulation Ag effects were most intensification for the AgNPs than Ag ionic. The larger percentage and mass of Ag was most apparent in the (1 $\mu\text{g L}^{-1}$) concentration for both Cit. AgNPs and PVP-AgNPs, and ionic Ag, the Ag accumulation was decreased with increased Ag concentrations exposure. This indicate that the higher concentration of AgNPs brought more aggregation, underwent less dissolution, and showed less accumulation, while the lower concentration showed less aggregation, more dissolution and higher accumulation. After the depuration period, Ag accumulation decreased. In the highest concentrations, histological alterations were observed. In general, the significant inductions measured showed that that chronic exposure enhanced sever histological damages than acute treatment.

Alshamari, Saad

Mentor(s): Dr. Stephen Shapiro

The Social Impact of Sport Mega-Events on Host Countries: Review of Research

Sport mega-events have a significant influence on the host countries across different areas (e.g., economic, social, physical activity, and nation branding). Recently, one of these areas that gained particular research attention is social impact, which is defined as a phenomenon that reflects on the quality of life of local residents. While research has documented the social impact sport mega-events have on host countries, there is a need to synthesize this research and examine the type of social impact these mega-events have on host countries. The purpose of this study is to synthesize the literature on the social impact of sport mega-events on host countries. Preliminary analysis shows that sport mega-events can have two levels of impact: positive and negative. Regarding the positive impact, research shows that there is considerable, short-term improvement of social life, involvement in sports, and urban regeneration. However, anti-social behavioral, cultural conflict, crowding, noise, and increased crime were documented as the negative impact of these mega-events on host countries. While research has contributed to our knowledge of the impact these sport mega-events have across different levels, future research should compare the short- and long-term impact of hosting sport mega-events.

Altman, Ekaterina

Mentor(s): Dr. Dwayne Porter

Exploring Science Communication and Research Translation Needs in a Coastal Community in South Carolina

Coastal communities are experiencing an increased need for skillful risk communication about environmental health and ways to protect public health. Coastal stakeholders have established practices to share information with their audiences. However, it takes time for scientific information to reach specific target audiences. Therefore, the aim of this study was to explore communication practices, unmet needs, and best practices to improve science communication between researchers, coastal stakeholders, and the public. Semi-structured interviews were conducted with coastal stakeholders who were identified as local leaders in environmental stewardship. Interviews were recorded and transcribed; transcripts were coded and analyzed using thematic analysis. Coastal stakeholders described the work that they do and their preferred communication practices both with scientists and the public and expressed the need to find more robust ways to evaluate communication practices. Participants mostly lacked formal training in science communication and research translation and expressed interest in participating in such training. The results of this research aim to generate a better understanding of how to enhance science communication practices between scientists, community leaders, and the public to improve environmental health and protect public health.

Anderson, Brandi

Mentor(s): Dr. Breanne Grace

Invisible Tears: Finding My Voice

This study is intended to test the effectiveness of an intervention which combines the use of an existing evidence-based program (SSET) with expressive arts techniques, to improve overall mental health of youth ages 7-18.

Anderson-Sieg, Tyler

Mentor(s): Dr. David Mott

Acetylcholine modulates the excitability of amygdalar neurons in a context and region-dependent manner

The amygdala generates appropriate and adaptive emotional behaviors in response to salient stimuli, a function accomplished through a precise pattern of internal circuitry. Sensory information enters the lateral nucleus (LA), splits into parallel streams that move into the basolateral nucleus (BL), and ultimately generates emotional behavior through BL pyramidal neurons (PNs) targeting downstream brain areas. The net output signal of the BL and selection of emotional behavior is shaped by extra-amygdalar inputs acting on these streams as they move into the BL. The cholinergic basal forebrain densely innervates the BL, suggesting that acetylcholine (ACh) – a molecule that alters neuronal excitability – is important for shaping emotional behavior through its impact on BL PN output. The anterior and posterior divisions of the BL (BLa and BLp) preferentially process negative and positive emotions. We have previously shown that the BLa receives a substantially denser cholinergic innervation than BLp, suggesting that ACh more strongly regulates circuits responsible for negative than positive emotion. This project used whole cell recordings from mouse amygdalar slices to test the hypothesis that released ACh preferentially impacts neuronal excitability in BLa compared to BLp. Stimulation in LA designed to model sensory input evoked an action potential (AP) in both BLa and BLp PNs. Optogenetic stimulation of cholinergic fibers simultaneous with the LA stimulus released ACh that increased AP output in BLa but had no effect in BLp, an effect mediated by nicotinic ACh receptors (nAChRs) because it was blocked by general nAChR antagonist mecamylamine. When ACh was released 160ms after the LA stimulus, AP output was inhibited in both regions, but to a much greater extent in BLa. This effect was mediated by muscarinic AChRs (mAChRs) because it was blocked by the general mAChR antagonist atropine. Examination of the effects of released ACh on PN membrane potential revealed that ACh evoked a fast nAChR depolarization preceding a slower mAChR hyperpolarization. Both components were significantly larger in BLa. Together, these findings suggest that ACh preferentially regulates activity of BLa over BLp PNs through nAChRs and mAChRs, suggesting a biased role for ACh in negative over positive emotional processing in the amygdala.

Arsenault, Sydney

Mentor(s): Dr. Liyun Zhang

Identifying Red Flags of Child Sex Trafficking in South Carolina

Sex trafficking as a type of human trafficking is severely oppressing children in South Carolina. Instability, vulnerability, and need for familial security creates opportunities for traffickers to reach out, bond with the children, and use those relationships to initiate sex activities for financial gains (Shared Hope International, 2008). 139 human trafficking cases were reported in South Carolina involving 88 potential child victims in 2020. Of those human trafficking cases, 69% were sex trafficking (The South Carolina Human Trafficking Task Force, 2020). However, due to difficulty in identifying victims (Dank, Yahner, Yu, Vasquez-Noriega, Gelatt, & Pergamit, 2017; Shared Hope International 2008), the actual number of cases is believed to be higher. Challenges in identifying victims and high-risk children exist due to the lack of data on the prevalence and dynamics of child sex trafficking (CST).

The purpose of this project is to increase understanding of CST red flags through analyzing actual human trafficking incident reports provided by South Carolina law enforcement agencies. Two agencies provided 21 reports from 2016 to 2020 which were included in the analysis. Data collected from the incident reports included information on the case, complainant, child victim, subject, and 11 red flags of CST. These red flags were selected from the Children's Law Center's CST Flagging Tool and refer to facts that are indicative of CST.

The narrative of the 21 reports was analyzed using qualitative methods and compared to the 11 red flags of CST. The primary red flags among the incident reports were the child engaging in sexual acts in

exchange for something of value, having a history of DSS/DJJ involvement, exhibiting sexually explicit behaviors, and having a runaway history. The data suggested the co-existence of multiple red flags in the incident reports. Analysis also provided data on several recruiting and advertising tactics used by traffickers. Case examples will be provided.

Results of the analysis showed further training and tools on identifying red flags of CST should be provided to law enforcement. More data is still needed to further test the findings of this analysis and examine the prevalence of red flags of CST in South Carolina.

Atube, Kidochukwu

Mentor(s): Prof. Michael Gower

Development of Phosphatidylserine Presenting Particles for Targeting Macrophages in Tissue Regeneration

The breakdown of the body's tissue regeneration mechanism results from deviant immunological responses often caused by aging, vascular diseases, diabetes and certain genetic disorders such as sickle cell anemia. In the United States, the number of people suffering from impaired tissue regeneration is nearing epidemic proportions, with up to 45% of the older population suffering from loss of muscle tissue and approximately 7 million people having non-healing wounds such as venous and diabetic foot ulcers, leading to about \$50 billion in annual treatment costs.

Studies have often identified prolonged immune inflammatory response, characterized by failed resolution of such inflammation, as the pivotal initiating factor in impaired tissue regeneration.

Reputedly, macrophages are mediators of inflammation in the immune system and these immune cells play a vital role in initiating and maintaining tissue regeneration. Hence, a strategy aimed at targeting and modulating macrophages in such a way as to ensure they carry out their functions properly presents a promising therapeutic means to tackle impaired tissue regeneration.

Herein, we describe the development of poly(lactide-co-glycolide) (PLG) polymer microparticles between 2-3 μ m that are surface-functionalized with phosphatidylserine. Phosphatidylserine (PS) is a phospholipid present on the surface of apoptotic cells. Similar to an apoptotic cell, PS enhances particle uptake by macrophages and subsequently turns on a regenerative gene program by promoting myoblast differentiation to form multinucleated myotubes, the building blocks of muscle fiber. In summary, we report a potential immunotherapeutic capable of targeting macrophages and promoting the growth of muscle tissue fibers.

Baquet, Jacqueline

Mentor(s): Mrs. Peyton Nunley

Assessing the Anticipated Needs of Transgender Patients in Cancer Genetic Counseling

Most cancers are sporadic and happen by chance, but about 5-10% of all cancer is hereditary, or caused by a heritable genetic mutation. Genetic counselors (GCs) use guidelines based on the patient's personal medical history, family history of cancer, which gene has the mutation, what body systems are at an increased risk for developing cancer, and the availability and accessibility of interventions to make recommendations for cancer-risk management. Transgender patients have healthcare needs that differ from those of cisgender patients.

The purpose of this study was to explore the motivations and needs of transgender individuals who may seek cancer genetic counseling. We aimed to determine where current practices of cancer genetic counseling could be improved to increase comfortability and inclusivity of transgender patients, while also assessing options for how to adapt genetic counselor training and education to optimize transgender patient care. 87 individuals who identify as transgender were eligible to participate in the study and were

asked about their comfortability and preferences regarding current genetic counseling practices. These individuals completed an online questionnaire regarding their personal perspectives on their anticipated wants and needs during cancer risk assessment and genetic testing for hereditary cancer.

Most participants reported that they would feel comfortable sharing their pronouns, hormone therapies, and surgical history on an intake form before their genetic counseling appointment, demonstrating the need for inclusive paperwork. Preliminary results suggested that comfort levels between the different current documentation practices had no statistical differences, however a large majority of participants indicated that they would not be comfortable being represented as their sex assigned at birth on an official pedigree. When assessing motivations, preliminary evidence demonstrated that most participants would want to discuss how hormone and surgical therapies impact personal cancer risk and many have already had or considered hormone and surgical transitioning. The findings of this study reinforce the recommendations for existing literature regarding the adaptation and evolution of current practices to meet the need of transgender patients while highlighting the need for standardized education and training in order to provide comprehensive, inclusive care for all patients, regardless of gender identity.

Barker, Naomi

Mentor(s): Dr. Crystal Hill-Chapman

An Exploration of the Genetic Counselor's Role in the Individualized Education Plan

Purpose: This exploratory study aimed to assess school psychologists and special education teachers' knowledge regarding genetic conditions and the resources used in the development of Individualized Education Plans (IEP) for students with genetic disorders. While the IEP process has been described for children with disabilities, literature explicitly focusing on children with genetic conditions is lacking. The rarity of genetic conditions often leaves school personnel with limited information. **Methods:** School psychologists (N=29) and special education teachers (N =14) throughout the United States participated in an online questionnaire. School psychologists were recruited from research committees' listservs of state associations, and special education teachers were identified through the Council for Exceptional Children. The questionnaire included demographic questions, Likert-scale questions regarding perceptions, and open-ended responses. The questionnaire assessed the current practices of school psychologists and special education teachers when developing and implementing IEPs for students with genetic conditions. **Results:** Overall, school psychologists and special education teachers felt that they had adequate understanding of the services, expectations, and knowledge to discuss IEP objectives pertaining to a child's genetic condition. Participants felt that additional information regarding the symptoms, impact on educational abilities, diagnosis, and future associated concerns could help set more realistic goals for students with genetic conditions. Providing information early in the IEP process (early childhood, at time of diagnosis, during background preparation, and during evaluations of IEPs) would be most beneficial. **Conclusions:** These results suggest a desire for more information by the IEP team regarding genetic conditions. The participants reported that specific genetic information and the timing of the information would improve the development and implementation of IEPs for children with genetic conditions. While respondents identified little professional experience with a genetic counselor, they identified that the role of a genetic counselor included expertise in the education of genetic information as well as the counseling and support of patients and families. Collaboration with a genetic counselor could enhance the knowledge of the IEP team to improve the decision-making during the IEP process for children with genetic conditions and identify additional resources available for members of the IEP team.

Bercaw, Hope

Mentor(s): Dr. Angela Liese

Food insecurity and dietary intake adequacy in youth and young adults with type 1 and type 2 diabetes

Household food insecurity is associated with poor dietary intake in the general population, but not much is known about persons with diabetes. We examined dietary intake among youth and young adults (YYA) with diabetes in relation to food security (FS) to identify differences in intake quantity and adherence to recommendations.

The SEARCH for Diabetes in Youth cross-sectional study includes 1,134 YYA with type 1 diabetes (T1D, mean age: 21 years \pm 5) and 274 YYA with type 2 diabetes (T2D, 25 years \pm 4.2). Participants (or parents if <18 years) completed the USDA Household FS Survey Module, wherein ≥ 3 affirmations indicate food insecurity. Diet was assessed via food frequency questionnaire and compared to age- and sex-specific 2020-2025 Dietary Guidelines for Americans (DGA) for daily energy, added sugar, saturated fat, calcium, fiber, iron, magnesium, potassium, sodium, vitamins C, D, and E. Associations of FS with daily intake and meeting guidelines were assessed with sex-stratified multivariate linear regression.

No intake differences by FS were observed, except females with T1D consumed more sodium (+155 mg, $p = .01$) and percent of kilocalories from saturated fat (+0.7%, $p = .04$) when FS was absent. Additionally, males with T2D consumed more vitamin E (+1 mg, $p = .03$) when FS was present. Crude guideline adherence was poor across the board (i.e. below 60%). After multivariate adjustment for demographic, socioeconomic, clinical and diabetes characteristics, female YYA with T1D and T2D, regardless of FS, on average met vitamin C and males met iron guidelines. Male YYA with T2D also met percent of kilocalories from saturated fat guidelines in the absence of FS.

DGA adherence among YYA with diabetes is of grave concern given that diet is crucial to diabetes management. FS reflects very little enhancement in diet quality. YYA with diabetes consume excessive sodium and added sugar, and with the exception of vitamin C and iron, inadequate micronutrients - all of which have negative health implications.

Berrios, Louis

Mentor(s): Dr. Bert Ely

Genes related to redox and cell curvature facilitate interactions between Caulobacter strains and Arabidopsis

Bacteria play an integral role in shaping plant growth and development. However, the genetic factors that facilitate plant-bacteria interactions remain largely unknown. Here, we demonstrated the importance of two bacterial genetic factors that facilitate the interactions between plant-growth-promoting (PGP) bacteria in the genus *Caulobacter* and the host plant *Arabidopsis*. Using homologous recombination, we disrupted the cytochrome ubiquinol oxidase (*cyo*) operon in both *C. vibrioides* CB13 and *C. segnis* TK0059 and showed that the mutant strains were unable to enhance the growth of *Arabidopsis*. In addition, disruption of the *cyo* operon, metabolomic reconstructions, and pH measurements suggested that both *cyo* operon expression and acid production by strain CB13 contribute to the previously observed inhibition of *Arabidopsis* seed germination. We also showed that the crescent shape of the PGP bacterial strain *C. crescentus* CB15 contributes to its ability to enhance plant growth. Thus, we have identified specific genetic factors that explain how select *Caulobacter* strains interact with *Arabidopsis* plants.

Brantley, Mia

Mentor(s): Dr. Andrea Henderson

“We Can’t Just Send Our Children into the World”: Black Women’s Motherwork around Adolescent’s Experiences of Racism

Dominant definitions and research on mothering and families have limited our understandings of the unique experiences of Black women. As a result, Black feminist scholarship looks to center Black women’s experiences and reimagine Black motherhood as a powerful force of resistance to society’s attempts at relegating them to a place of despair. This work utilizes the theory of “motherwork,” which highlights the ways Black mothers ensure the success and survival of their children in the face of micro- and macro-level structures that perpetuate racism and inequality. Contemporary research on racial socialization is almost synonymous with concepts from the theory of motherwork, which consists of three spheres: (1) physical survival, (2) collective power, and (3) identity. This work looks to contribute to current knowledge at the intersection of race, gender, and family within sociology. More specifically, I look to further our understanding of the practices and labor Black mothers engage to protect and empower their children in the face of racism. To examine these practices, I explore the possible parallels between motherwork and racial socialization within contemporary Black motherhood. This paper addresses the following research question: How do Black mothers engage in motherwork around their adolescent’s experiences of racism? Using a grounded theoretical approach, I am transcribing interviews and coding them to identify and differentiate recurring concepts, themes, and categories. Preliminary results suggest that Black women’s motherwork is rooted in the three spheres of physical survival, collective empowerment, and identity through three distinct themes: (1) delaying milestones, (2) preserving their innocence, and (3) constructing self-image. Particularly, Black women are engaging in motherwork by negotiating, and sometimes delaying, acts or milestones that are generally considered rites of passage during adolescence in an effort to protect their children when dealing with racism. Additionally, Black women look to maintain the innocence of their children in the wake of controlling images – i.e., stereotyping. Lastly, Black women are constructing a positive sense of self for their children that is rooted in their race and community.

Bratsch-Prince, Joshua

Mentor(s): Dr. David Mott

Modulation of amygdala theta oscillations by the basal forebrain cholinergic system

The amygdala is a temporal lobe structure that is involved in emotional behaviors, such as learning to associate the appropriate emotional response to environmental stimuli. Abnormalities in amygdala function result in altered emotional processing which are major features of anxiety disorders. Critical to amygdala function are theta oscillations (3-12 Hz), which function to temporally organize spiking activity and synchronize the amygdala to other cortical structures, features which are important for emotional behaviors. Aberrant amygdala theta oscillations are associated with anxiety disorders, yet it is not well understood how the amygdala oscillates at theta frequency. The neurotransmitter acetylcholine (ACh) is implicated in driving synchronized activity in the cortex and hippocampus and altered cholinergic signaling can mediate anxiety-like symptoms in humans, providing a link for ACh and amygdala theta oscillations. This study explores the hypothesis that ACh modulates theta oscillations in the amygdala. Brain slice recordings of the local field potential (LFP) in the basolateral amygdala (BL) show a bidirectional effect in response to optogenetically released ACh: an initial suppression followed by a robust increase in theta oscillations. At the single cell level, recordings from excitatory pyramidal neurons during the ACh-induced theta oscillations show these cells are depolarized and exhibit strong theta frequency membrane potential oscillations driven by GABAA receptors. Recording the inhibitory currents in these same cells shows large, compound events underlying the theta oscillation which are blocked by suppression of M3 muscarinic acetylcholine receptors. These inhibitory events are driven by PV+ and CCK+, but not SOM+ interneurons. Additionally, these ACh-induced events are more reliably evoked in the BL compared to other cortical structures, sug-

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gesting that ACh is especially important for emotional processing. Thus, deficits in cholinergic signaling in anxiety disorders are positioned to mediate aberrant emotional responses through preferential modulation of amygdala theta oscillations. These studies suggest the cholinergic system could be targeted for improved therapies to alleviate symptoms of anxiety disorders. Supported by the NIMH (R01MH104638).

Bucko, Agnes

Mentor(s): Dr. Russell Pate

Sleep and physical activity in 6-month-old children

This study evaluated associations between objectively measured nighttime sleep duration and physical activity in a sample of 6-month-old infants. Relationships between infant sleep and demographic and environmental characteristics were investigated as well. Cross-sectional relationships were assessed using linear regression analyses. Nighttime sleep duration was positively associated with physical activity, as well as with a consistent bedtime, sleeping in a separate room, male sex, and higher parent education. These findings inform the development of interventions aiming to improve infant sleep.

Cabezas, Jennifer

Mentor(s): Dr. Eugenia Broude, Dr. Gary Schools

Role of STAT1 and STAT3 in combinatorial effect of Lapatinib and CDK8 inhibition in a mouse xenograft model of HER2(+) breast cancer

Previous studies have found human epidermal growth factor receptor-2 (HER2)-expressing tumors to be highly aggressive and that HER2 activates oncogenic pathways which drive cell cycle, angiogenesis, invasiveness, and metabolic programming. FDA approved anti-HER2-targeting drug Lapatinib been shown to be a very effective therapy for HER2(+) breast cancer, but many of these tumors develop resistance to the drug. Therefore, has become crucial to find new methods to increase treatment efficacy. Transcription-regulating kinases CDK8 and CDK19, have become important targets in cancer therapies. CDK8 plays a role in regulating transcription in many pro-carcinogenic signaling pathways. Therefore, inhibition of CDK8 blocks transcription activation of proteins that aid in drug resistance and tumor progression. CDK8 been shown to activate STAT3 by S727 phosphorylation, and CDK8 inhibition with Senexin A or B resulted in reduced Y705- and S727-STAT3 phosphorylation in STAT3(Y640F) expressing cells, which shows that CDK8 is useful target to inhibit the STAT3 oncogenic activity. Furthermore, our lab has found that STAT1 and STAT3 are needed for the HER2 resistance phenotype in an in vitro model (unpublished data). We hypothesize that combination treatment of Lapatinib with a CDK8/19 inhibitor will work synergistically to decrease the phosphorylation of STAT1 and STAT3 leading to smaller tumor sizes and less cell proliferation.

To test this hypothesis human HER2(+) cancer cells were grafted into mice treated with vehicle, Lapatinib or Snx631 alone, or the combination. Tumors were excised, fixed in formalin, paraffin embedded, and processed for immunofluorescence. Our results showed there was less phosphorylation of S727 of STAT1 and STAT3 when tumors are treated with the combination treatment of Lapatinib + Snx631 compared to Lapatinib alone, while the difference in total STAT1 and STAT3 was negligible. Ongoing experiments show there is decrease in the proliferating cell marker Ki67 in all drug treatment conditions compared to the vehicle-treated control. We aim to continue to learn how the JAK/STAT pathway is regulated and what the exact role of CDK8/19 inhibition is in this process. This will be done using CDK8/19 knockout cells and investigating if STAT is still participating in regulation.

Cahl, Douglas

Mentor(s): Dr. George Voulgaris

Nearshore quadcopter research: Surface Ocean Currents

Nearshore surface currents are difficult and costly to measure. Traditional drifter deployments or ADCP deployments from moving vessels are timely and costly. Small commercial off the shelf drones have improved to a point where the video stability, resolution and framerate, combined with accurate GPS positioning, allows a myriad of research uses. Among new research, is estimating surface ocean currents using the aerial video of the ocean waves. Video is recorded from 120 meters altitude, pointed straight down. Camera calibration allows the conversion from pixels to world coordinates. The wave sizes and speeds calculated from the video analysis allows surface ocean current estimation through investigation of the dispersion relationship of the waves identified in the quadcopter video.

A short research cruise offshore of Georgetown south Carolina allowed 15 consecutive quadcopter flights. The surface ocean currents estimated offshore agree with the ADCP currents measured from the research vessel. A small eddy feature 5 miles offshore on the scale of 100 meters was identified. These features are not captured in traditional boat surveys, highlighting the importance of this new research method.

Cannon, Alkeiver

Mentor(s): Dr. Mitzi Nagarkatti, Dr. Prakash Nagarkatti

Single Cell RNA Sequencing Reveals Downregulation of lncRNA Gm42031 Expression After Treatment with AhR Ligands in Concanavalin-Induced T Cell-Mediated Liver Injury

Long-chain non-coding RNAs (lncRNAs) have been implicated in many biological processes and have been shown to have abnormal expression in inflammatory reactions and diseases. Recent studies have been exploring these non-coding RNAs to further elucidate their relationship with inflammatory diseases. Data from our lab has been generated that indicates that Aryl Hydrocarbon Receptor (AhR) activation by 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) triggers dysregulation in epigenetic pathways. Further, we have shown that this environmental pollutant promotes the differentiation of FoxP3+ regulatory T cells (Tregs) while an endogenous AhR ligand, 6-formylindolo[3,2-b] carbazole (FICZ), exerts contrasting effects and promotes proinflammatory Th17 cells. In an effort to further explore activated inflammatory genes altered upon treatment with these ligands, a murine model of immune cell-mediated liver injury was employed by intravenously injecting 12.5 mg/kg Concanavalin A (ConA), a polyclonal T cell mitogen. Mice were treated one hour after challenge with vehicle, 10 µg/kg TCDD, or 50 µg/kg FICZ intraperitoneally. Single cell RNA sequencing (scRNA-seq) was conducted on infiltrating liver mononuclear cells enriched via a percoll gradient. Upon analysis, immune cell clusters were identified and included multiple B cell and T cell clusters, as well as Kupffer cells, neutrophils, NK cells, among others. We observed a clear increase in the number of T cells and a decrease in the number of Kupffer cells, fibroblasts, and neutrophils upon TCDD treatment. Additionally, Gm42031 was identified as a lncRNA upregulated in vehicle-treated ConA challenged mice but downregulated in both AhR ligand-treated groups, specifically in the B cell, CD8+ T cell, Kupffer cell and NK cell populations. For the first time, this data suggests Gm42031 as a potential player in liver inflammation that was downregulated following AhR ligation. (Supported by NIH grants P01AT003961, P20GM103641, R01ES030144, R01AI129788 and R01AI123947)

Chandler, Alexa

Mentor(s): Dr. Shawn Arent

Differences In Internal And External Workloads During Consecutive Collegiate Volleyball Matches

Recovery between consecutive (<24 hr apart) collegiate volleyball matches is essential to maintain optimal performance. However, the cumulative effects of the matches may lead to increased internal workloads during the latter match, even when external workloads remain constant. PURPOSE: The purpose

of this analysis was to assess differences in both internal and external workload metrics between two matches separated by <24 hours.

METHODS: Female volleyball players (n=11; age= 20.0 ± 1.3 y) were monitored using heart rate (HR) and accelerometry during 8 matches. Internal workload was calculated as summated heart rate zones (SHRZ; AU) by determining time spent between 50-100% of maximum HR, with higher HRs accounting for greater point accumulation. External workloads were quantified as total distance covered per match and distance covered in speed zones four (SZ4; 4.2-5.3 m/s) and five (SZ5; >5.3 m/s). Paired t-tests were used to determine differences in between-day workload metrics (M1 and M2) with an alpha level of 0.05. Pearson's correlations were used to assess relationships between internal and external workloads.

RESULTS: There were no differences in SHRZ between M1 and M2 (P=0.29), but average HR was lower during M2 (P=0.01). Additionally, total distance covered was higher during M2 compared (+280.6 m; P=0.04), total distance covered in SZ4 and SZ5 didn't differ between matches (P>0.05). SHRZ was strongly correlated with distance covered for M1 (r=0.73) and M2 (r=0.72) and moderately correlated with distance covered in SZ5 (Match 1: r=0.53; Match 2: r=0.52). SHRZ was weakly correlated with combined distance covered in SZ4+5 (M1: r=0.36; M2: 0.40) and was not associated with distance covered in SZ4. (r<0.20).

CONCLUSIONS: Despite being played on a small court, monitoring distance covered in volleyball players may provide a useful measure of match-demands. Internal workloads were not elevated during M2 when fatigue is likely accumulating among athletes. In fact, total distance covered was higher in M2, suggesting a lower overall intensity as more external work was completed without an increase in internal workloads.

Chavez, Bernardo

Mentor(s): Dr. Hippokratis Kiaris

A strategy for the Identification of Paracrine Regulators of Cancer Cell Migration

We hypothesized that the correlation of the whole transcriptome with quantifiable phenotypes may unveil genes contributing to the regulation of the corresponding response. We tested this hypothesis in cultured fibroblasts exposed to diverse pharmacological and biological agents, to identify genes influencing chemoattraction of breast cancer cells. Our analyses revealed several genes that correlated, either positively or negatively with cell migration, suggesting that they may operate as activators or inhibitors of this process. Survey of the scientific literature showed that genes exhibiting positive or negative association with cell migration had frequently been linked to cancer and metastasis before, while those with minimal association were not. The current methodology may formulate the basis for the development of novel strategies linking genes to quantifiable phenotypes.

Cheung, Candice

Co-Author(s): Griffin Carter

Mentor(s): Dr. Michael Gower

ATRA-loaded PLG microparticles to direct macrophage regenerative function

Statement of Purpose: During muscle repair, macrophages play a significant role in establishing a local environment that supports muscle growth. Macrophages achieve this by releasing factors that induce muscle growth, including insulin-like growth factor-1 (IGF1). All-trans-Retinoic Acid is a small molecule that has an established effect on muscle growth and influences macrophage phenotype but has a short half-life in physiological conditions. We show that ATRA can be incorporated into biodegradable poly(-lactide-co-glycolide) (PLG) microparticles for extended delivery to macrophages and naïve muscle cells, improving myotube formation and muscle growth.

Methods: ATRA was encapsulated within PLG microspheres using a single emulsion evaporation technique. Particles were differentially centrifuged to obtain particles 2 μ m in diameter, frozen, then lyophilized overnight. RAW264.7 murine macrophages were incubated with ATRA-loaded particles for 24 hours. The “conditioned” media is collected for IGF1 content analysis and subsequent experiments. To elucidate from macrophage- and particle-only effects, media alone, macrophages alone, and particles alone were incubated in complete media for 24 hours to generate conditioned media controls. C2C12 myoblasts were treated and differentiated into myotubes for 4 days using the collected conditioned media. After 4 days of differentiation, formed myotubes are fixed and stained for myosin heavy chain. Image analysis is conducted to quantify differences in myotube growth and formation. Primary murine macrophages were treated with fluorescent particles for 8 days, fixed, and stained for actin.

Results: ATRA was successfully incorporated into biodegradable poly(lactide-co-glycolide) microparticles and induced an increase in media-levels of IGF1 from RAW264.7 macrophages by 3.1-fold compared to untreated cells ($p < 0.0001$), and a 1.5-fold difference compared to blank PLG microparticle control ($p < 0.0001$). When treated with conditioned media collected from RAW264.7 macrophages incubated with ATRA particles, C2C12 myoblasts differentiated and fused into myotubes more readily compared to media-only, macrophage-only, and particle-only conditioned media treatment ($p < 0.0001$, $p = 0.0002$, and $p = 0.0070$, respectively). Fluorescent particles remained intact in primary macrophages for over 8 days.

Conclusion: ATRA can be encapsulated into 2 μ m PLG particles that can be delivered long-term and induce IGF1 production by macrophages. The particle-treated macrophages enhanced myoblast differentiation and formation into myotubes compared to macrophage- and particle-only conditioned media.

Childs, Tasha

Mentor(s): Dr. Aidyn Iachini

A Content Analysis of School District Websites for Parent and Family Resources During COVID-19

The unprecedented school closures due to the COVID-19 pandemic has current and lasting impacts on students and families. During COVID-19, schools were forced to close entirely, reopening slowly virtually and in varied modalities. Prior to COVID-19, schools served as a main provider of mental health services, food security, and other psychosocial services that support students' academic success and overall well-being. However, once COVID-19 occurred, it was unclear what resources schools provided for students and families. This study collected and examined 80 South Carolina school district websites in order to understand the types of resources available to parents and families during COVID-19. Out of the 80 school district websites, about 68% (54) provided both information on COVID-19 and resources for families or just information on resources for families. A majority of the school districts provided resources for English Language Learners, information on meals and nutrition, e-learning, wi-fi/internet, and computers and technology; whereas fewer school district websites provided resources on mental health, telehealth, grades and accountability, and for students with disabilities. Most surprising, given the need and public attention on loss of housing, no school districts provided resources on housing. Overall, this study found school district websites communicated vital information and resources for parents and families during COVID-19. Additionally, school districts may examine their resources and continue to prioritize the distribution of information on other student needs such as housing and mental health on the school district website, especially given it is publicly accessible for families and these needs continue to plague families during the ongoing pandemic.

Cooper, Ellen

Co-Author(s): Tegan Osborne

Mentor(s): Dr. Krystal Werfel

Title: The Impact of Childhood Hearing Loss Diagnosis on Maternal Health Literacy and Well-Being

Introduction: A diagnosis of hearing loss for a child can lead not only to lower maternal well-being, but also be detrimental to maternal sensitivity to a child's linguistic needs, negatively impact involvement in early intervention programs, and decrease parent-child interaction quality (Quintter et al., 2013; Ingber & Dromi, 2009; Ingber et. al, 2010; Calderon & Greenberg, 1999). The initial diagnosis of hearing loss carries a vast array of decisions, and parents, who rarely have any experience with childhood hearing loss, are under pressure to make decisions rapidly. Understanding experiences of mothers of children with hearing loss is a critical step in closing the gap of delayed skills in this population. The proposed study seeks to determine maternal perspective and decisions made to optimize future outcomes for mothers and their children. This mixed methods inquiry aims to identify specific gaps in maternal hearing loss health literacy, as well as areas of concern related to well-being for mothers of children with hearing loss that could be addressed by communication disorders professionals.

Methods: Participants include mothers of three-year-old children who have had a hearing loss diagnosis for at least one year. Participants are recruited until saturation in qualitative coding is met (n = 10 - 20). Mothers in this study have a child with bilateral hearing loss confirmed via audiological report. Mothers are mailed measures of hearing loss health literacy, parent stress, and parent self-efficacy and involvement. In addition, child language, listening and hearing device use outcomes are measured.

Results: Data collection for this study is ongoing; the anticipated completion is March 2021. The study hypothesis is that higher maternal hearing loss health literacy will be related to lower stress and higher involvement in care. Additionally, children of mothers with higher hearing loss health literacy will demonstrate higher skills in language and listening and will have higher levels of amplification use.

Conclusion: Understanding how mothers navigate these choices is necessary to further inform communication disorders professionals on how to support maternal well-being and health literacy related to a child's hearing loss.

Crowley, Archie

Mentor(s): Dr. Elaine Chun

"We have to get behind words": Approaches to Language in Trans Communities

Debates about language within transgender communities often take place as individuals articulate themselves within personal, local, and national discursive scales of trans representation and identity. While prescriptive arguments about language often are framed as aspiring to articulate one "correct" linguistic form that should become the norm, in fact, many members of trans communities recognize that multiple interests are at play and that different linguistic practices are necessary for each context. This sociolinguistic study draws on multiple methods of data collection and analysis, including 6 months of participant observation in 2 trans organizations in Columbia, South Carolina; 9 ethnographic group interviews with 18 community members; and methods of interaction analysis, allowing for the identification of locally salient ideologies that participants draw on when rationalizing their lexical and grammatical choices. During the interviews, participants talked about language with an awareness of the multiple projects that are being served. I highlight how the participants primarily orientated to two distinct approaches to language and language use within trans communities: a "political" approach to language and a "philosophical" approach to language. On the one hand, the political approach to language presumes that the function of language is goal-oriented and attentive to the outside world, and presents a single, unified truth of lan-

guage. On the other hand, the philosophical approach to language centers affect, personal discovery, and a plurality of truths. They negotiate how both of these approaches to language are useful and salient for trans communities. In fact, they highlight specific types of people who ascribe to one singular orientation to language as part of how conflict about language use arises both inside and outside trans communities. They hold that it is crucial to simultaneously make space for both of these theories of language in order for trans individuals to utilize the power of language for self-determination and for trans communities more broadly to move their political goals forward and push for social change.

Cunningham, Patrice

Mentor(s): Ms. Emma Patton, Mr. Gustavo Martinez, Mr. Aman Sumal, Dr. Kandy Velázquez
Skeletal Muscle Macrophage Dysfunction in Cancer Cachectic Mice

Abstract

Cachexia contributes to an increased mortality rate in multiple chronic diseases including cancer. Patients who develop cancer cachexia have unintentional body weight loss, which can include loss of muscle with or without loss of fat mass. The loss of muscle mass not only decreases muscle function, but also contributes to a poor quality of life and an increased mortality risk. Inflammation is one of the proposed mechanisms involved in the development and progression of muscle wasting. Therefore, we seek to investigate macrophage involvement in the progression of muscle wasting in pre-clinical cancer models. In this study, we used male and female Lewis Lung Carcinoma (LLC) - tumor bearing mice and ApcMin/+ mice. Blood was collected for complete blood count and quadriceps muscles were weighed and processed for gene expression and flow cytometry assays. LLC-tumor bearing mice lost muscle mass and developed anemia. The percentage of monocytes in the blood of wild-type and LLC-tumor bearing mice were not significantly different. However, LLC-tumor bearing mice showed a higher variability of monocytes. A significant decrease in the expression of F4/80, Mertk, CD11b, and CD206 (macrophage markers) were observed in the muscle of severely cachectic LLC-tumor bearing mice when compared to control wild-type mice. During the progression of cancer cachexia in ApcMin/+ mice, there was a decrease of M2 macrophages in the pre-cachectic stage followed by an increase of M2 macrophages in the skeletal muscle of cachectic mice. In general, our data indicated disruption of macrophages in skeletal muscle of cancer cachectic mice. However, whether macrophage dysfunction occurs as a consequence of cachexia or is one of the promoters of muscle wasting is not known.

Daneshian, Leily

Mentor(s): Dr. Maksymilian Chruszcz

Molecular Basis of Xenobiotic Metabolism and Resistance in *Tetranychus urticae*

Invasive pest species are a major cause of crop loss around the world and adversely affect the agricultural industry. We are focusing on *Tetranychus urticae* (two-spotted spider mite; TSSM), which is a polyphagous pest that targets more than 1100 plant species. The TSSM alone causes a loss of roughly \$1.6 billion per year globally due to acaricide resistance. It is developing resistance to most acaricides due to rapid growth and reproduction. Therefore, new acaricides are needed to combat TSSM resistance and infestation [1]. To address this problem, four enzymes of TSSM, intradiol ring cleavage dioxygenases, a glutathione S-transferase, a β cyanoalanine synthase, and uridine diphosphate glycosyltransferases, are characterized. These enzymes contribute to the detoxification system of TSSM and are potential protein targets to develop new acaricides. Intradiol ring-cleavage dioxygenases are involved in the breakdown and metabolism of toxic aromatic compounds [2]. Glutathione S-transferases conjugate reduced glutathione to xenobiotics for detoxification and have been associated with insecticide resistance [3]. The β cyanoalanine synthase is known for detoxification of cyanide and silencing this gene in TSSM reduces the survival of the mites on cyanogenic plants [4]. Uridine diphosphate glycosyltransferases (UGTs) catalyze the covalent addition of sugar moieties from UDP sugar donors to xenobiotics to facilitate their elimination from

cells [5]. UGTs are known for the detoxification of acaricides such as abamectin. Here we have structurally and functionally characterized these proteins, particularly focusing on revealing the crystal structure of enzymes with the intention of exposing unique properties that will allow for the design of new acaricides.

Dastrup, Ryan

Mentor(s): Prof. Todd Koesters, Dr. Stephen Shapiro

“Why Can’t We Be Friends”? An Examination of Academic and Industry Alignment in Sport Sponsorship

Within the complex marketing environment, sports sponsorship is a central component, estimated at \$20 billion by 2022 (PWC, 2020). As a result, this sector of sport has been relevant to both academia and industry, which is supported by the significant body of scholarly and practitioner-based literature.

The academic literature on sport sponsorship has been comprehensively examined through three reviews. Cornwell and Maignan (1998) performed an initial systematic sponsorship review. Given the relative novelty of research on sponsorship, the literature either described the development of sponsorship or defined its main characteristics. Bjorn Walliser (2003) extended the initial review by including international studies. He focused on the evolution of sponsorship and found the definition of sponsorship had matured. Finally, Spais and Johnston (2014) examined how scholarly sponsorship research evolved by using computer-assisted text analysis. They found the amount of sponsorship articles more than doubled in two-thirds the time.

These three broad reviews focused on research and direction for future investigations, however there is a wealth of industry articles and a topical review of this literature does not exist. The abundance of articles provides an opportunity to assess the alignment between sponsorship theory and practice.

Following the methods of previous reviews, searches were performed using Business Source Complete and ISI Web of Knowledge between January 2014 and October 2020. In addition, a manual search of Sports Business Journal (SBJ), and other relevant industry sources was conducted for the same time-frame.

The purpose of this study is to extend previous academic reviews but will also integrate industry articles and assess alignment of topics across sectors of the sport sponsorship landscape providing a more thorough literature review of sponsorship.

Davis, Eleanor

Mentor(s): Prof. Kirstin Dow

Won’t you be my neighbor? Small business, community resilience, and complex hazards

Small- and medium-sized enterprises (SMEs) are experiencing unprecedented decreases in revenue, loss of employees and customers, disruptions to supply chains, and government-mandated restrictions and closures due to impacts from the COVID-19 pandemic. In addition to the pandemic, natural hazards and extreme weather events, including wildfires, hurricanes, and floods, have further disrupted SMEs and communities across the country. As small businesses provide two-thirds of net new jobs and almost 50% of the United States workforce, the growing impact of COVID-19 and hazards amplifies the need for SME resilience building. A series of SME surveys have been conducted as a collaboration between the University of South Carolina, National Institute of Standards and Technology (NIST), and the National Oceanic and Atmospheric Administration (NOAA).

This presentation highlights survey work during COVID-19 in the Carolinas studying SME preparation for hurricanes, adaptation and resilience factors, and community participation and support. As COVID-19

conditions persist, the chances of overlapping natural hazards increases for communities. The genesis of these survey projects began in 2019 with an in-person data collection to study the impact of hurricanes on Charleston, South Carolina SMEs. This paper will present results, lessons learned, and ongoing research synergies to enhance our understanding of SME resilience to complex hazards caused by climate change.

Davis, Brittany

Mentor(s): Dr. Krik Foster

Equitable Development for Historically Low-Income African American Communities

The United States' long history of racial exclusion has contributed to development disparities for low-income neighborhoods of color (Popescu et al., 2018). Research has shown that low-income, segregated African American neighborhoods have been characterized by high levels of abandoned buildings and inadequate municipal services and amenities (Williams & Collins, 2002). The divestment of economic resources from African American neighborhoods has been associated with urban infrastructure decline, hazardous physical environments, and poor quality of life (Williams & Collins, 2002; Pacheco et al., 2014; Popescu et al., 2018). Empirical evidence suggests that some efforts to revitalize these neighborhoods (i.e., gentrify) may lead to further marginalization of longtime residents (Shaw & Hagemans, 2015; Alvaré, 2017). Gentrification, a process of rapid neighborhood change and redevelopment, has been associated with the physical displacement of vulnerable residents who cannot manage increased housing costs (Rothstein, 2017; Choi et. al, 2018; Pearsall, 2013; Brown-Saracino, 2010). Evidence suggests that longtime residents who manage to remain in gentrifying neighborhoods may experience social and cultural displacement due to shifts in neighborhood demographics, the loss of social ties and networks, and redevelopment not reflecting the historical fabric of communities (Curran, 2018; Thurber et al., 2019; Shaw & Hagemans, 2015; Alvaré, 2017; Hyra, 2015). Additionally, empirical evidence demonstrates that African American residents in gentrifying neighborhoods may also experience feelings of exclusion as developers take measures to rebrand and rename their neighborhoods without their input (Alvaré, 2017). Feelings of exclusion, as well as physical, social and cultural displacement, are likely to negatively impact some longtime residents' sense of community. Scholars have identified membership as an element of sense of community, which implies a "right to belong" (McMillan & Chavis, 1986) Thus, a loss sense of community may lead to further marginalization of residents of color. This further marginalization perpetuates the cycle of systematic social injustice. Scholars have identified Community Land Trusts (CLTs) as a more equitable redevelopment strategy (Thurber et al., 2019). However, limited empirical evidence exists about residents' sense of community and feelings of inclusion or exclusion in gentrifying neighborhoods of color where CLTs are being implemented.

DeVivo, Katherine

Mentor(s): Dr. Christine Pellegrini

Exploring the Barriers and Facilitators to Physical Activity in Adults with Overweight and Obesity During the Coronavirus Pandemic

Background: The COVID-19 pandemic has disrupted everyday life. While preliminary evidence suggest that physical activity levels have changed during the COVID-19 pandemic, the factors which interfere with or promote physical activity behaviors are uncertain. This study sought to understand how the pandemic influenced physical activity in adults with overweight or obesity and gain insight into barriers and facilitators of physical activity.

Methods: Adults enrolled in an online weight loss program from Rhode Island and Massachusetts were recruited to complete a semi-structured interview on how COVID-19 may have influenced physical activity. Constant comparative analysis was used to identify emergent themes.

Results: A total of 30 participants completed the interviews (83% female, 87% white, 54.6±10.0 years,

31.1±4.5 kg/m²). Identified physical activity subthemes include less/no activity, change in activity type, and more active during the pandemic. Barriers include COVID-19 restrictions on gym access, COVID-19 related fears/limitations, lack of motivation, and poor environment/weather. Facilitators include social support or being active with others, positive environment/weather, use of an activity tracker, ability to exercise at home, and owning a dog.

Conclusions: The pandemic, and related stay-at-home orders generated new barriers (i.e., restrictions on gym access and COVID-19 related fears and limitations) to physical activity and increased existing challenges (i.e., lack of motivation). As many individuals continue to face challenges with motivation to be active, encouraging or finding support from others, including family members, may be helpful as social support was an identified facilitator to activity in the current study. An additional possible solution may be to promote physical activity within the home, as this emerged as an important physical activity facilitator. At home activities that participants reported as being helpful were prerecorded workout videos and classes or utilization of home exercise equipment. Helping individuals overcome barriers and promoting engagement in regular physical activity is essential as the pandemic continues and in the event of future stressful situations and events.

Dopkins, Nicholas

Mentor(s): Prof. Mitzi Nagarkatti, Prof. Prakash Nagarkatti

Cannabidiol treatment in experimental autoimmune encephalomyelitis inhibits production of the pro inflammatory cytokine IL-1 β

Cannabidiol (CBD) is a phytocannabinoid that encompasses a major constituent of extracts isolated from cannabis plants. CBD has garnered wide-spread attention due to the potential of its therapeutic application in neuroinflammatory and autoimmune disorders. CBD poses as a non-toxic and relatively inexpensive alternative to current market anti-inflammatory medications that are associated with inadvertent side effects and exorbitant costs¹. Despite growing consumption of CBD as a complementary and alternative medicine, there is still little understanding on how CBD supplementation limits excessive inflammation in the clinical setting. We aimed to study how CBD limits excessive neuroinflammation by administering CBD via oral gavage (20mg/kg) in a murine model of multiple sclerosis known as experimental autoimmune encephalomyelitis (EAE). Our initial results demonstrated that CBD significantly reduces EAE severity by ameliorating the neuroinflammation-related paralysis symptoms by reducing the number of infiltrating macrophages and increasing the number of myeloid derived suppressor cells (MDSCs). In order to better understand how CBD limited macrophage infiltration, we looked at the transcriptome of the immune cell fraction isolated from the CNS of EAE mice using single cell RNA sequencing (scRNASeq)². The scRNASeq results indicated that the macrophages infiltrating the CNS of control mice produced high levels of the pro-inflammatory cytokine, interleukin 1 beta (IL-1 β) in comparison to the CBD treated mice³. We validated these results by confirming the expression of IL-1 β transcripts within myeloid cells isolated from the CNS of vehicle treated mice was significantly higher than that of CBD treated mice. We further confirmed that CBD treatment inhibits IL-1 β production by using bone marrow derived macrophages (BMDM) treated with lipopolysaccharide (LPS) to induce an inflammatory response. CBD treatment of BMDM under LPS-stimulated conditions resulted in a significant reduction in IL-1 β expression as well as no detectable levels of IL-1 β being secreted. In summary our results demonstrate that CBD treatment results in an anti-inflammatory shift in the myeloid cells infiltrating the CNS by inhibiting the production of the pro-inflammatory cytokine, IL-1 β in a murine model of autoimmune neuroinflammation.

DuBois, Kelli

Mentor(s): Dr. Christine Blake, Dr. Caroline Rudisill, Dr. Sayward Harrison, Dr. James Hebert

Perceptions Among Patients with Ulcerative Colitis: Treatment and Self Management Methods

Background- Patients with Ulcerative Colitis (UC) experience a range of gastrointestinal (GI) and extraintestinal symptoms that generate a significant burden on daily life. Many patients seek out complementary treatments and undertake socio-behavioral and lifestyle adaptations to self-manage disease symptoms, reduce dependence upon pharmaceuticals, and respond to the challenges of living with chronic illness. This study will describe patient perspectives and experiences with UC treatment and self-management methods.

Methods- Qualitative data were collected using individual semi-structured interviews to reflect the perspectives and experiences of individuals with UC on treatment and self-management methods. Patients were recruited through Greenville's Prisma Health Gastroenterology department, the Carolina's Crohn's and Colitis support group, and Facebook support groups. Eligibility criteria included: 1) diagnosis of UC; 2) duration of illness ≥ 5 years; and 3) minimum of one disease flare during the illness trajectory. Interviews were audio recorded and transcribed. Thematic analysis was conducted using NVivo 11 software.

Results- Twenty one individuals with diagnosed UC participated in this study. Progressive use of medications in response to disease flares was common. Participants identified stress as a precursor to disease flares. While some patients doubted the effect of diet on disease activity, the majority of participants spoke about foods as culprits for GI symptoms. Other participants described making changes to their dietary intake to manage their overall health. Patients who underwent colorectal surgery described a continuing need to self-manage gastrointestinal symptoms.

Conclusion- Participants expressed a spectrum of attitudes and approaches towards dietary change. Greater understanding is needed to identify how diet can influence immune functioning and overall health among UC patients.

El Loubani, Mohammad

Mentor(s): Dr. Dongkyu Lee

Creation of nanoscale speckle patterns with metal oxides on carbon fibers by pulsed laser deposition

Carbon fibers are commonly used as reinforcements in composite material systems for automotive, aerospace, and defense applications. As demand for high-performance carbon fibers increases, the tensile strength of commercial fibers needs to be improved. In order to evaluate the tensile strength of fibers, forming a random speckle pattern on the surface of single fibers is indispensable. In the case of millimeter and larger length scales, creating such a pattern is straightforward by using airbrushing or toner powder. However, new approaches to create the random pattern at micron- and nano- length scales on the surface are strongly demanded. One promising way of creating the random pattern at a reduced length scale is using thin solid films of metal nanoparticles, which have been enabled by various deposition techniques. Among such techniques, pulsed laser deposition (PLD) has recently attracted much attention in fabricating metal particles on solid surfaces. This technique presents many advantages, such as excellent control of the size, dimension, and distribution of metal nanoparticles. Therefore, the feasibility of the formation of speckle patterns on the surface of carbon fibers using the PLD system needs to be assessed. In this study, we report the nanoscale fabrication of metal oxide speckle patterns on carbon fibers using PLD which has not been reported previously in literature. We fabricate the speckle patterns of a Nb-doped SrTiO₃ under a wide range of temperature, oxygen partial pressure and the pulse duration to study their effects on the morphology of the pattern. Scanning electron microscope is utilized to take high-quality

images of the samples to observe the nanoparticle patterns formed on carbon fiber surfaces. Our finding shows that a substrate temperature of 100 °C, an oxygen partial pressure of 100 mTorr, and 2000 pulses are the optimized conditions.

Eley, Emily

Mentor(s): Dr. Subrahmanyam Bulusu, Dr. Corinne Trott

The concurrence and air-sea interactions of Hurricanes Marco and Laura (2020)

The formation, maintenance and intensification of hurricanes in the Gulf of Mexico (GoM) is remarkable due to its high ocean heat content (OHC) and ability to rapidly recover sea surface temperatures (SST) following the passage of a storm. During August 2020, Hurricanes Marco and Laura existed as temporally consecutive and spatially adjacent storms. This study aims to investigate the atmospheric and oceanic conditions that influenced the maintenance and intensification of the two coincident cyclones, and to specifically determine why GoM conditions were favorable for intensification of Hurricane Laura as a category 4 storm despite Marco's existence. Additionally, this study aims to analyze the biophysical responses of the surface ocean to Marco, Laura and the combined effect of both storms using a combination of satellite observations and ocean model outputs. Marco weakened due to increased wind shear and interactions with a Loop Current (LC) cold core ring (CCR). Hurricane Laura's intensification, and apparent disregard of Marco, is attributed to a high-pressure system shifting its track westward, reduced wind shear, and lack of interaction with the CCR. The eastern GoM, particularly the CCR, had the greatest biophysical oceanic response. Reduction of sea surface temperatures (SST), increased sea surface salinity (SSS), deepening of the mixed layer depth (MLD) and a thickening of the barrier layer thickness (BLT) as well as heat and moisture fluxes and the basin's thermodynamic conditions are further studied in this work.

Elmore, Amanda L.

Mentor(s): Dr. Nansi Boghossian

Prescription Opioid Use and Use of Medications for Opioid Use Disorder Among Women of Reproductive Age in the United States: NHANES, 2003-2018

Introduction: Prescription opioid use and opioid dependency remain prevalent in the United States and have negatively impacted women and children. Given that half of all pregnancies are unplanned and prenatal opioid use poses risk for infants, it's important to examine prescription opioid use among women of reproductive age. From 2010-2017, the rate of opioid use disorder at delivery increased by 100% or more in 24 states but studies suggest many women with opioid use disorder do not receive the recommended medication therapy. However, recent prevalence estimates of prescription opioid use and use of medications for opioid use disorder among women of reproductive age are limited.

Methods: Using the 2003-2018 National Health and Nutrition Examination Survey, we determined the prevalence, trend, and correlates of prescription opioid use, long-term use (≥ 90 days of use), and use of medications for opioid use disorders among women of reproductive age ($n=13,558$). Prescription opioid use within the last 30 days and prescription duration were collected through interviews and identified using prescription codes. Trend analysis was conducted using NCI's Joinpoint Trend Analysis Software version 4.7. To evaluate correlates of each outcome, we used chi square tests of independence and survey logistic regressions through unadjusted and adjusted models with SAS 9.4.

Results: From 2003-2018, the average prevalence of prescription opioid use was 4.5%, which significantly decreased by about 9% every two-years ($p<.05$). About 2% of women reported long-term opioid use and 0.6% reported use of medications for opioid use disorder but no significant trends were found for these outcomes. Among long-term prescription opioid users, the mean duration of use was 1,357 days (range: 91-9,855 days). Correlates of prescription opioid use and long-term use included ages 35-44, non-Hispanic White, public insurance, and women with poor or fair health status.

Conclusions: Considering recent evidence of an increasing trend in maternal opioid use disorder, the low

prevalence of medications for opioid use disorder is concerning. As policy makers and clinicians strive to reduce the negative impacts of the opioid epidemic on women and children, they should determine mechanisms to improve access to effective treatments for opioid use disorder.

Erichsen, Jennifer

Mentor(s): Ms. Jennifer Woodruff, Dr. Claudia Grillo, Dr. Lawrence Reagan, Dr. Jim Fadel

Molecular effects of intranasal insulin in the rodent brain

As brain insulin resistance has been identified as a pathological feature of age-related cognitive decline (ARCD), intranasal insulin (INI) is being explored as a potential treatment for patients with ARCD. Previous studies have demonstrated that INI enhances memory, but the underlying mechanisms remain unclear. To investigate the mechanistic basis for the pro-cognitive effects of INI, insulin receptor (IR) signaling and the expression of glutamate receptors and transporters, due to the role of the glutamatergic system in hippocampal synaptic transmission, was examined. Adult male Sprague-Dawley rats received bilateral hippocampal injections of a control lentiviral vector (LV-Con) or a lentivirus containing a selective insulin receptor antisense sequence (LV-IRAS) to induce hippocampal-specific insulin resistance. Seven months later, these animals were administered INI 30 minutes before euthanasia. In a separate cohort of Fischer 344 x Brown Norway F1 hybrid male rats (no virus) we investigated the effects of acute and chronic (10 days) INI dosing paradigms in young (3 months old) and aged (26 months old) rats, with a final INI administration 30 minutes before euthanasia. In both experiments, the hippocampus was processed for immunoblot analysis to assess changes in central IR signaling and phosphorylation/expression of glutamate receptor subunits and transporters. We previously observed that LV-IRAS injection selectively downregulated hippocampal IR expression and insulin-stimulated IR phosphorylation without affecting peripheral insulin sensitivity. Additionally, LV-IRAS animals showed reduced hippocampal basal glutamate levels and decreased phosphorylation/expression of glutamate receptor subunits. In this study, vesicular glutamate transporter 2 (vGluT2) expression, but not vGluT1, was significantly decreased in the hippocampus of LV-IRAS animals after INI administration. In the other cohort, age- and dosing paradigm-dependent effects were observed vis-à-vis IR signaling and glutamate receptor phosphorylation/expression. More studies are needed to fully understand the mechanistic changes following INI and to determine the most effective treatment strategies, but these data indicate that INI may improve cognition through the enhancement of IR signaling in the brain and/or through exerting synaptic effects on glutamate neurotransmission. It is important to understand the mechanism of action, as INI could eventually be used in the broader clinical setting to treat ARCD.

Everhart, Kayla

Mentor(s): Dr. Robin Dail, Dr. Sara Donevant, Dr. Victor Iskersky, Dr. Michael Wirth

A National Survey to examine blood transfusion practices in early preterm infants

Background/significance: Over 100,000 early preterm infants are born annually in the United States (US) and suffer morbidity and mortality during hospitalization in a neonatal intensive care unit (NICU). Necrotizing enterocolitis (NEC), a devastating gastrointestinal disorder is one such morbid condition. Another acute morbidity is anemia in preterm infants due to frequent laboratory testing. Anemia requires correction with a packed red blood cells (PRBC) transfusion. Researchers have found an association between NEC and PRBC transfusions in preterm infants; the etiology is unknown.

Purpose: To examine standard practices for PRBC transfusions in NICUs across the US to suggest possible links between NEC and PRBC transfusions in preterm infants.

Methods: Based on a literature review and NICU experience, we developed a survey using RedCap software. Surveys were advertised through social media and a one-time email blast to US NICU nurses, with gift cards offered as incentives. Participants completed surveys over the internet.

Results: Over 4 weeks, 757 surveys were attempted; 521 were completed. Over 90% of the respondents

represented level III-IV NICUs from 47/50 states. The mean age of respondents was 32 years (21-66, SD 0.42). Results revealed consistencies in frequency and manner vital signs were assessed. Data revealed considerable differences in feeding protocols around transfusions amongst NICUs with feedings given full or reduced volume, or not at all during the transfusion. Results revealed differences in criteria for transfusions, with clinical indication or at the preference of the shift clinician as determining factors. Only 10.2% (53) of respondents indicated they warmed PRBCs prior to infusion; however, only 2.1% used blood warmers.

Conclusion: Survey results indicate wide variation in practice for PRBC transfusions for preterm infants in NICUs across the US. Future research should examine variations in practice in relationship to the incidence of NEC in infants who receive PRBC transfusions.

Flannery, Anne

Mentor(s): Dr. Steffen Strauch

The MUSE Scattered-Particle Scintillators

The MUon Proton Scattering Experiment (MUSE) at the Paul Scherrer Institute will measure the

muon-proton and electron-proton elastic cross sections in the same experiment. The scattered-particle scintillators (SPS) are part of the event trigger and help with the particle separation and

reaction identification via time-of-flight (TOF) measurements. These detectors are made out of organic plastic scintillators (EJ-204), which are up to 220-cm long, and are read out with Hamamatsu R13435 photomultiplier tubes. This presentation will discuss methods to determine the energy calibration, signal attenuation, and thresholds of the SPS detectors.

This material is based upon work supported by the National Science Foundation under NSF PHY-1812382. The MUSE experiment is supported by the Department of Energy, National Science Foundation, Paul Scherrer Institut, and the US-Israel Binational Science Foundation.

Fu, Lan

Mentor(s): Prof. Song Wang

Deep Learning for Object Detection in Material-Science Images

Deep neural networks and deep learning have achieved great success in many signal and image processing applications, especially those with large-scale annotated training data for supervised learning. While in principle, deep-learning methods can be applied to boost the performance of processing material-science images, i.e., microscopic images that capture important micro-structures of various material samples, many domain priors and requirements in materials science must be considered to maximize the performance gains in processing those microscopic images. In this research, we focus on the important problem of detecting objects of interest from microscopic material-science images and introduce different approaches to incorporate several such domain priors, including object shape, symmetry, and 3D consistency, in deep learning. In particular, we explore the use of these three domain priors to enable the network training with less data annotations, which is highly desired in materials science. This tutorial-style article will summarize the contributions in the literature as well as our current research achievements and we hope it can provide an initial insight to new researchers who are interested in using deep learning for material-science image processing.

Gange, Gayathri B.

Mentor(s): Prof. Dmitry V. Peryshkov

Metal free bond activation by carboranyl phosphine ligands

Catalytic bond activation reactions are important in organic synthesis in many research fields such as synthesis of pharmaceuticals, dyes, and plastics. A diverse range of these industrial catalysts is based on precious metals such as palladium, rhodium, iridium, and platinum which have demonstrated great efficiency due to their aptitude to perform multielectron transfer reactions. In recent years, metal-free catalysts have attracted increasing attention as an alternative approach to overcome the most common issues of these transition metal catalysts such as high cost, toxicity, and low abundance issues. In boron cluster chemistry, the unique electronic structure of carborane cages allows them to reversibly accept two-electrons which is analogous to transition metal reactivity. We utilized this ability of carborane for the cage-driven activation of strong bonds by incorporating the exohedral centers of these clusters with phosphine moieties. Thus, we discovered a novel type of metal-free strong bond activations that are driven by the unusual electronic properties and rearrangement of boron clusters (carborane). Herein, metal-free activation of a range of substrates including alkynes, hydrides, and boranes by carborane-based compounds will be introduced. The flexibility of boron cage contraction/expansion and its influence on the reactivity of phosphine substituents in this study represents a new approach to cluster-induced organic transformations which are not accessible employing conventional organic entities.

Garcia Walther, Julian

Mentor(s): Dr. Nathan Senner

The Effects of Sea Level Rise on the Future Distribution of Red Knots in Northwest Mexico

Global sea levels are predicted to rise between 0.3 and 1.2 m over the next century. At the ecosystem level, sea level rise (SLR) will alter intertidal habitats by causing geomorphological and geochemical changes, habitat loss, and coastal squeeze due to inundation. However, at the species level, the responses to these changing conditions are not well understood. In this study, we assess the effects of SLR on the habitat suitability of red knots (*Calidris canutus roselaari*)—a long-distance migratory shorebird that spends its non-breeding season in Northwest Mexico. To model the current habitat suitability, we used red knot presence data derived from field surveys, satellite transmitters and eBird citizen science observations, in conjunction with environmental covariates known to be of importance for the species. We calibrated the future habitat suitability of red knots by using a moderate SLR scenario for the year 2050. Elevation and distance to the coast were the best predictors of red knot distribution, with higher suitability at low elevations and proximity to coastal wetlands. We found that up to 35% of current coastal wetlands in NW Mexico may be at risk of inundation by 2050. Future habitat suitability models predict that, on average, two thirds of the region's wetlands will decrease their suitability for red knots by up to 25%, and one third of the wetlands may gain up to 30% suitability by 2050. Of the ten wetlands known to host large concentration of red knots, all of them are predicted to decrease their habitat suitability by 2050. While our models do not incorporate biophysical feedbacks (e.g., marsh migration) that may increase the resilience of the wetlands to SLR, our results suggest that the size and quality of the red knot's potential distribution will decrease in the future. In combination with increasing coastal development and anthropogenic disturbance, these predicted changes suggest that the potential distribution of red knots will further shrink, which may exacerbate their population declines.

Gebere, Mengistu

Mentor(s): Dr. Azhar Mohamad, Dr. Aniket Bhattacharya, Mr. Ahmad Mohammed, Dr. Jason Kubinak,

Protective and Preservative role of Transforming Growth Factor Beta 2 (TGFβ2) in Postnatal Aorta of Mice

Aortic aneurysm is defined as a permanent localized dilation of the aortic lumen with a propensity of dissection and rupture, which result in massive and often fatal internal bleeding. Heterozygous transforming growth factor beta2 (TGFB2) mutations causes Loey-Dietz syndrome4 (LDS4). These patients develop aortic aneurysm and dissection, and aortic rupture. There is mouse model of LDS4 aneurysmal pathology. Our aim was to study the role of TGFβ2 in aortic homeostasis by knocking out Tgfb2 in vascular smooth muscle cells (VSMCs) of postnatal mice. Male mice with Myh11creERT2 and mTmG (+/-) transgenes and homozygous TGFβ2 conditional ready allele (Tgfb2,1c/1c) were used for this study. At 4-week postnatal age mice were injected with 1mg/mL of tamoxifen for 4 days. Aortas were collected from 2 to 8 weeks of post tamoxifen injection. 10 um frozen sections for cell tracing analysis and 7 um of paraffin sections were made for histological and immunohistochemical analyses. Histological examination of aorta from VSMCs Tgfb2 conditional knockout mice exhibited aortic dissection and aortic rupture. Intramural hematoma and aortic dissection with false lumen were observed mostly in descending aorta. Trichrome stain indicated deposition of collagen in the medial part of aorta of Tgfb2 conditional knockout mice. Immunohistochemistry and in situ hybridization analyses indicated hyperactivation of TGFβ signaling exhibited by increased expression of TGFβ1 and pSmad2. This may be attributed to compensatory or protective response during aortic dissection. Elevated expression of TGFβ1 may be associated with hyperproliferation of VSMCs and infiltrated hematopoietic and myeloid derived immune cells into the dissected part of media. We conclude that TGFβ2 plays a crucial role in maintenance of structural integrity of the aorta and keeping vascular smooth muscle cells in their differentiated state. Protective compensatory processes accompanied by infiltration of immune cells resulted from disruption of TGFβ2 function. Though the medial degeneration and aortic dissection seen in these mice resembles the pathophysiology of both Marfan and Loey-Dietz syndromes, our model specifically shows the effect of TGFβ2 disruption as the cause of aortic aneurysm and dissection, and aortic rupture.

Gonzales, Shelby

Co-Author(s): Ayan Mitra

Mentor(s): Dr. Michelle Bryan

A Systematic Review of Conventional and Expanded Adverse Childhood Experiences (ACEs) in Diverse Populations: What does the Future of Neuroscience Research Hold?

Adverse Childhood Experiences (ACEs) are forms of abuse (physical, emotional, and sexual), household challenges (substance abuse and household instabilities) and neglect (physical and emotional) that can predict long-term physical and mental health outcomes in adulthood, as well as early mortality (Anda et. al., 2006). The initial ACEs study primarily dealt with white, middle/upper class which narrows the scope and generalizability of the study to diverse and minority populations. Some current studies have explored community level stressors along with household challenges and expanded the definition of Conventional ACEs to Expanded ACEs (Wade et. al., 2015) work to apply these. However, the potential to situate this research within a neurodivergent framework and its long-term implications on the brain is untapped. In this systematic review we looked at the existing literature on ACEs and diverse/minority populations in order to suggest possible correlations and future studies with trauma-induced changes in the brain. Areas of the brain that are implicated in stress response are the amygdala, hippocampus, and the prefrontal cortex. Traumatic stress has been found to leave permanent impressions on the brain (Bremner, 2006). Research has also shown that traumatic experiences in childhood often interrupt brain development, especially in relation to the formation of neural pathways (or their non-formation) which further leads

to functional impairments. Consequently, some of these can alter the mental, emotional and behavioral health along development of the brain extending up to adulthood. Specifically, areas of the brain that are associated with planning and executive functions and the prefrontal cortex show lesser amounts of gray and white matter in young adults who have been found to be exposed to childhood trauma as opposed to those who did not report such experiences (Child Welfare Information Gateway, 2017).

By synthesizing the knowledge of ACEs in a diverse population and neuroimaging, we would be able to better understand trauma-induced developmental changes in the structure of the brain in relation to Conventional and Expanded ACE

Gorman, Erin

Mentor(s): Dr. Fiona Hollis

The role of mitochondrial function in postpartum depression in rats

AIMS: While postpartum depression (PPD) is the most common complication of childbirth, affecting 20% of mothers, it remains an understudied psychiatric illness. The precise mechanisms underlying the pathology of PPD remain unclear, although many proposed mechanisms share a link with mitochondria. These highly dynamic organelles function in various cellular processes including energy production. Mitochondria are linked to trait anxiety and affected by stress, a major risk factor for PPD. Considering the importance of mitochondria in regulating brain function and behavior, we sought to identify mitochondrial dysfunction as a potential contributor to behavioral changes in a stress-induced rat model of postpartum depression.

METHODS: Using a late-gestation chronic mild unpredictable stress (CMUS) paradigm, we induced depressive-like behaviors in adult postpartum female Wistar rats. Depressive- and anxiety-like behaviors were measured in the early postnatal period using sucrose preference test (SPT), elevated plus maze (EPM), and forced swim test (FST). Maternal care was assessed using a pup retrieval task. Immediately following euthanasia on postnatal day 11, mitochondrial respiratory function was measured in prefrontal cortex (PFC), nucleus accumbens (NAc), and cerebellum (Cb).

RESULTS: We report that pregnant stressed (PS) dams exhibited behavioral differences in maternal care, sucrose preference, and forced swim test compared to controls. Interestingly, gestational stress decreased coupled respiration and maximum respiratory capacity in the PFC, but not the NAc or Cb of PS dams.

CONCLUSION: Our findings highlight an association between PFC mitochondrial respiratory activity and depressive-like behaviors following gestational stress. Further experiments will determine the nature of this association.

Guo, Wenyu

Mentor(s): Prof. Yang Wang

Between Two Worlds

Asian American Children (Re)negotiate Bicultural Identities through the Analytic Window of Children's Literature -- Building on AsianCrit, reader response theory, and the critical literacy perspective of literacy and identity, my study investigates how Chinese American elementary-aged children respond to children's literature which portray contemporary Chinese American people's lives and cultures in a community-based literary club. Specifically, this study explores how Chinese American children (re)construct and (re)negotiate their bicultural identities through reading, responding, and discussing culturally relevant picture books with peers and researcher in the community-based literary club. Thus, our qualitative case study seeks to answer the following research questions: 1) How do second-generation Chinese American elementary-aged children respond to picture books that portray contemporary Chinese American lives and cultures? 2) How do Chinese American children (re)construct and (re)negotiate their bicultural identities through reading culturally relevant picture books in the community-based literary club?

Hagan, Tiffani

Mentor(s): Dr. Amy Lehman

What is Production Dramaturgy? An Introduction to Production Dramaturgy through She Kills Monsters: Virtual Realms

This presentation will answer the question, “What is a production dramaturg?” by showcasing the ideas behind production dramaturgy and what it means to hold that position within a theatre. Production dramaturgs work within a theatrical production team to help bring the words of a play or musical from the page to the stage through research and in-depth knowledge of the text. This presentation will utilize my work as production dramaturg for the 2020 production of *She Kills Monsters: Virtual Realms*. For this play, I was able to serve as a virtual production dramaturg, and this presentation will also touch on the changes that were necessary to move to a virtual world due to COVID-19.

Hall, Sarah

Mentor(s): Dr. Subrahmanyam Bulusu

Surface Freshwater Fluxes in the Arctic and Subarctic Seas During Contrasting Years of High and Low Summer Sea Ice Extent

Freshwater (FW) flux between the Arctic Ocean and adjacent waterways, predominantly driven by wind and oceanic currents, influences halocline stability and annual sea ice variability which further impacts global circulation and climate. The Arctic recently experienced anomalous years of high and low sea ice extent in the summers of 2013/2014 and 2012/2016, respectively. Here we investigate the interannual variability of oceanic surface FW flux in relation to spatial and temporal variability in sea ice concentration, sea surface salinity (SSS), and sea surface temperature (SST), with focus on years with summer sea-ice extremes. We find that in 2012, a maximum FW flux of $0.32 \times 10^3 \text{ m}^2\text{s}^{-1}$ passed over a large portion of the Northeast Atlantic Ocean at 53°N . FW flux also has a decreasing trend through the Fram Strait over this time period. We also find that in years with high (low) sea ice extent, the relationship between SSS and SST (sea ice concentration) was most coherent on timescales of 1-6 months in the North Atlantic. This study highlights the large changes currently happening in the Arctic and Subarctic Seas and the importance of continued remote sensing monitoring of key variables to understand the dynamics behind these ongoing changes. Observations of FW fluxes through major Arctic routes will be increasingly important as the polar regions become more susceptible to warming, with major impacts on global climate.

Hall, Cooper

Mentor(s): Mrs. Amy Wardyn

Exploration of Patient Communication Preference Regarding Reclassified Genetic Test Results

Genetic testing is becoming increasingly used to detect individuals who are predisposed to developing cancer. If genetic testing identifies a variant in an individual’s DNA, the testing laboratory uses available data to classify the variant as either disease-causing or benign. When limited data is available regarding a variant’s pathogenicity and the risk of cancer for an individual is not clear, the variant is classified as a “variant of uncertain significance” (VUS). If new data is discovered, the VUS may be reclassified. There is a gap in current literature regarding desired communication for a reclassified genetic test result. There are no standard guidelines for healthcare providers regarding communication of a reclassified VUS results. This study aimed to explore communication preferences of past Prisma Health patients with a VUS result on cancer genetic testing. A total of 34 participants responded to the anonymous online questionnaire. Participants reported telephone call by a genetic counselor as the most preferred communication for an upgraded VUS result and a letter in the mail as the most preferred communication for a downgraded VUS result. There was no significant difference in communication preferences for upgraded versus downgraded VUS results. A majority of participants reported mild concern regarding their VUS result. Overall, this

study determined that patients want to be contacted regarding a reclassified VUS result, but there is no clear consensus on the most preferred method.

Hasan, Samiul

Mentor(s): Dr. Iftikhar Ahmad

Boron Aluminum Nitride: A new material for superior performance of III-Nitride UV- LED

Recently, researchers around the world have been working on a new and neglected member of the III-Nitride family, Boron Nitride (BN), and its alloys with Aluminum (Al). It has already shown to improve the efficiency of ultraviolet light emitting diodes (UV-LEDs) along with some other potential applications. At the University of South Carolina (UofSC), we have grown this material system using metal-organic chemical vapor deposition (MOCVD). Our poster will show the results of the MOCVD growth of BN and BAlN, and their characterizations. We will show how these materials can drastically improve the efficiency of UV-LEDs that have large number of applications in science and technology. We will highlight the challenges the scientific community is facing in the development of BAlN. Finally, we will describe the present and future applications of the new material system.

Hayes, William

Mentor(s): Dr. Douglas Wedell

Attention to predicted outcomes versus feelings influences outcome encoding in human reinforcement-learning

Decision makers often compare the outcomes of their choices to what would have occurred if they had chosen differently, a relative comparison. Relative outcome encoding can function well in stable contexts, but it can lead to suboptimal decisions in new contexts. Encoding absolute outcome values allows decision makers to maximize performance across multiple contexts, although it increases the cognitive complexity of the task. We tested whether directing attention to predicted outcomes versus feelings associated with choice options influences learning in a choice task. Participants completed an initial learning phase that involved repeated choices between two (Experiment 1) or three (Experiment 2) options at a time with full feedback on obtained and forgone outcomes. Choice options were nested within stable contexts so that participants only encountered a small set of the possible combinations during the learning phase. Their goal was to learn to choose the options that yielded the highest reward. On half the trials a third of the participants rated how they felt about a particular option (Feelings condition) while another third estimated how much they expected to win from a particular option (Outcomes condition). The final third did not make any ratings or estimations (Control). Participants then completed a transfer test in which they made repeated choices between all possible pairs of options without feedback. Results from the learning phase showed that all three groups were able to learn which options were best within each context. When options were extrapolated beyond their original contexts in the transfer test, participants in the Outcomes condition made a significantly higher proportion of correct choices than those in the other two conditions. These effects were explained by a reinforcement-learning model in which participants in the Outcomes condition encoded absolute outcome information to a greater extent than those in the other two conditions, who primarily encoded relative information. Our findings suggest that people may make suboptimal decisions in novel contexts if they are guided by feelings and associations that were formed in original learning contexts, but focusing attention on predicted outcomes can mitigate this tendency.

He, Xiaofei

Mentor(s): Dr. Jing Fang

FUNCTION OF GPR68 IN NORMAL HEMATOPOIESIS AND MALIGNANT HEMATOPOIETIC DISEASES

G protein-coupled receptor 68 (GPR68), as a proton-sensing receptor, involves in pleiotropic physiological processes. However, its specific functions in normal hematopoiesis and malignant hematopoietic diseases were unknown. With the *Gpr68*^{-/-} mouse model, we found reduced B lymphocytes under stressed conditions, such as aging and hematopoietic regeneration. However, hematopoietic stem cells (HSC) from *Gpr68*^{-/-} mice exhibited comparable competitiveness, possibly due to the compensatory effects of *Gpr68* in non-hematopoietic cells. With *Gpr68*^{flox/flox};*Vav*-*cre*⁺ mice that *Gpr68* gene was exclusively deleted in hematopoietic tissues, we observed enhanced competitiveness of *Gpr68*-deficient HSC from aged mice, possibly through a Ca²⁺ pro-apoptotic pathway. This indicated a cell-intrinsic effect of *Gpr68* on regulating HSC function. By performing reverse bone marrow transplantation, we observed decreased frequency of B cells when *Gpr68* was deleted in the microenvironment of HSC (i.e. HSC niches), indicating that the function of *Gpr68* in non-hematopoietic cells was correlated with B cell formation.

Additionally, GPR68 was overexpressed in acute myeloid leukemia (AML) and associated with aggressive outcomes. By screening a series of pharmacological inhibitors that target Ca²⁺ sensitive apoptotic molecules, we identified that *Gpr68* was essential to maintain AML cell survival through activating the Ca²⁺/calcineurin pathway. To explore the therapeutic potential of GPR68 in AML, we studied the combined effects of GPR68 inhibitors with other drugs, i.e., chemotherapeutic drug Cytarabine (Ara-C) and BCL-2 inhibitor Venetoclax (VEN). We found that GPR68 expression was associated with sensitivity to Ara-C and VEN. Mechanistic studies revealed that chemotherapeutic agents enhanced GPR68 expression, while glycolysis increased GPR68 activity, which was associated with GPR68-mediated resistance to Ara-C. In addition, GPR68 collaborated with BCL-2, leading to enhanced oxidative phosphorylation that was associated with resistance to VEN. In summary, inhibition of GPR68 would improve the function of HSC and induce apoptosis of AML cells. Our studies indicated that the potent effects of GPR68 inhibitors in improving drug sensitivity of AML cells made GPR68 a potential therapeutic target.

Hodge, Julia

Mentor(s): Dr. Gregory Trevors

First-Generation Student Support: Exploring Imposter Phenomenon, Self-Efficacy, and Test Anxiety

This longitudinal mixed-method study examines first-generation students (FGS) from a new angle, using the lens of the imposter phenomenon (IP) and the impact of a support program tailored to this population. The Opportunity Scholars Program (OSP) serves low-income, first-generation in-state students. The program promotes retention for low-income FGS. It is worthwhile to evaluate whether and to what degree such a program affects IP among FGS. Specifically, the following research questions guided the study:

RQ1. Do first-generation students report higher rates of IP and test anxiety and lower rates of academic self-efficacy compared to non-first-generation students?

RQ2. In what ways does a comprehensive academic support program affect the degree of IP, test anxiety, and academic self-efficacy among first-generation students?

The random sample consisted of three different groups: non-FGS, FGS, and first-generation OSP students. IP, academic self-efficacy, and test anxiety were assessed via self-reported scales at the beginning of the semester, Time 1 (n=153) and at the end of the semester, Time 2 (n=99) to estimate the effect of OSP on the subsample who experience it in comparison to the other two groups.

ANOVA and RM ANOVA showed at Time 1 FGS in OSP had higher levels of IP and lower levels of academic self-efficacy compared to non-FGS as expected (RQ1), but this difference was not observable at Time 2 (RQ2). Paired-samples t-tests were conducted to compare IP, self-efficacy, and test anxiety in each group

for Time 1 and Time 2. Compared to Time 1, IP was higher for FGS not in OSP; $t(34)=2.45$, $p=.02$, and test anxiety was higher for non-FGS; $t(30)=2.18$, $p=.038$ at Time 2. With no significant increases in such factors for OSP students, OSP may be viewed as a protective factor for FGS that promotes resilience against IP and anxiety. This tentative conclusion will be further explored in interviews with a subset of students to gain a deeper understanding. Both quantitative and qualitative results will show important insights into risk factors for this growing population of students and the ways universities can better support their success.

Hohn, Julia

Mentor(s): Dr. Wayne Carver

Optimization of porcine internal thoracic artery decellularization

Despite enormous clinical potential, the impact of advanced biomaterials on tissue engineering and regenerative medicine have been somewhat limited, in part because of a lack of systematic, data-driven optimization of these materials for specific engineering applications. The need for optimized replacement materials is particularly evident in vascular engineering where over 600,000 damaged and diseased blood vessels are replaced annually. Unlike larger blood vessels, which are effectively replaced by synthetic materials, small diameter blood vessels are prone to fail when replaced by purely synthetic materials. Due to the large number of vascular bypass surgeries performed annually and the lack of sufficient graft materials, there is a critical need for the development of “off-the-shelf” options that could be efficiently and effectively used for replacement of small diameter blood vessels. Ongoing studies are being carried out to optimize the decellularization of porcine internal thoracic arteries to generate small diameter vascular grafts. The effects of a wide range of anionic detergent concentrations and treatment times are being evaluated on decellularization efficiency and the biomechanical and structural properties of resulting scaffolds. The present studies demonstrate that increasing ionic detergent concentration to a certain threshold enhances the removal of cellular proteins while preserving the native structure, biomechanical properties, and composition of the extracellular matrix. However, the treatment of tissues with excessively high concentrations of ionic detergent have resulted in residual detergent in the scaffolds, which can result in cytotoxic effects during the recellularization process. Ongoing studies include the use of supercritical carbon dioxide as a method to enhance the removal of cellular components and detergents from the scaffold.

Holloman, Bryan

Mentor(s): Dr. Mitzi Nagarkatti, Dr. Prakash Nagarkatti

Single Cell Profile of LPS-Induced Acute Respiratory Distress Syndrome shows an increase of Reg3g, Scgb1a1, and Scgb3a expression with I3C treatment

Acute lung injury and acute respiratory distress syndrome (ALI/ARDS) are clinical disorders that manifest from the inflammatory response in the lungs due to direct and indirect activation of the immune cells. The aggressive reaction of immune cells directly impact disease severity, leading to alveolar damage, breakdown in the lung epithelial cell barrier, and impaired pulmonary functioning. Interestingly, the aryl hydrocarbon receptor has been shown to regulate Th22 and lung progenitor cell differentiation, which play a crucial role in reparative re-epithelialization and lung maintenance. Our studies aim to determine if indole-3-carbinol, a naturally occurring AhR ligand, promotes accurate barrier reconstitution and restores lung functioning through differential regulation of epithelial genes and immune-mediated mechanisms. Towards this, 5mg/kg of LPS was intranasally administered in C57BL/6 mice to induce ALI, and the mice were treated with 80mg/kg I3C i.p. three hours after disease induction. After 48 hours, mice lung compliance was tested using Buxco plethysmography, and it was noticed that LPS + I3C treated-mice have similar basal functionality to naïve mice. Histopathological analysis revealed that I3C prevented atelectasis and poorly organized epithelium repair in LPS-administered mice. Furthermore, I3C increased

the population of Th22 cells and increased the expression of IL-22 in bronchoalveolar lavage fluid, which are mediators of re-epithelialization and antimicrobial peptide production. Single-cell RNA sequencing showed that LPS + I3C treated-mice had upregulation of Scgb1a1, Scgb3a1, and Reg3g, genes expressed by club and nonciliated secretory cells, variant Clara cells, and lung progenitor cells. IL-22 regulates Reg3g. In conclusion, our studies suggest that I3C alleviates lung injury and impaired pulmonary compliance by restoring lung epithelium, which may be mediated by IL-22 and epithelial-associated genes Reg3g, Scgb1a1, and Scgb3a.

Huang, Rongjie

Mentor(s): Prof. Stella Self

Associations Between Food Insecurity and Pregnancy Outcomes in a Low-Income Population

This project explores associations between food insecurity and pregnancy outcomes, including gestational weight gain, gestational age at delivery, gestational hypertension, gestational diabetes, birthweight, preterm birth, and Cesarean delivery. The data consists of 2350 patients from the Centering and Racial Disparities study performed at Prisma Health Upstate in South Carolina; 81.5% of study participants were Medicaid recipients. In addition to pregnancy outcomes, demographic information, body mass index (BMI), and home addresses were obtained for all patients. Food insecurity was assessed directly with five survey questions that were used to create a food insecurity score ranging from 0 to 5. Food insecurity was also assessed indirectly by determining which patients lived in a food desert (as defined by the United States Department of Agriculture) during pregnancy. We found there was no association between living in a food desert and food insecurity score as measured by the survey, suggesting that living in a food desert may not be a good proxy for food insecurity among low-income populations. Multivariable regression models were used to evaluate associations between food insecurity and pregnancy outcomes. After adjusting for age, BMI, race, ethnicity, and medical insurance class, there was a significant positive association between food insecurity score and gestational hypertension (adjusted OR = 1.37, CI = (1.09, 1.73)). Adjusted analyses also found that patients living in a food desert delivered significantly larger infants (57.97 grams larger, CI = (7.19, 108.75)), were less likely to experience preterm birth (adjusted OR = 0.68, CI = (0.50, 0.92)), and more likely to have a Cesarean delivery (adjusted OR = 1.27, CI = (1.01, 1.59)). While these results suggest that food insecurity may be associated with increased risk of gestational hypertension; further analysis is needed to determine the reasons for this association, including the role of stress as a positive mediator. As our analysis suggests low-income patients living in a food desert are no more likely to experience food insecurity than similar patients not living in a food desert, more studies are needed to determine the reasons for the observed differences in pregnancy outcomes between these two populations.

Hutchful, Frances

Mentor(s): Prof. Allison Marsh, Dr. Breanne Grace

The Dilemma : An Analysis of Deciding Factors and Experiences of Africans Considering Applying for Graduate School Abroad.

This study was conducted during the 2020-2021 pandemic period. It fills the gaps in research that talk about African immigration to developed countries. However, there seems to be very little data on deciding factors for emigration especially among the youth. Many studies also focus on surface information such as whether or not people are willing to migrate and potential destinations they will consider, without delving into reasons why or why or not (Appiah-Nyamekye, J., Logan, C., & Gyimah-Boadi, E., 2019). This report captures data concerning happenings in the United States concerning immigration laws within the said time period, the global educational system, and how the African community was reacting to this. Answering the following three research questions, the research hopes to report findings of African university students and graduates flirting with the idea of applying for graduate school in the U.S. and other

destinations. The study includes a comparison of the U.S to other countries with more student-friendly immigration rules, a section that ranks the most influential information sources in the application process, and an attempt to help graduate schools understand the African target audience in their bid to construct marketing or social media strategies to increase application rates.

Research Question 1: What factors relate to a graduate in Africa applying to graduate school in the U.S.

Research Question 2: Are African students more likely to apply to other countries for graduate school than the U.S?

Research Question 3: Which information sources are relevant in the school selection process?

This study stands out because it took place in a season of change and uncertainty. We sought to record the reconstruction of mindsets and opinions that African youths have had about schooling destinations. Participants for this study had to fit a criterion, if not, the SONA system kicked them out. The conditions to satisfy were:

1. African
2. Residing in Africa
3. Graduate or current undergraduate.
4. Considering pursuing post-graduate studies even slightly

This research project aims to bring a unique perspective on the subject of higher education, immigration, and all that happens in-between from students in the African continent.

Hwang, Kyungjin

Mentor(s): Dr. Lenny Sanchez

Investigating Young L2 Learners' Multimodal Reading Response Using Transactional Theory

Drawing on Rosenblatt (1978)'s transactional theory of reading-response and Kress (2003)'s multimodality theory, this research examines how digital multimodal texts provide second language (L2) learners with opportunities to engage in their L2 learning. This study has two research questions: (1) How do the L2 learners respond to a digital multimodal text? (2) What roles do the learners play in multimodal reading-responses?

The two participants, 9-year-old James and 7-year-old Emily, are siblings and they were native English speakers born in the United States. They have joined in a 10-week long project of learning Korean with digital multimodal texts — YouTube videos. I have provided the participants with a variety of Korean-based YouTube videos to watch each week. This current paper is a part of the project.

In this paper, I use a video related to Korean history titled "Dividing Korea into North and South" on Korean history. The video is about five minutes long with subtitles. The children can understand and interpret the meaning of the video through various modes like language, image, gesture, gaze, body posture, sound, music, and speech. They talk about the meaning they form and as a final step, they write a multimodal journal.

Data include audio-recorded class conversations and children's multimodal journals. The data offer a snapshot of how they respond to the digital multimodal text. For analysis, I first employ discourse analysis (Gee, 2010) to glean a fine-grained understanding of the collected data. Then, I do the data analysis with "open coding" (Strauss, & Corbin, 1998) to generate codes to capture different reading responses, which culminated into different categories. In subsequent cycles, I conduct holistic coding (Saldana, 2013) to categorize chunks of data that eventually culminate into themes.

The results show how the two children respond to the digital multimodal text based on their social, emotional, and personal context. They respond as follows: responding like an expert with experience and knowledge; responding like a curious questioner; responding like an artist using multiple modes. This study highlights the importance that language learning centered on multimodality and reader response can influence dynamic transactions between readers and texts.

Jacobs, Andrew

Mentor(s): Dr. Sheri Silfies, Dr. John Gilliam

Test- Retest Reliability of Trunk Muscle Force Modulation Protocol

Background: Low back pain (LBP) is the most common chronic pain in the United States. Impairments in back muscles of individuals with LBP include decreased strength and endurance (muscle capacity) and altered motor planning and activation patterns (neuromuscular control). Muscle force modulation is one aspect of neuromuscular control that has limited investigation. This study sought to establish reliable methods for assessing trunk extensor force modulation. Methods: Twenty-nine healthy participants were tested (15 males, mean age of 24.5) using three dynamic force matching paradigms. Participants were positioned in a modified kneeling position with their pelvis stabilized and fitted with a harness around their shoulders that was attached to a tension load cell mounted in front of the participant. Two trials of maximum back extensor strength were performed by pulling on the load cell. The participants dynamic target force (N) range was based on their maximum strength. The three protocols challenged the participant's ability to accurately match increasing and decreasing force (20-50% max strength) and varied in number of cycles (sine waves) over 45 and 60 s. Each protocol was performed twice and then repeated to measure within-day reliability. Subjects performed a second session 1-7 days apart repeating the same protocols. The accuracy of force modulation was calculated as the root mean square error (RMSE) between the target force and subject generated force. The RMSE was used to determine the within- and between-day reliability by calculating the ICC (Intraclass correlation coefficient) and minimal detectable difference with a 90% confidence interval (MDD90). Results: Within-day reliability across the three protocols ranged from .77 to .95 ICC(2,2) with MDD90 ranging from 4.0 to 5.9 N. Test-retest reliability ranged from .71 to .96 ICC(3,2) with MDD90 ranging from 3.6 to 5.7 N. Discussion: Results indicate these protocols demonstrate moderate to excellent within-day and between-day reliability. An RMSE difference >4.0-5.9N and >3.6-5.7 N would need to be observed for within- and between-day changes, respectively, in order to confidently attribute differences in performance on these protocols to something other than measurement error. Moderate to excellent reliability indicates that these protocols may be used in future research.

James, Robin

Mentor(s): Dr. Victor Giurgiutiu

Nondestructive Evaluation and Structural Health Monitoring of Manufacturing Flaws and Operational Damage in Composite Structures

Advanced composite materials have begun to be used extensively in the manufacturing of aerospace structures. Composite aerospace structures can develop complex types of damages during the manufacturing stages and operational lifetime. This creates an indispensable demand for appropriate nondestructive evaluation (NDE) and structural health monitoring (SHM) methods that are tailored to specific types of damage. This work addresses innovative methods for NDE and SHM of manufacturing flaws and operational damage in composite structures.

For the NDE of manufacturing flaws in carbon fiber reinforced polymer (CFRP) composites, an eddy current testing (ECT) NDE method has been developed by conducting multiphysics modeling and simulation

of ECT detection of different types of manufacturing flaws. In addition, extensive experiments have also been conducted on in-house manufactured composite specimens with embedded manufacturing flaws, and specimens obtained from Boeing which had realistic manufacturing flaws.

To validate NDE and SHM methods, controlled impact testing experiments have been conducted on quasi-isotropic CFRP composites of increasing thicknesses (2-mm, 4-mm and 6-mm) to create approximately 1" impact damage diameter. The impact testing experiments were conducted with increasing energy and it was observed that it was easier to experimentally obtain the desired impact damage size in thin composites compared to thicker composites. Each impact damage was characterized using ultrasonic NDE, X-ray micro-computed tomography (CT) and contact profilometry methods.

A pure mode guided wave excitation method using a variable angle beam transducer (ABT) as the excitation, and a phased array transducer (PAT) as the receiver, has been developed. This method has been used for exciting pure SH0 mode guided wave in quasi-isotropic composites for the detection of impact damage. Experiments have demonstrated that the presence of impact damage in thin composites leads to an amplitude drop in the received signal. On the other hand, in thicker composites, in addition to the amplitude drop, we can also observe mode conversion.

An in-situ acoustic emission recording method for impact damage ascertainment has been implemented. This method utilizes a quasi-isotropic composite coupon which has been instrumented with four piezoelectric wafer active sensors (PWAS) to record real-time acoustic emission signals during an impact event.

Jayaweera, H. D. A. Chathumal

Mentor(s): Prof. Dmitry V. Peryshkov

Bond activation of small molecules by ruthenium (BB)-carboryne pincer complex

Carboranes are icosahedral boron-carbon molecular clusters that have gained attraction as multifunctional ligands due to its unique geometry, electronic properties and functionalization. Transition metal carboryne complexes which are the boron analogues of benzynes where two neighboring atoms of the cluster are coordinated to a single metal center have become attractive systems in studying the reactivity of metal-boron bonds. The highly strained and electron-rich metal-boron bonds in the (BB) >Ru metallacycle can act as nucleophilic reaction centers in bond activation of small molecules. The pincer ligand architecture stabilizes the highly reactive metal boron-bonds in these carboryne complexes. We have synthesized a novel ruthenium (BB)-carboryne benzonitrile complex to overcome the drawbacks and to enhance the reactivity of the previously reported ruthenium (BB)-carboryne carbonyl complex. The fundamental studies of the ruthenium (BB)-carboryne benzonitrile complex in C-C bond activation of terminal alkyne, C-H bond activation of the phenyl group, both C-H and C-C bond activation of aldehydes and the N=N bond activation of azides have been studied. The reactivity trend demonstrates the analogy of transition metal benzyne complexes and (BB) >M carboryne complexes.

Jiles, Marcey

Mentor(s): Dr. Abbi Lane-Cordova

Racial Disparities in Gestational Weight Gain, Body Mass Index, and Physical Activity during Pregnancy and after Delivery

Racial Disparities in Gestational Weight Gain, Body Mass Index, and Physical Activity during Pregnancy and after Delivery

Marcey Jiles, Zoe Rhodes, William Tucker, Brooke Wilson, Lohita Kollipara, Paige Wilbanks, Abbi Lane-Cordova

Background & Purpose: African American women have higher rates of obesity than white women. Pregnancy is characterized by rapid weight gain, and 48.8% of women in South Carolina exceed recommended limits. Prenatal exercise is recommended and may help prevent excessive gestational weight gain (GWG). Our purpose was to determine whether GWG and prenatal exercise levels differed between African American and Caucasian women.

Methods: We included 67 women who delivered a singleton infant 6 months- 3 years ago and were free from smoking, type 1 or 2 diabetes, or use of steroids or protease inhibitors (mean age =31.3 yrs; mean BMI= 29.5 kg/m²; 22.4% African American). Participants self-reported their exercise habits during their second trimester of pregnancy using a validated survey. GWG in their most recent pregnancy was self-reported. Height and weight were measured with a stadiometer and digital scale. Differences in mean GWG and physical activity by race were assessed using Wilcoxon ranked-sum tests and a t-test. Associations of race with exercise and GWG were evaluated with linear regression, adjusted for current BMI and gestational age at delivery.

Results: There were no differences in mean GWG or prenatal exercise by race, Table 1. There was no association of race with GWG, B =-6.28, P=0.28. Pregnancy exercise was not associated with GWG, B=-0.23, P=0.08. However, an association between GWG and BMI approached significance, B=-0.79, P<0.06.

Conclusion: The results indicated no difference in GWG or pregnancy exercise by race and no associations of race or pregnancy exercise with GWG. However, an association of GWG with BMI approached significance. A future study should consider race differences in Institute of Medicine GWG categories defined by prenatal BMI.

Karki, Ishwor

Mentor(s): Prof. Ken Shimizu

Solid Phase Extraction (SPE) properties of monolithic poly (divinylbenzene-co-N-vinylpyrrolidone) over a wide range of monomer ratios.

Hybrid solid-phase extraction (SPE) materials, having the balance of hydrophilic and lipophilic properties (HLB), are widely popular sorbent materials in the separation science. These HLB polymers have the potential to extract polar and non-polar analytes directly from aqueous samples and to tune their extraction properties by varying the balance of the constituent lipophilic and hydrophilic monomers. However, the commonly used suspension polymerization method is only able to prepare HLB polymers with a limited range of hydrophilic monomer ratios due to the hydrophilic monomer partitioning into the aqueous phase. Thus, in this study a series of HLB polymers based on divinylbenzene (DVB) and N-vinylpyrrolidone (NVP) of widely varying hydrophilicities were prepared by the more robust monolith polymerization method. The binding capacities of the monolith co(DVB-NVP) polymers were optimized for analytes of varying polarity such as adenosine (log P = -1.5), caffeine (log P = -0.07) and p-toluidine (log P = 1.39)

as determined by batch binding studies. A varying binding performance was observed for the monolithic HLB resins having different DVB/NVP monomer ratios. Interestingly, superior binding performance was observed for the monolith polymer sorbent prepared with the intermediate 70:30 feed ratio of DVB/NVP, which had the highest binding capacity due to a balance of specific surface area and hydrophilicity. The prepared series of polymer were also tested for analyte recovery for the real world analytical application and the binding/recovery performance was found different for range of analytes like morphine, gabapentin, methamphetamine, fentanyl, buprenorphine, diazepam etc.

Keator, Lynsey

Mentor(s): Dr. Julius Fridriksson

Effects of transcranial alternating current stimulation (tACS) on language and network coherence in aphasia

Introduction

Approximately 20 to 30 percent of stroke survivors experience aphasia,^{1,2} a language disorder resulting from damage to the left hemisphere (LH). One subtype of aphasia, Broca's aphasia, is characterized by non-fluent speech and short, telegraphic utterances,³ secondary to damage to anterior cortical speech areas. Though patients with Broca's aphasia can improve with behavioral speech-language rehabilitation, 4–7 deficits often persist into the chronic stages of recovery and most patients never fully recover.

One therapy paradigm, speech entrainment (SE), yields promising improvements in speech fluency for these patients. ⁸ Unlike traditional approaches that prompt patients to produce speech (a task that is inherently difficult for them to do), SE relies on speech perception tasks involving hearing speech and seeing the mouth of a speaker (audiovisual speech) and is thought to activate residual areas of the LH.⁸

Outside of traditional behavioral approaches for rehabilitation, noninvasive brain stimulation (NIBS) techniques improve therapy outcomes.^{9–17} One NIBS method, transcranial alternating current stimulation (tACS), is unexplored as a method to boost aphasia therapy outcomes. tACS is hypothesized to entrain endogenous rhythms at the frequency of stimulation^{18,19} and induce synaptic changes via spike timing dependent plasticity^{20,21} to modulate behavioral effects. This technique has been implemented across a variety of behavioral domains including those related specifically to speech, language, and cognition in healthy controls: audio-visual perception,²² speech perception,^{23–25} and cognition.^{26–29} The current study aims to determine if tACS can improve SE performance among individuals with chronic, nonfluent aphasia.

Project Description, Design, and Approach

Applying a novel approach to rehabilitation for chronic stroke survivors, we will 1) examine behavioral and neurophysiological effects of tACS on SE performance in individuals with nonfluent aphasia and 2) investigate how lesion characteristics and neural connectivity influence behavioral and neurophysiological responses to tACS.

Anticipated Results

It is hypothesized that tACS will provide an exogenous boost of in-phase frontotemporal theta coupling to enhance frontotemporal network connectivity, facilitate neural integration, and subsequently, improve SE performance. We predict that a greater proportion of spared fronto-temporal cortical regions will yield better modulatory effects of network coherence.

Kelley, Mathew

Mentor(s): Dr. Andrew Greytak, Dr. MVS Chandrashekhar

Solution Processed Quantum Dots: Nanoscale Materials with Large Scale Applications

As global energy demands continue to grow, the urgency to develop innovations that meet and exceed them rises in parallel. This is particularly relevant in consumer electronic and optoelectronic spaces which are currently dominated by silicon-based devices necessitating costly high temperature and high purity manufacturing conditions. Solution processed alternatives such as colloidal semiconductor quantum dots (QDs) are attractive low-cost candidates for flexible, high efficiency solar cells, lighting, and many other applications, due to their favorable characteristics including size-tunable bandgap energies spanning the ultraviolet to short wave infrared, and large absorption coefficients that minimize required material thickness. These QD-based optoelectronic devices operate on the basis of efficient charge migration within QD solids, and charge separation and recombination at electrical junctions, underscoring the need for (1) processing strategies that facilitate charge transport and (2) characterization techniques that robustly interrogate charge separation at QD interfaces.

Here, I will introduce our work on the purification of near-infrared (NIR) bandgap PbS QDs by gel permeation chromatography, a repeatable post-synthetic QD purification method along the road to device fabrication. Secondly, I will describe my work on the formation and study of hybrid PbS QD/epitaxial graphene/SiC (QD/EG/SiC) devices that function as photovoltaics and as NIR detectors, where we achieve NIR responsivity due to the incorporation of NIR bandgap (~ 1300 nm), ligand exchanged PbS QD films. We utilize scanning photocurrent microscopy to reveal a characteristic transfer length (LT) for charge carrier collection across the QD/SiC interfaces, demonstrating a large-area response even with a small ohmic contact area. The scanning photocurrent measurement also allows the QD film resistivity and QD/SiC junction resistance and capacitance to be obtained by modeling the film as a lumped element transmission line. I will show that this approach can be used to accomplish spatially resolved Fourier transform impedance spectroscopy, a novel technique to quickly build and map the frequency response of optoelectronic devices using optical probes. Finally, I will describe recent work on environmentally benign semiconductor QDs, with a focus on the formulation of ligand exchanged AgBiS₂ nanocrystal inks for the direct deposition of photoconductive devices.

Khatami, Farboud

Mentor(s): Dr. Erfan Goharian

Expanding the view of sustainability beyond Carbon: The relative aggregate footprint of energy production in the southeast United States

Energy sustainability is a concept that goes beyond just the carbon emissions involved in generation processes. In this study, we calculated the aggregated footprint of various energy generation technologies in the southeast United States by considering their environmental, economic, technical, and social aspects. Further, to evaluate the feasibility of using different technologies in each state, the uncertainties associated with decision-making and available resources were also considered. The results show energies such as wind, solar, and geothermal generally have the lowest footprints in the region, where the main sources of energy production have traditionally been coal, natural gas, and nuclear energy. The feasibility of adopting different technologies in each region was also measured under multiple scenarios with the focus put on different criteria. In the end, the study provides insight on how energy supply mixes can be developed for various regions with respect to the available resources and characteristics of the region.

Khathayer, Firas

Mentor(s): Prof. Swapan Ray

Evaluation of Therapeutic Efficacy of Combination of 4HPR and SAHA In Inhibition of Growth of Human Glioblastoma T98G Cells in Zebrafish Xenograft Model

Use of xenograft of human cancer cells in animal is an important area for evaluating efficacy of new therapeutic agents. Rodent model is used long time as standard model for many of scientific researches to understanding the biology of glioblastoma, but they are not suitable for high-throughput screening for evaluating of new therapies. Our laboratory used embryo of zebrafish (*Danio rerio*) xenotransplantation of human glioblastoma T98G cells as a new animal model for studying biology of glioblastoma in vivo and efficacy of a novel combination therapy to treatment of glioblastoma cells. Zebrafish model is a relatively rapid, ease, small size, and cost-effective in vivo model of human glioblastoma. Furthermore, the immune system in zebrafish is absent until embryogenic day 9 that might make it topical animal model in xenotransplantation. Glioblastoma is the most common aggressive tumor in central nervous system. Despite the current therapies to treatment of glioblastoma that include surgery, radiotherapy, and chemotherapy, its prognosis unfortunately remains very poor. In this study, we used two drugs, suberoylanilide hydroxamic acid (SAHA) and N-(4-hydroxyphenyl) retinamide (4HPR), alone or in combination to inhibit cell proliferation and induce apoptosis in human glioblastoma T98G cells injected in the zebrafish as a new model used the first time in USC to test effective anticancer drugs. Zebrafish embryo was microinjected with fluorescence labeled T98G glioblastoma cells in zebrafish yolk sac. Glioblastoma was imaged after several days by fluorescence microscopy before and after treatment. The results showed that size of tumor grew up inside of zebrafish without treatment (control), but the size of tumor in zebrafish after treatment with 4.0 μ M 4HPR and 8.0 μ M SAHA alone or their combination was decreased. The combination of two drugs was better than a single drug in suppressing cell proliferation and inducing of apoptosis. We assessed effects of two drugs and found that 4HPR inhibited 63.92 % cell proliferation while SAHA inhibited 42.0% cell proliferation but the combination of two drugs significantly decreased glioblastoma growth to 34.4%. Our work suggested that the zebrafish xenograft model could be useful to identify the therapeutic efficacy of combination of drugs in the treatment of glioblastoma.

Kirmani, Fawad

Mentor(s): Dr. John Rose, Dr. Steven Rodney

Detecting Gravitationally Lensed Supernovae Using Machine Learning

When a star explodes as a supernova (SN) it can be as bright as an entire galaxy, but it will only shine so brightly for a few weeks or months. This makes it challenging to find these transient astrophysical events. When discovered and carefully observed, some supernovae can be used to measure cosmic distances. Sometimes the light from a distant supernova passes very close to an intervening galaxy on its way to Earth. In such cases, that galaxy can act as a gravitational lens, distorting spacetime and acting as an imperfect cosmic magnifying glass. This causes the SN to appear as two or more images in the sky—a multi-imaged SN. We are applying machine learning to the analysis of imaging data from the Legacy Survey of Space and Time (LSST) and Las Cumbres Observatory (LCO). Due to the extreme rarity of lensed SN (there are only two known examples), we have trained our deep learning algorithms on simulated LSST and LCO data with lensed SN and false positives (image artifacts). Our deep learning model identifies multiple overlapping SN images by operating directly on the pixels in these astronomical images. We are getting encouraging results from our preliminary datasets and models, achieving classification precision, recall and f1-score of 99% in our early runs. We will further iterate our data pipeline to generate more realistic simulated images, incorporate measured galaxy characteristics, further test and benchmark our machine learning models against traditional (non-ML) classification algorithms.

Kishman, Erin

Mentor(s): Dr. Xuewen Wang

Sedentary and Physical Activity Time in Women During the First Year Postpartum

During the postpartum period, 150 minutes of moderate-intensity physical activity (PA) per week is recommended. However, little is known about how many women are meeting these guidelines and if racial differences exist. The purpose of this study was to examine the time spent being sedentary and the percentage of women meeting the recommended PA guidelines during the first year postpartum. Methods: Participants were white (n= 85) and African American (n= 49) women (18-43 years), who gave birth to a singleton at ≥ 37 weeks gestation. At 6-8 weeks, 4 months, 6 months, 9 months, and 12 months postpartum, PA was measured by a hip worn accelerometer for at least 5 days. Participants were told to maintain their normal daily routine. Data was analyzed to determine time spent in sedentary bouts and MVPA. Mean daily MVPA was used to determine if participants met the guidelines of 150 minutes of MVPA per week. Results: At 6-8 weeks, 4, 6, 9, and 12 months, sedentary time was 222.96 ± 144.02 , 183.61 ± 139.5 , 182.43 ± 137.24 , 186.68 ± 141.36 , and 187.73 ± 158.17 minutes ($p \leq 0.001$ for trend), respectively. At the same timepoints, MVPA time was 39.63 ± 18.11 , 45.41 ± 20.09 , 47.01 ± 17.82 , 53.12 ± 19.92 , and 58.48 ± 26.53 minutes ($p \leq 0.001$ for trend), respectively. The percentage of African American and white women who did not meet the MVPA guideline, respectively, was 32.7% and 10.7% at 6-8 weeks, 25.0% and 6.4% at 4 months, 7.4% and 6.7% at 6 months, 17.7% and 3.5% at 9 months, and 17.7% and 1.7% at 12 months. Conclusions: During the first year postpartum, sedentary time appeared higher at 6-8 weeks than later timepoints. Time in MVPA showed an increasing trend across the timepoints. There was a higher percentage of African American than white women not meeting the guidelines at each timepoint.

Supported by: NIH Grant R21MD012740

Kupneski, Taylor

Mentor(s): Mrs. Jessica Fairey

Primary Care Provider Comfort with Utilization of Genetics in Practice

Primary care providers (PCPs) are often the first opportunity for individuals at risk for a genetic condition to be identified and they must care for patients with known genetic conditions. However, PCPs lag behind other providers in incorporating genetics into their practice. This study aimed to understand which genetics related concepts/topics PCPs (1) find relevant to practice, (2) are currently comfortable utilizing in practice, and (3) desire further education on. A mixed methods survey was sent to internists, family medicine providers, OBGYNs, pediatricians and geriatrics providers in South Carolina via email to assess this information. This included physicians, nurse practitioners, and physician assistants providing care in these fields. A total of 71 complete responses were analyzed.

The survey found that the majority of providers felt 8/13 items analyzed were relevant to their clinical practice. Furthermore, majority of providers did not feel comfortable utilizing 17/24 items (expanded from the 13 items used when assessing relevancy) in their clinical practice. For the five items that majority of respondents did not find relevant for practice, majority of respondents also indicated that they were not comfortable utilizing these items in practice. This suggests some type of correlation between perceived relevancy and provider comfort, though the exact relationship is unclear. Majority of providers reported their prior education has been inadequate for what is needed in clinic on 10/14 items questioned. It was found that PCPs were less comfortable reaching out to genetics health professionals than other specialty providers and the majority of providers were unaware of 10/13 genetics-based resources available to them. Overall, the study concluded that there are multiple opportunities for genetics health professionals to aid in furthering the education of PCPs, and specific topics per specialty and provider type were identified. Additionally, it is important for genetics health professionals to recognize the need

to aid these providers in remedying the education gap, as well as continuing to find ways to be more accessible to PCPs.

Lampe, Nik

Mentor(s): Dr. Peiyin Hung, Dr. Shan Qiao

Measuring Stigma in Sexual and Gender Minority Health Research: A Systematic Review

Stigma against sexual and gender minority (SGM) populations can increase negative health effects for SGM populations. However, there are limited metrics in SGM health research that comprehensively address the implementation of valid and reliable measures of SGM stigma. Despite the growing need for robust stigma measurements, there is a lack of construct clarity that makes comparisons across studies particularly challenging for researchers examining SGM stigma. In this systematic review, we summarize and synthesize 48 peer-reviewed studies published in English between January 2010 to December 2020 that used quantitative, qualitative, or mixed-methods to measure stigma affecting SGM communities. This review aims to systematically characterize how stigma affecting SGM communities is being measured and identify what validated and reliable stigma measurements exist in prior research. There were no restrictions on definitions, demographic characteristics, geographic location, or sexual practices of SGM study populations. Additionally, there were no limitations on the types of stigma measured. The following four databases were searched for peer-reviewed studies: PubMed/MEDLINE, PsycINFO, CINAHL, and Web of Science. In the initial search strategy, we identified 280 entries between four electronic databases, of which 28 papers with no empirical data were excluded and 4 full-text articles were excluded as publications that were irrelevant to stigma measurements for SGM populations. In total, we assessed 48 full-text, peer-reviewed articles for stigma measurements by SGM context. Of the 48 articles reviewed, we found that most studies measured stigma among gay and bisexual men (39%), were conducted in the United States (60%), used quantitative methods (96%), and examined internalized stigma (over 74%). Majority reported on validity or reliability (83%) of stigma metrics. Overall, most stigma measurements overlooked the experiences of SGM populations living beyond sex, gender, sexual binary systems (e.g., female/male, cisgender women/men, and heterosexual/gay/lesbian) and/or conflate SGM identities (90%), thus obscuring distinct concerns of bisexual, transgender, and intersex populations. Integrating sex, gender, and sexual variation and multiple ecological levels in SGM stigma measurements can further transform our understanding of associations between stress and health effects among SGM communities while filling substantial gaps in SGM health research.

Langley, Samantha

Mentor(s): Dr. Amit Almor

Limitations on Alignment to Sarcasm

The interactive alignment model (IAM) suggests that during conversation, interlocutors create similar mental representations and are primed to use similar linguistic and paralinguistic forms. IAM offers a possible explanation for why speakers use similar words, prosody, syntax, and gestures. Other research suggests that situational factors, like prior exposure to irony, may affect its production, raising the question of whether people align to ironic language. The present study aimed to address this by examining participants' tendency to choose sarcastic responses in pseudo-interactions. Participants engaged with a virtual interlocutor of their same gender and race. The virtual interlocutor started the dialogue with a printed prompt. Participants responded by selecting one possible response: agree, disagree, neutral, or sarcastic. Subsequent turns followed the discourse coherently with similar structures. Participants engaged in two dialogues of twenty exchanges each. The virtual interlocutor was either sincere or sarcastic throughout each dialogue. Participants either participated in two dialogues with the same interlocutor in both or a different interlocutor in each. We aimed to test whether the sarcasm of the virtual interlocutor would affect the participant's choice to respond sarcastically and whether changes in interlocutors would

modify this effect.

A one-way ANOVA revealed that sarcastic responses were chosen more often when the virtual interlocutor was sarcastic, $F(1, 222) = 24.14$, $p < .0001$. Additionally, we found a marginally significant interaction between first block interlocutor sarcasm and second block interlocutor sarcasm, $F(1, 216) = 2.91$, $p = .089$. This interaction was driven by fewer sarcastic responses to a sarcastic interlocutor in the second block when the first block interlocutor was sarcastic than when the first block interlocutor was sincere. In contrast, second block responses to a sincere interlocutor were not affected by whether the first block interlocutor was sarcastic or not.

In line with the IAM, participants responded more sarcastically when interacting with a sarcastic interlocutor. Based on this theory, we anticipated participants to use more sarcasm when participating in two sarcastic conversations compared to one sincere and one sarcastic conversation, but we observed the opposite. Overall, our results provide little evidence for the applicability of the IAM for sarcasm.

Leith, Gabrielle

Mentor(s): Prof. Natalia Shustova

Tailoring Donor-Acceptor Alignment in Two-Dimensional Organic Structures

Covalent-organic frameworks (COFs) are a versatile platform constructed from covalent bonds between organic linkers that typically forms a two-dimensional extended structure. Tuning the electronic properties of the material through integration of a strong electron acceptor is one avenue to modulate the electronic structure. In particular, investigating the potential of strong electron-acceptors, e.g., corannulene, 7,7,8,8-tetracyanoquinodimethane (TCNQ), and fullerene led to unforeseen revelations when combining their renowned properties with those of hierarchical extended structures. The ability to merge the intrinsic properties of two- and three-dimensional acceptors (TCNQ, corannulene, or fullerene-based derivatives) with the inherent properties of crystalline COFs foreshadows an avenue for preparation of a novel class of multidimensional and multifunctional crystalline porous materials. The rigid structure of a COF can promote donor-acceptor (D-A) alignment through covalent tethering and could potentially promote directional charge transport and energy transfer, and as a result, enhance device performance. The modularity of COFs allows for an unprecedented control of D and A moieties, that is a pressing demand for the production of optoelectronic, photonic, and spintronic devices.

This presentation will survey our progress towards tailoring crystalline porous D-A COFs possessing tunable electronic properties. Specifically, the evolution of D-A COFs revealed that the behavior of extended purely organic motifs could shift drastically from insulating to semiconducting. Such a dramatic alteration of properties portends the development of electroactive and conductive multivariate crystalline porous materials. Our results demonstrate the first steps toward utilizing crystalline scaffolds for enhancing the electronic properties with the potential to address current challenges in a plethora of areas, including optoelectronics, lithium ion batteries, and highly efficient porous electrodes.

Li, Jing

Mentor(s): Prof. Igor Roninson

Dissecting CDK8/19-dependent tumoral and stromal signaling pathways in castration-refractory prostate cancer

Prostate cancer (PCa) is the most common cancer among men and remains incurable for a significant portion of patients with advanced PCa. Androgen deprivation therapy (ADT) is given to these patients as the most effective front-line treatment but many patients will eventually progress despite the low levels of testosterone. Their castration resistant prostate cancer (CRPC) no longer responds to ADT and becomes more metastatic and resistant to other therapies. We hypothesized that Mediator kinases CDK8 and CDK19 are novel targets of treatment for CRPC and discovered that a selective CDK8/19 inhibitor (CD-

K8/19i), named SNX631, possesses a strong therapeutic efficacy in a CRPC in vivo model. SNX631 specifically inhibits the tumor growth of a CRPC cell line 22Rv1 in castrated mice but not in intact mice, suggesting a unique role of CDK8/19 in androgen-independent growth of CRPC tumors. In this project, we established single-knockout (8KO/19KO) and double-knockout (dKO) derivatives to elucidate the mechanism of action for SNX631 in 22Rv1 CRPC model. Knockout of both CDK8 and CDK19 protein does not affect tumor growth in intact mice but strongly suppresses tumor growth in castrated mice, resembling the effects of CDK8/19i. Treatment with SNX631 has no significant additional effects on tumor growth suppression in dKO xenografts, confirming that the effects of this compound are mediated by CDK8/19. Transcriptomic analysis revealed that castration induces several tumor promoting genes in 22Rv1 tumors and SNX631 treatment or CDK8/19 knockout suppress their induction. All the data indicate that CDK8/19i exert its therapeutic effects mainly through targeting CDK8/19 in tumor cells via preventing CDK8/19-dependent transcriptional reprogramming under the castration environment. Currently we are testing effects of single knockout of CDK8 and CDK19 in CRPC cells and analyzing the effects of CDK8 and CDK19 re-introduction into dKO cells on CRPC tumor growth, to determine whether CDK8 and CDK19 play the same or different roles in CRPC tumor growth.

Lipkea, Dacia

Mentor(s): Ms. Victoria Vincent

LANGUAGE INTERPRETERS' PERSPECTIVE OF THE INTERPRETER-GENETIC COUNSELOR WORKING ALLIANCE

Interpreters are an asset to the genetic counseling process as they help to bridge both cultural and linguistic gaps. For various reasons, their ability to accurately render the often-complex information discussed in genetic counseling sessions is likely dependent on their ability to establish a working alliance and collaborate with genetic counselors to overcome any challenges. Studies in other healthcare fields document the elements crucial to forming a working alliance between interpreter and healthcare provider, but little research has been done specifically investigating how to form a working alliance in the context of the specialized nature of genetic counseling. The goal of this study was to characterize the experience interpreters have had while working with genetic counselors and determine which factors are most important in establishing a working alliance. The majority of study participants characterized their overall experience working with genetic counselors as good or very good (98%). Participants thought it was most important that genetic counselors create an environment that allows both the interpreter and the patient to feel comfortable asking questions, the genetic counselor speaks at a moderate pace, pausing often to allow the interpreter to easily interpret the information to the patient, and use simple language and avoid jargon or at least provide a clear explanation of the terms when talking to the patient. Pre-sessions to discuss sensitive topics that may come up, review technical terminology, and the patient's reason for the appointment are something that participants value but don't experience very often. Participants also valued sharing with genetic counselors mutual trust, respect, and an understanding of each other's roles. The results of this study may provide guidance on establishing official guidelines on how to work with interpreters in the genetic counseling setting.

Liu, Xiaoyi

Co-Author(s): Peyton Chandarana

Mentor(s): Prof. Cindy Corbett, Prof. Jason Okean

Usability and Usefulness of a Conversational Assistant Medication Reminder Skill

Introduction: Medication non-adherence is a widespread issue in healthcare treatment outcomes. With technological advances, conversational assistants, such as "Alexa", are increasingly used as medication reminders. MedBuddy, a newly developed medication reminder application, was designed by our team to be a medication reminder system that interfaces with Amazon Echo.

Purpose: The study purpose was to assess the usability and usefulness of interactive medication reminders via software (i.e., skill), developed by our team, for use with Amazon Echo devices.

Methods: A single group with 25 female college students taking contraceptives was conducted to understand the efficacy of medication reminders via an interactive voice assistant to improve medication adherence. The skill was used to record whether participants reported taking or missing their medicine. Participants received separate alerts: 15 minutes before, at the right medication-taking time, 15 minutes after. Following 60 days of use, participants self-reported medication adherence and were interviewed about their perceptions of the usability of MedBuddy.

Results: Participants' usability experience with the skill was mixed, with 56.5% reporting a positive experience. Usability problems were primarily related to user commands not being correctly interpreted and/or heard by the Echo device. However, most participants rated the skill as useful (91.3%). Several aspects of the voice reminder and receipt were perceived as useful for promoting medication adherence. Participants' self-reported medication adherence improved post-study versus baseline. However, there was no statistically significant difference in participants' self-report of taking the medicine within a designated 2-hour time frame pre- versus post-study.

Conclusions: The study findings support the potential usefulness of virtual home assistants to promote medication adherence through hands-free voice reminders. Usability problems of the skill were primarily compromised by the inability of the Echo device to consistently understand user comments. Based on the findings, MedBuddy is being further developed with new features and expanded use to apply to a more general population. The revised skill will allow users to track their medication adherence through their linked Google Calendar as well as through a separate mobile app.

Luo, Kai

Co-Author(s): Lei Xu

Mentor(s): Prof. Chen Li

Phase-Change Thermal-Switch Based on Electro-Wetting Droplet Actuation

Thermal switches can efficiently transfer or insulate heat by a simple switchover, which is very promising for a variety of applications, such as heat distributions in spacecraft, thermal energy harvesting, adaptive building materials, and photonic devices, etc. To achieve a high switch ratio (a ratio of thermal resistance between ON and OFF states), a phase-change thermal switch based on electro-wetting droplet actuation was proposed. By changing the electric field and modifying surface wettability, droplets can be manipulated to promote or prohibit the phase-change heat transfer in a vapor chamber, thus significantly improving the switch ratio. Significant progresses have been made in last several months. Firstly, an electric grid was successfully developed on a printed circuit board with a dielectric layer made of thin plastic film (~ 0.5 mil thickness). Contact angles of droplet were then characterized under different DC voltages to determine the working condition. A relay circuit and a microcontroller were developed to control the electric field change. A smooth one-dimensional movement of droplet (as small as ~2 mm in diameter) was successfully achieved in a control manner. Secondly, components of vapor chamber were designed and fabricated. An experiment setup was built to characterize the thermal switch under ON and OFF states. Initial results and future plan will be discussed.

Ma, Xiao

Mentor(s): Prof. Robin DiPietro

Examining the impact of technology integration on employee well-being and outcomes: the moderating role of psychological capital

Smarter and more powerful technologies are leading changes in the service industry (Wirtz et al., 2021). To overcome challenges due to COVID-19, restaurants have widely adopted self-service technologies (SSTs), such as online/app ordering and/or mobile payment, that enable them to enhance off-premises and contactless capabilities (National Restaurant Association, 2021). Many restaurant operators also seek alternative business models by using service robots to deliver front-of-house customer service and perform various back-of-house tasks.

The increased adoption of both SSTs and robots may have both positive and negative impacts on employees' psychological well-being (PWB) and job-related behaviors and performances. Wright and Bonett (2007) defined PWB by the relative presence of positive emotion and the relative absence of negative emotion, such as satisfaction and stress. Wright and Cropanzano (2000) also suggested that PWB is a broad construct and can be associated with job satisfaction and workplace performance. Studies have found that the adoption of technology enhances employee productivity, facilitates customer interaction through human-robot collaborations, and pushes employees to upskill (Gray & Suri, 2017; van Doorn et al., 2017). However, it could also increase employees' work stress and induce job insecurity feelings (Lacity & Willcocks, 2016; O'Neill & Davis, 2011). Such negative emotions may impact job performance and increase hostility and withdrawal behaviors among employees (O'Neill & Davis, 2011).

Studies have shown that employees' psychological capital is linked to PWB and organizational behaviors and performances (Wen & Liu-Lastres, 2021; Bufquin et al., 2021). Psychological capital is defined as "an individual's positive psychological state of development" (Luthans et al., 2007, p.3). It can be reflected in four domains, including self-efficacy, optimism, hope, and resiliency (Luthans et al., 2007). Psychological capital can interact with employees' stress and subjective well-being and affect employees' behaviors and performance (Darvishmotevali & Ali, 2020; Roberts et al., 2011).

The purpose of this study is to develop and test a model to examine the relationship among technology integration, PWB, psychological capital, and employees' outcomes. The results are expected to contribute to the body of knowledge in technology integration in restaurants and PWB.

Mandelbaum, Jennifer

Mentor(s): Prof. Rachel Davis

Predictors of adolescents' use of food label use

Rates of obesity among youth in the United States have risen rapidly in recent decades, with recent estimates indicating that nearly 20% of U.S. children and adolescents have obesity (Body Mass Index [BMI] \geq 95th percentile), and 29.9% have overweight or obesity (BMI \geq 85th percentile). Youth with obesity are at greater risk for obesity in adulthood and a number of comorbidities, including type 2 diabetes, coronary heart disease, and cancer. Few evidence-based strategies for long-term adult weight loss exist, highlighting the importance of prevention and treatment of obesity in childhood. Previous studies suggest that the use of nutrition facts labels is associated with increased fruit and vegetable intake and reduced risk for overweight and obesity among adults. The United States introduced uniform nutrition labels in 1994 as a means of providing dietary information and improving eating practices among consumers. While several studies have assessed predictors of nutrition label use among adults, few studies have examined how adolescents use food labels and which characteristics might influence nutrition label use. This study examines food label awareness and understanding among a sample of adolescents in the United States ages 10 to 17 (n=1603).

Martin, Joseph D.

Mentor(s): Dr. Judith Collazo

Learning Disabilities and the Christian School

Christian schools across the country have the opportunity to teach students with learning disabilities, but are failing to understand, communicate, and provide for their educational needs. Because these schools do not fall under the jurisdiction of the Department of Education, learning disabled students often are denied access to services and resources provided through the Individuals with Disabilities Education Act (IDEA) and therefore parents often must choose between school choice and student services. This presentation focuses on three approaches to meet the unique needs of learning-disabled students in Christian schools: teacher intervention, parent education, and school obligation. Giving educators the tools needed to understand, identify, and address learning disabilities while dispelling myths and biases surrounding learning-disabled students is the first step in creating an inclusive educational experience for children in need. Parent education regarding learning disabilities is a necessary but often forgotten responsibility of Christian schools who seek to provide equitable opportunities for student success. Lastly, Christian schools and educators must acknowledge their obligations to their students regardless of government intervention, especially those students with learning disabilities. Research has shown that learning disabled students are in the general classroom at the highest rates in two decades, so Christian schools must address their inefficiencies and look for opportunities to create systems of equality for learning-disabled students. All students deserve a fair fight, and every teacher should be given the tools to educate, empower, and encourage all students, especially those with learning disabilities. This action-based research project will serve as professional development for educators in the author's current school setting and potentially in larger Christian school contexts.

Martinez-Muniz, Gustavo

Mentor(s): Ms. Patrice Cunningham, Mr. Aman Sumal, Ms. Emma Patton, Dr. Kandy Velázquez

The role of Interleukin-4 role in the mediation of visceral pain produced by colorectal cancer

In cancer pain, the pro-inflammatory cytokine tumor necrosis factor alpha has been shown to contribute to nociceptor sensitization. However, the effects that anti-inflammatory cytokines have on cancer pain are less recognized. Recently, interleukin 4 (IL-4) has received attention in the pain field due to its analgesic properties in conditions such as neuropathic pain. Therefore, we sought to investigate the role that IL-4 plays in cancer-induced visceral pain. We utilized the chemicals azoxymethane (10mg/kg) and dextran sulfate sodium (2%) to promote colorectal cancer in wild-type, IL-4 knockout, and IL-4 receptor KO mice. Body weight, food and water intake, and symptom score were monitored weekly. Referred somatic hyperalgesia (RSH) was measured using Von Frey filaments ranging from 0.008-6.0 g of pressure. Wild-type mice with lower pain threshold showed lower levels of IL-4 than cancer mice with higher threshold of RSH. We expect that knocking out IL-4 and its receptor will lead to a lower pain threshold. Future studies include determining the cell responsible for producing IL-4 during painful events.

Mau, Aaron

Mentor(s): Dr. Susan Lang

Novel characterization of hydrothermal dissolved organic carbon at the Mid-Cayman Rise

Oceanic dissolved organic matter is a major carbon reservoir composed primarily of persistent, refractory material. Circulation through hydrothermal systems has been demonstrated to profoundly alter this material, but the conditions that lead to its addition, removal, and alteration are poorly constrained. As a consequence, the contribution of hydrothermal systems to organic carbon in the deep ocean, and the biological and geochemical processes responsible for this input, remain highly uncertain. In January 2020, samples were collected from two hydrothermal vent fields at the Mid-Cayman Rise that have

substantial differences in host rock type, depth, and vent fluid temperature, allowing carbon fluxes and chemical transformations to be investigated over a range of physical and chemical conditions. The mafic, neovolcanic Piccard field hosts high temperature black-smoker fluids while the Von Damm field is situated atop an oceanic core complex and is influenced by ultramafic rocks that may facilitate abiotic organic matter production. Dissolved organic matter in fluids ranging from 4 - 393°C has been characterized by multiple means, including Nuclear Magnetic Resonance (NMR) and Isotope Ratio Mass Spectrometry. At Von Damm, concentrations of dissolved organic carbon isolated by solid phase extraction decreased from background seawater values proportionally with increasing temperature, while becoming more enriched in ^{13}C . At Piccard, the dissolved organic carbon in fluids of supercritical pathways had no distinguishable difference in $\delta^{13}\text{C}$ from background seawater, nor did concentrations correlate with temperature. NMR analysis of these samples indicates that Piccard fluids do not contain the thousands of compounds seen in background seawater, but instead contain a high concentration of a few compounds with specific characteristics detectable by NMR. Organic acid analysis indicates that formate is the dominant aqueous organic species in Von Damm vent fluids, with concentrations exceeding 800 μM . Our results suggest that there are radically different reaction pathways for DOC production and consumption at the Mid-Cayman Rise, which may have significant influences on deepwater carbon cycles and implications for extraterrestrial abiotic carbon synthesis.

Maxwell, Nicholas

Mentor(s): Ms. Alia Sadek, Mrs. Frances Loyo Rosado, Dr. Lawrence Reagan, Dr. Jim Fadel, Dr. Claudia Grillo

Identifying new links between obesity and depression

Obesity has plagued the United States for decades, but has become much more rampant since the turn of the century. In addition to obesity, we have witnessed a rise in health problems that are related to obesity, including heart disease, diabetes, and depression. While it is unclear whether obesity or these other health risks come first, it has been well documented that they are linked. In particular, depression, which is primarily caused by deficits in the monoaminergic systems in the brain, are frequently associated with eating disorders. Treatments for depression, such as selective serotonin reuptake inhibitors (SSRIs), monoamine oxidase inhibitors, and tricyclic antidepressants also modify eating behavior in these patients. In addition to serotonin, the adipose derived hormone leptin, which reduces food intake, may also play a role in this intersection between depression and dysregulation of food intake. Patients with obesity have higher levels of plasma leptin, yet the signaling of leptin is greatly reduced, which is known as leptin resistance. My work studies the role of leptin in the serotonin system, and how this affects feeding behavior. I have now been interested in describing the anatomical and functional pathways in the brain that may link deficits in the serotonin system to imbalanced eating behavior. By using neuronal tract tracing techniques paired with fluorescent histology and confocal microscopy, I have characterized the anatomical pathway between the hypothalamus, which is the primary brain region that controls how much we eat, and the raphe nucleus, the primary source of serotonin in the brain. I have also shown that this pathway involves serotonin, and can be controlled by leptin. Further characterizing these connections may be the key to understanding the link between depression and eating disorders, and developing better, more efficacious treatments to combat the obesity and obesity-related depression.

McCain, Richard

Mentor(s): Dr. Norma Frizzell

Linking altered microglial metabolism to an impaired inflammatory response in Leigh syndrome

Leigh syndrome is a progressive neurodegenerative mitochondrial disease stemming from genetic defects in the electron transport chain, such as Complex I, which leads to lactic acidosis, bilateral necrotizing brain lesions, respiratory failure, and early death. The NADH dehydrogenase [ubiquinone] iron-sulfur

protein 4 (NDUFS4, a Complex I assembly factor) knockout mouse is an established model of Leigh Syndrome, manifesting many of the biochemical and clinical aspects of Leigh syndrome, including microgliosis in lesioned brain regions. However, the contribution of altered microglial metabolism in Leigh Syndrome remains understudied. The inhibition of Complex I function following loss of Ndufs4 reduces the electron transport chain activity leading to mitochondrial dysfunction and increased reductive stress, manifesting as elevated NADH:NAD⁺ levels. Reductive stress and the consequent inhibition of NAD⁺-dependent Krebs cycle enzymes facilitates the accumulation of intermediary metabolites, including the dicarboxylate fumarate. Fumarate can irreversibly modify protein thiols, a modification known as protein succination, and we have previously demonstrated increased protein succination in the pathologically lesioned regions of the Ndufs4 knockout brain. Activated immune cells produce the dicarboxylate itaconate through the action of immunoresponsive gene 1 (Irg1). Itaconate acts as part of a negative feedback loop to suppress pro-inflammatory activity. I propose that altered levels of Krebs cycle intermediates may interfere with the capacity to mount a normal anti-inflammatory response in Complex I deficient Ndufs4 knockout microglia; as a result of impaired itaconate production. This impairment is predicted to limit microglial phagocytic function and alter the capacity to respond to infections. Real time PCR confirms increased expression of microglial genes, a ~2-fold increase in several pro- and anti-inflammatory factors, but a decrease in Irg1 in late stage Ndufs4 knockout olfactory bulb samples. Ndufs4 knockout immune cells show decreased itaconate levels in response to lipopolysaccharide (a pro-inflammatory stimulus). Lipopolysaccharide stimulation resulted in a lower metabolic capacity and impaired induction of inflammatory cytokines and phagocytic uptake. Treatment of Ndufs4 knockout mice with 4-octyl itaconate, a derivative of itaconate, improved motor endurance. Overall, our data suggests that altered mitochondrial metabolism and reduced itaconate production impair microglial ability to resolve inflammation in the Ndufs4 knockout model of Leigh Syndrome.

McClam, Maria

Mentor(s): Dr. Lauren Workman

South Carolina Maternal, Infant, and Early Childhood Home Visiting Program: Needs Assessment

The Maternal, Infant & Early Childhood Home Visitation (MIECHV) Program funded a comprehensive needs assessment to understand the needs of families and young children in South Carolina (SC). The purpose of the needs assessment was 1) to assess the quality and capacity of home visiting services in the state, including gaps in early childhood home visiting in the state and the extent to which programs are meeting family needs, and 2) to understand community readiness among counties defined as 'at risk'. Data was collected through an online stakeholder survey among early childhood home visiting program representatives and partners. The survey asked questions about the gaps in home visiting services, the extent to which programs are meeting family needs, and perceived community readiness. Additionally, secondary data analysis from a series of prior interviews and focus groups with families was used to understand family perspectives. Results showed that overall, home visiting programs provide a service that is much needed by families across the state. Home visiting programs have a positive impact on the families that they serve in many ways. Families reported that the home visiting services provided valuable information about growth and development, parenting advice and skills, home safety, support for parents, and books and other supplies. Families also appreciate the convenience of the home visiting services. Many families felt that their home visitor had a positive impact, not only on their child, but on the whole family. Survey participants perceive that their communities have low levels of infrastructure and leadership prioritization for home visiting programs, but higher levels of buy-in for implementation. Survey respondents noted that families face many barriers to accessing services including lack of transportation, lack of available services, lack of awareness of available services, and competing family priorities (work, school, etc.). Families also have many continued needs such as transportation, child care, mental health services, job needs, and other basic needs. Home visiting programs could benefit from stronger referral systems, care coordination, and finding new ways to help with family engagement and reaching families

in rural areas.

McClam, Maria

Mentor(s): Dr. Lauren Workman

SC DHEC Maternal and Child Health Needs Assessment

The SC Department of Health and Environmental Control's (SC DHEC) Bureau of Maternal and Child Health (MCH) partnered with USC CARE to conduct a needs assessment (NA). The goal of the NA was to inform a prioritization and decision making process for the Title V Block Grant Program funding. A public input survey (n=344), stakeholder interviews (n=20), and four focus groups (n=28) were used to understand perceived MCH needs across SC. A list of interview candidates was developed based on recommendations from the advisory council and priorities identified in the public input survey. An inductive approach was used to analyze interview and focus group data and basic descriptive statistics were calculated for survey data. Several needs and strengths related to MCH in South Carolina were identified. Critical areas of need included addressing the social determinants of health, mental health, and access to healthcare. Lack of access to care in rural areas is of concern. Additional areas of need focused on prevention, including the need for more early intervention, efforts to enhance parenting skills, build healthy relationships, and engage fathers. Moreover, awareness-raising activities are needed to educate the public on resources and services. The value and promise of community navigation and case management services was discussed as a strategy to facilitate coordination of care and help families connect to services. Attention should be paid to particularly vulnerable populations including those with adverse childhood experiences, children in foster care systems, and victims of human trafficking. Stakeholders recommended the need for additional collaboration, increased funding, and workforce development to address these challenges. While stakeholders would like to see more collaboration, they identified several existing collaboratives, community organizations, and prevention programs as a key asset. Understanding the needs of the MCH populations can help determine where future efforts need to be focused.

McDonald, Sierra

Mentor(s): Dr. Angela Murphy

Long-term emodin administered in the diet reduces tumor number in transgenic breast cancer mouse models

Breast cancer is the most prevalent cancer worldwide accounting for 12% of all new cancer cases in 2020. In the US alone, the cost of treating breast cancer in the same year was estimated at \$20.5 billion. Given the global burden of breast cancer, more cost-effective and safer treatment options are continually being sought after. The use of natural compounds show promise in this aspect, as well as in circumventing the pitfalls of traditional chemotherapeutics which include pervasive off target effects, acquired multidrug resistance, and non-selective cytotoxicity. Previously, our group showed that emodin (1,3,8-trihydroxy-6-methylantraquinone), a Chinese herb-derived anthraquinone, administered short term via IP injection inhibited breast cancer growth and metastasis in orthotopic mouse models. To further our understanding of emodin's inhibitory effects, we conducted a survival study to investigate whether long-term emodin administration in the diet could prevent or delay breast cancer onset and survival in two well-established transgenic mouse models of mammary cancer, C3(1)/SV40Tag and MMTV-PyMT. Three-week-old female mice were randomized to four groups based on the concentration of emodin in the diet: 0, 170, 340, 680 mg emodin/kg diet (roughly equivalent to 0, 20, 40, and 80 mg emodin/kg body weight). Mice were euthanized upon tumors reaching a size of 15x15 mm². Emodin treatment resulted in dose-dependent reductions of both total tumor number (p<0.05) and number of tumors with an area ≤ 100mm² per mouse (p<0.05) in the MMTV-PyMT model. Similarly, a dose-dependent reduction in total mammary tumor number with an area ≤ 100mm² per mouse was observed in the C3(1)/SV40Tag model, as well as a reduced total tumor number compared to control diet. In both breast cancer models, reductions in the

number of both total tumors and smaller tumors were achieved without any significant change in body weights or food intakes. Emodin treatment reduced tumor burden without any significant change in liver, parametrial fat, or spleen weights in both models; indicative of an absence of toxicity exerted by emodin. Our results demonstrate that although long term emodin in the diet does not improve survival or delay onset of breast cancer, it can effectively lessen total tumor burden.

McDorman, Sam

Mentor(s): Dr. Karen Smith

Digital Collection and Dissemination of Southeastern Complicated Stamped Pottery: A User Needs Study for Snowvision/World Engraved

Complicated stamped pottery is ubiquitous across what is now called the southeastern United States. Vessels were stamped with carved wooden paddles that do not survive in the archaeological record, but the paddle designs can be reconstructed from careful study of the pottery. The most complex type, called Swift Creek, was produced from approximately 100-850 AD and is found primarily in Georgia, Florida, and Alabama. The process of sorting thousands of pottery sherds across hundreds of sites to identify matches is a daunting task for archaeologists but is necessary to reconstruct paddle designs and to understand the movements of and connections between the people who created these artifacts.

To aid archaeologists in this task, a multi-disciplinary team at UofSC has built Snowvision, a machine learning computer vision algorithm to match sherds and designs, and World Engraved, a free and public online digital archive of reconstructed designs and sherds to accumulate data from across the southeast. My thesis builds on the fields of information science and archaeology by using a two-part user needs study to gain an understanding of the expected user population. A survey was distributed in late 2019, followed by user testing and interviews conducted virtually in late 2020. Respondents were professional archaeologists interested in sharing large volumes of data held at their institutions. Respondent feedback was incorporated into the interface of the World Engraved website, created changes to proposed metadata collection, and assisted in the development of data sharing policies for the digital archive.

McElhinny, Paul

Mentor(s): Prof. Jie Guo

Tracing Modern and Contemporary Sino-French Literary and Intellectual Relations: China, France, and Their Shifting Peripheries

My dissertation focuses on modern and contemporary Sino-French literary and intellectual relations. I explore them through the center/periphery binary developed by Samir Amin in Eurocentrism and expounded upon by Édouard Glissant in Poetics of Relation. Due to French imperialism in East Asia, these theorists view France as a “center” of global power with China being “peripheral” to it for most of the twentieth century. This speaks to a larger trend in postcolonial studies, which has focused on unequal power relations between countries and the impact they have had on cultural production. Nevertheless, I find that the history of exchange between China and France is more complicated. Even though China was diplomatically, militarily, and economically outmaneuvered by the West during the colonial period, the country was never fully colonized and remained a vast empire. Therefore, I argue that we must also take into account how the two countries’ histories have been intertwined through their former imperial possessions, or “shifting peripheries. To accomplish this, I deliberately choose to examine a variety of works, including writings by Twentieth and Twenty-first century French authors who have traveled to China, Marguerite Duras’s Indochina novels, and contemporary works by Ying Chen and Nobel Laureate Gao Xingjian—two Chinese diasporic authors who write in and translate their works into French. Together these texts take us from colonial Vietnam (Duras), which before the arrival of France, had long been dominated by China; to contemporary Montreal (Chen), a city that once sat at the farthest reaches of the French colonial em-

pire, and is now considered a cosmopolitan metropolis at the cross-roads of anglophone, francophone and allophone Canada; and the outer reaches of Sichuan province (Gao)—a frontier region that has been subject to internal colonization by Han China.

McLauchlin, Christopher

Mentor(s): Dr. Ralf Gothe

Measurement of Polarization Observables and Electron Beam Helicity Asymmetries of Double Charged Pion Electroproduction off the Proton

A key objective of the N^* program is the measure the resonance transition form factors, which contain information needed to describe the distance-dependent interaction of constituents within the nucleon as it is excited into one of its resonance states. These resonance transition form factors are sensitive to the underlying degrees of freedom and dynamics of the nucleon while being confined within the nucleon. Experimental observables from charged single- and double-meson electroproduction channels serve as dominant sources for the extraction of these form factors due to their relative ease of detection and ability to trace distance dependent interactions in comparison with photoproduction. This analysis is an extension of a previous study on the $+p$ reaction channel using data from the e1-6 experimental run conducted in Hall B at the Thomas Jefferson National Laboratory (JLab) using the CEBAF Large Acceptance Spectrometer (CLAS) detector performed by Dr. Arjun Trivedi. Said extension consists of additional data from e1-f, also conducted in Hall B, and an exploration of a potential electron beam helicity asymmetry. The experimental range in regard to four-momentum transfer by the probe squared (Q^2) and invariant mass of the photon-target proton system (W) is $2 \text{ GeV}^2 < Q^2 < 5 \text{ GeV}^2$ and $1.4 \text{ GeV} < W < 2.125 \text{ GeV}$, respectively. Thus far a fraction of the e1-6 run has been analyzed to the point of a preliminary event selection and the extraction of raw yields according to the seven dimensional binning structure relevant to the extraction of the differential cross sections.

Merrihew, Allie

Mentor(s): Mrs. Amy Wardyn

Efficacy of telegenetics: a diagnostic yield comparison between in-person and telemedicine pediatric genetic evaluations

The purpose of this study is to investigate the efficacy of telegenetic services for pediatric genetic evaluations conducted by telemedicine by comparing it to in-person pediatric genetic evaluations. Research into the utility of telegenetics would greatly serve to identify if this is a preferred alternative service delivery model to bridge the gap in accessibility and reach a greater catchment area of the population, especially to those living in underserved and rural locations. This study is a retrospective review of electronic medical records of pediatric patients seen at Greenwood Genetic Center (GGC) for initial in-person genetic visits prior to the COVID-19 outbreak and initial telemedicine genetic visits during the COVID-19 outbreak. Primary indications were reviewed in conjunction with the final clinical assessment made by the geneticist at the time of visit. Diagnostic information from the clinical assessment was used to determine if a clinical diagnosis could be made, which was categorized into clinical genetic diagnosis (met clinical criteria with/without the need for molecular confirmation), environmental etiology, isolated anomaly, multifactorial etiology, within normal variation, and testing not indicated. If testing was indicated, results were categorized into diagnosed, undiagnosed, uncertain, or sample not returned. Both clinical assessment and genetic testing outcomes were used in the diagnostic yield comparison. We found that visit type did not have a significant effect on the likelihood of a diagnosis. Identifying the similarities in diagnostic outcomes for patients seen by telemedicine may strengthen the support for telegenetic services, improve accessibility to genetic services, and benefit both providers and patients.

Miller, Tracey

Mentor(s): Dr. Ann Scott, Dr. Leigh Pate, Dr. Angie Davis

Simulated Medication Competency for Pre-licensure Nursing Students

Background/Significance: Medication errors harm more than 1.5 million people annually. Medication errors can cause injuries or even death and lead to extra medical expenses at an estimated cost of more than \$3.5 million. BSN students cause 77% of those errors due to incorrect dosing. Nursing students also have problems with medication administration rights, decreased medication calculation ability, and decreased self-confidence. BSN students have chosen the wrong syringe to medicate in the clinical setting, have not appropriately identified the patient, and attempted to use a needle with a needleless system. With computerized testing, the evaluation of the five rights is limited.

Purpose: This DNP project aimed to use the simulated medication competency (SMC) to observe and rate the students' ability to complete the medication calculations adequately. Additionally, the student was assessed regarding the five rights to determine if they possessed the technical skills to administer medications safely. Lastly, to obtain the student's perception of satisfaction and self-confidence with medication administration.

Methods: Concurrent mixed-methods guided by the NLN Jeffries Simulation Framework (NLN).

Results: Integrated qualitative/quantitative data revealed four relevant constructs related to the NLN: Skill performance; Learning satisfaction; Self-confidence, and Learning Knowledge. The mean of the computerized medication competency (CMC) was 94, and simulation medication competency (SMC) was 84. 100% (13) per the NLN Survey of the participating students felt very confident or confident the SMC experience prepared them in all aspects of safe medication administration related to skills performance alone based on their responses: "I feel more confident moving forward administering medication because the hands-on portion was the extra practice I needed."

A disproportion was found with student confidence increasing while SMC scores decreased.

Conclusions: The project results demonstrate that while students may know how to calculate medication dosages, they are not competent in the "Five Rights" or "hands-on" aspect of safe medication administration. It also demonstrates that simulation is a better method to evaluate nursing students' competence for safe medication administration than computerized testing alone. Safe medication administration helps the patient and decreases medical cost, prevents extended hospital stays and sentinel events.

Mitchell, Chandani

Mentor(s): Dr. Philip B Busbee

AhR expression on Vil1-expressing colonic epithelial cells are essential for I3C-mediated protection against colitis

The number of people who suffer from an inflammatory bowel disease (IBD) called colitis has constantly been on the rise. Some of the symptoms of colitis include abdominal pains, bloody stool, and ulcers in the lining of the abdomen and leave the patient with a negative quality of life. Few treatments offer alleviation of these symptom without additional negative side effects. However, in our lab we previously reported the ability of indole-3-carbinol (I3C), a natural plant product and an aryl hydrocarbon receptor (AhR) ligand, to alleviate some of the symptoms of colitis through innate lymphoid type 3 (ILC3) cells in an interleukin-22 (IL-22) dependent manner. In this study, we produced AhR knockout mice in Vil1-expressing colonic epithelial cells (CECs) and induced colitis in them using 3% dextran sodium sulfate (DSS). Our results showed that the mice with an AhR deficiency in Vil1 cells (AV mice) lost the expected efficacy effects of I3C treatment during colitis. Additionally, they had a higher disease score as well as inflammation in the colon. However, the AV mice still had the ability to increase IL-22 via ILC3s suggesting that the IL-22-ILC3 axis is not necessary for the alterations in other I3C-mediated mechanisms that prevent colitis development by the AhR deficiency in CECs. Therefore, these data collectively show that AhR expression in CECs play a critical role in I3C-mediated prevention of colitis.

Mohammed, Ahmed

Mentor(s): Dr. Jason Kubinak

Defective Humoral Immunity Disrupts Bile Acid Homeostasis Which Promotes Inflammatory Disease of the Small Bowel

Mucosal antibodies maintain gut homeostasis by promoting spatial segregation between host tissues and luminal microbes. Whether and how mucosal antibody responses influence gut health through modulation of microbiota composition is unclear. One critical metabolic function carried out exclusively by bacteria in the gut is bio-transformation of host bile acids (BAs), and dysregulation of BAs metabolism has been linked to numerous inflammatory and metabolic diseases in humans. Here, we use a CD19^{-/-} mouse model of antibody-deficiency to demonstrate that a relationship exists between dysbiosis, defects in BA homeostasis, and enteropathy of the small intestine (SI). SI enteropathy that develops in CD19^{-/-} mice is associated with alterations to the luminal BA pool in the SI, marked by significant reductions in the abundance of conjugated BAs. Manipulation of BA availability, adoptive transfer of functional B cells, and ablation of bacterial bile salt hydrolase (bsh) activity all influence the severity of SI enteropathy in CD19^{-/-} mice. Collectively, results from our experiments support a model whereby mucosal humoral immune responses limit inflammatory disease of the small bowel by regulating bacterial BA metabolism.

Mohtasebzadeh, Abdul

Mentor(s): Prof. Thomas Crawford

Magnetic nanoparticles and their unique properties.

Magnetic nanoparticles are found to exhibit interesting and rather unique properties than those found in larger scales. Their finite size, high surface to volume ratio and different crystal structures allow them to be used in various applications such as magnetic drug delivery, magnetic storage systems and functional 2D and 3D nanostructures for photonics. We use enormous magnetic field gradients at the surface of a Hard Disk Drive (HDD) to understand how we can control self-assembly of magnetic nanoparticles and produce functional materials. Monodisperse 25 nm diameter particles colloiddally suspended in hexane are assembled onto parallel line templates at the surface of HDD. We present results from orientational order parameter determined by the local director field of a particle with the angles that are given by the bonds to the nearest neighbors in six-fold. The power law exponent of orientational correlation function at 200 nm correlation length indicates that particles are at hexatic phase, a state of matter that is between the solid and the isotropic liquid phases in a two dimensional system of particles. Our results demonstrate that controlling both magnetic force at the surface of HDD and colloidal stability of nanoparticle solution are equally important in the process of nanoparticle self-assembly.

Moran, Mariah

Mentor(s): Dr. Naomi Farber

Where the Home Fires Burn: The Heart of Geographic Mobility in Rural Southern America

The presentation will report on findings from research using in-depth interviews to identify the social and psychological factors of geographic mobility that are evaluated and negotiated by rural Southern residents. Multiple mobility patterns are examined among three groups: people who leave their rural community and later return, those who left and do not intend to return, and those who have stayed in their rural community. The intersection of those mobility patterns with age, race, gender, and socio-economic status will be discussed.

This research is situated within the emergent findings on the reasons people move that challenge the prevalent explanations of geographic mobility based on economic and life course theories (Henderson & Akers, 2009; Stack, 1996; von Reichert, Cromartie, & Arthun, 2014). Since approximately 2005, research-

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ers have also questioned assumptions that moving is a conclusive life event. Rather, mobility is a continual and iterative process that includes social and psychological aspects which are sometimes accompanied by a physical move. This more fluid understanding of mobility challenges the assumptions made in the predominant theories about what it means to be mobile.

Emerging themes from the findings will be presented that suggests blurring between mobility and immobility and argues that mobility is far more complex and nuanced than previously understood. Despite evidence of multiple pragmatic reasons people move related to employment, finances, family concerns, and social resources, there is important new evidence that reveals deeply personal meanings and processes that also influence these decisions about whether or not people move. Data from a rural sample in the Southern U.S. will be discussed that substantiate the need for a deeper understanding of social and psychological factors to better understand mobility, and in particular, rural mobility. Specifically, the findings include themes such as sense of comfort and belonging, the importance of relationships and being known, community responsibility, and the role of identity formation in seeking locations. The findings also include personal processes such as the complex negotiation and compromise between obligation and opportunity, and the conflicting desires, goals, and expectations that people have for themselves and their loved ones.

Murphy, AJ

Mentor(s): Prof. Stanley Dubinsky

Classical Greek direct object case(s): A corpus-based statistical exploration

Classical Greek verbs can take direct objects marked with genitive (GEN) or dative (DAT), rather than accusative (ACC) case. This is despite the fact that ACC is the typical direct object case, with GEN and DAT normally thought of as indirect object cases. Accordingly, while the verb “eníkēsan” [defeat] takes an ACC object, the verbs “erkhe” [rule] and “apelésas” [threaten] take GEN and DAT objects, respectively.

To date, Classical Greek grammars all fail to offer any principled account for the distribution of ACC, GEN, or DAT direct objects of transitive verbs. The present study seeks to fill the gaps in our understanding of the use of DAT and GEN case in Classical Greek. To this end, the presentation analyzes a corpus of Classical Greek texts, and explores, descriptively and statistically, the particular semantic properties of subjects and direct objects of verbs whose direct objects are marked with one of these three cases.

In carrying out this research, we collected 195 instances of transitive verbs whose object take ACC, GEN, or DAT case, and then coded them according to Dowty’s 1991 Proto-Role Properties and a revision of Luraghi’s (2010) Transitivity Hierarchy (Murphy et al, 2020). Our study found a highly significant correlation between a verb’s level of transitivity (as indicated by object-case) and two semantic properties: (i) a resulting change of state and (ii) a volitional subject (Dowty 1991). In finding a systematic, principled relationship between ACC, GEN, and DAT case-marking and semantic correlates, the present study presents the first corpus-based, statistically-driven methodological approach for this question.

O’Connor, Kyle

Mentor(s): Prof. Steve Rodney

Searching for Strongly Lensed Supernovae with Las Cumbres Observatory

We present an analysis of four semesters of the Las Cumbres Observatory Lensed Supernova Search, LCOLSS, which is targeting 112 strong lensing galaxy-galaxy systems with the Las Cumbres Observatory one meter telescopes in the rp with the goal of detecting a gravitationally lensed SN, gLSN.

Detections of gLSN are of great interest for their use in time delay cosmology and SN physics. However, gLSN detections are very rare, owing to the intrinsic rarity of SN explosions, the necessity of

alignment with a foreground lens, and the relatively short window of detectability. The LCOLSS program is one of the first attempts to detect gISN using a targeted survey. The LCOLSS systems were selected for their high expected SN rates, based on the estimated star formation rates of the lensed background galaxies. No plausible gISN is yet detected by LCOLSS in these four semesters. The analysis done here measures a detection efficiency for these observations and runs a Monte Carlo simulation using the predicted supernova rates to determine the expected number of gISN detections. The results of the simulation suggest an expected number of detections and 68% Poisson confidence intervals, NSN = 1.1, [0.2, 3.4], NIa = 0.40, [0.005, 2.4], NCC = 0.67, [0.06, 2.8] broadly consistent with our non detection.

Odhiambo, Chrisogonas

Co-Author(s): Pamela Wright

Mentor(s): Dr. Cynthia Corbett, Dr. Homayoun Valafar

Medication Adherence Monitoring Using Neural Networks on Smartwatch Accelerometer Sensor Data

Background. Medication adherence among people with chronic conditions is a global problem that contributes to preventable morbidity and mortality and resulted in \$2.7 trillion avoidable health care costs. Recent advances in sensor technology and artificial intelligence present an innovative opportunity to objectively measure and assist with medication adherence.

Purpose. Develop an artificial intelligence neural network, using the accelerometer signals from wearable smart watches, that can reliably (>80%) detect medication-taking gestures.

Methods. This ongoing study's three stages include data collection, training of artificial neural networks, and evaluation. Following receipt of supplies (watch and phone, medication bottle, candy as placebo medications), recruited participants (n = 26 to date) were trained via videoconferencing to collect data by simulating medication-taking 10 times/day over 10 different days. Week one involved participants' natural way of medication-taking and week two, involved a scripted way of medication-taking. The participants then transferred data from the smart watch to the smart phone and then to the research cloud, which is downloaded and pre-processed as an input to train the neural network for pattern recognition.

Two approaches were used to partition the dataset to train, validate, and test the neural network. In the first approach, the dataset was split in the ratio of 80:20, and the test dataset was sliced out of the main dataset. In the second approach, the 80:20 train/validation partition was maintained, except the model test data was a separate dataset omitted from the training data. Specificity, sensitivity, and accuracy will be used to measure the performance of the methods.

Results. The highest accuracies for the two tested training approaches for scripted gestures were 98.5% and 97.07%. The second approach provided a more realistic picture of how the model would perform or generalize in a real deployment. This technique will be further tested as more data is collected from additional participants.

Conclusions. The findings of this study will positively impact scientific knowledge about medication-taking gestures and provide an artificial intelligence approach to objectively monitor medication adherence. In the future, this artificial intelligence technology could be used by clinicians or caregivers to monitor and improve medication adherence.

Oh, Sewon

Mentor(s): Dr. Svetlana Shinkareva

Development and Validation of Naturalistic Video Stimuli Conveying Authentic and Inauthentic Emotions

The use of naturalistic, context-rich stimuli has been recently emphasized in affective neuroscience research. We have sampled 171 videos from online sources and validated them in a series of behavioral experiments. These videos were selected to differ on expressed emotion and authenticity. Authentic emotions are genuinely expressed whereas inauthentic emotions are faked. Ninety-eight participants watched and rated the videos on valence, arousal, authenticity, and categorized each video into one of seven emotion categories (anger, disgust, fear, happiness, neutral, sadness, and surprise) across six experiments. After removing videos with low agreement among participants (lower than 85%) in the emotion categorization task, 119 videos remained. The relationship between valence and arousal ratings of the video stimuli was typical of affective stimuli sets with static images; Positive and negative videos were rated as more arousing than neutral videos. Authenticity was quadratically related to valence after controlling for arousal. This naturalistic video stimuli set can be used to enhance the ecological validity of future affective neuroscience research.

Oostdyk, Alicia

Mentor(s): Dr. Melanie Cozad

Using Pictures to Provide Patients Power Over Pain: A Novel Application of a Qualitative Methodology - Photovoice

OBJECTIVES: Fibromyalgia syndrome is a chronic condition that causes widespread pain, fatigue, and mood symptoms that mimic other chronic conditions. Due to the confusing nature of symptomatology, patients find articulating their experiences with pain and communicating with their physician to be difficult. For patients and physicians to effectively participate and share in the treatment decision process, open and honest communication is essential. This study focuses on identifying the perspectives of patients with fibromyalgia on barriers and facilitators of discussing pain and complex symptoms with their doctor.

METHODS: Subjects enrolled in a prospective, qualitative research study applying photovoice. Photovoice is a participatory, visual research methodology used to capture patient perspectives on a given topic. Study participants were asked to submit at least 3 photographs that describe how they discuss their pain and symptoms with their doctor. During a semi-structured interview, subjects described the personal meaning of their photographs. Interviews were conducted and transcribed during November 2021 and January 2021. Photos and transcriptions were coded using a grounded theory approach. Codes were condensed into major themes that support development of a conceptual framework.

RESULTS: A purposive sample of 10 female subjects with a mean age of 52.4 + 14.64 took part the research study. Patients with fibromyalgia described actions of the patient and doctor during the office visit that increase or hinder communication. Patients also described desired actions of the physician, such as listening and building connections, that would increase willingness to share information with the doctor. Additionally, patients described wanting to share how they felt physically and emotionally when discussing their experience with fibromyalgia with their doctor.

CONCLUSIONS: To increase communication with patients, health care providers should focus on rapport building and listening to patients during their encounters. Listening entails being mindful to allow patients time to articulate their physical and emotional experiences connected to symptoms of fibromyalgia.

Osborne, Andrew

Mentor(s): Dr. Alicia Wilson

Groundwater Discharge from Passive Continental Margins: Rethinking Oceanic Chemical Budgets

Geothermal convection and sediment compaction drive large-scale flow in continental shelves. We suggest that this flow is an overlooked control on the major ion chemistry of the ocean. Conventional ocean chemical budgets are constructed using river discharge, mid-ocean ridge (MOR) convection and low-temperature basaltic alteration at the seafloor, but these budgets can be balanced only through assuming volumetric discharges for MOR convection that are far above realistic values. We synthesized data from 17 continental shelf basins to calculate a range of estimated groundwater and chemical fluxes from continental shelves. Net chemical fluxes were calculated assuming ocean water was the starting composition for groundwater discharging from the basins. Water-rock interactions such as clay mineral reactions and dolomitization alter the chemistry of this discharging groundwater. Chemical compositions of four likely basinal fluid types, here referred to as Groundwater Archetypes, were synthesized from the literature. Five major ions (Ca^{2+} , Na^+ , K^+ , Mg^{2+} , and Cl^-) were considered. We compared our results to the accepted modern-day fluxes of rivers and MORs and found that the chemical impact of continental shelves is likely globally significant and comparable to the impact of MOR convection. After accounting for the burial of calcium carbonate we were able to balance the ocean's chemical budget using our results.

Oudah, Saad

Mentor(s): Prof. Jamil Khan

An Experimental Investigation of the Effect of Multiple Inlet Restrictors on CHF and Pressure Drop in a Flow Boiling Microchannel Heat Sink

Due to shrinking component sizes and faster switching speeds, the volumetric heat generation rates as well as the surface heat flux in many advanced power electronic devices have increased tremendously, which has created an urgent need for efficient cooling technologies. Among the advanced cooling techniques, two-phase microchannel heat sinks have shown considerable promise for removing a large amount of heat from a small area. This study experimentally investigated the effects of various configurations of inlet restrictors (IRs) on the thermal hydraulic performance of flow boiling in a microchannel heat sink, which has a single rectangular microchannel with an aspect ratio of 13.12 and a hydraulic diameter of the 708 μm . The experiments were carried out for the microchannel with three designs of inlet restrictors: one-slot opening (1IR), three-slot openings (3IR), and five-slot openings (5IR), for mass fluxes of 32.68 and 81.29 $\text{kg}/\text{m}^2\text{s}$. The effects of the various IRs on the CHF and pressure drops of the microchannel heat sink were analyzed. The results showed that all test cases with IRs improved the CHF performance of the flow boiling microchannel heat sink, where the 5IR case works best at low mass flux and significantly reduce the pressure drop.

Park, Keunhyung

Mentor(s): Dr. Stanley Dubinsky

[+Agent]-conditioned case marking of nominalized verbs in Korean negative sentences

The aim of the current paper is to investigate how case is assigned to atypical noun expressions, as distinct from the typical case-marking of subjects and objects. Specifically, we examine the case marking of nominalized verbs in Korean Long-Form negation (LFN) constructions. In contrast to English, in which only exhibits nominative and accusative case on some pronouns (e.g., I/me, he/him, she/her, we/us, they/them), Korean nominative (NOM) and accusative (ACC) case markers, -ka and -lul respectively, are normally attached to subjects and objects as shown in (1). Just as subjects and objects get case in Korean, so can verbs in LFN constructions that are nominalized with a -ci marker get either NOM or ACC case. For instance, if the verb "mek" [eat] is nominalized "mek-ci", it might get ACC case when it is the object of

“anhassta” [didn’t]: “mek-ci-lul anhassta” [didn’t eat]. In other cases, this nominalized verb can have either NOM “ka” or ACC “lul” case: “paykophu” [hungry] + “ci” [nominalizer] can be expressed as “paykophu-ci-ka-anhassta” or “paykophu-ci-lul-anhassta” [wasn’t hungry].

On close examination, we find that the case marking on these nominalized verbs is not random. While, “mek-ci” [eat] can only have ACC case, “paykophu-ci” can get either NOM or ACC. We propose that the distribution of NOM and ACC case is determined by semantic properties of the nominalized verbs themselves. Precisely, we claim that the differences in case marking options in are dependent on whether or not the subject of the nominalized verb is itself an Agent. Evidence from other data we review will show that if a nominalized verb has a +Agent feature for its subject, then this feature will be passed up to “anhassta” [didn’t], forcing it to assign only ACC Case back onto the nominalized verb. If the nominalized verb has no +Agent feature, then “anhassta” will not receive that feature and will freely assign either NOM or ACC back onto the nominalized verb.

Patel, Dhruvinkumar

Mentor(s): Dr. Ahmad Iftikhar

Low temperature study of micro pixel ultraviolet light emitting diode (Micro-DUV LEDs)

III-Nitride based deep ultraviolet light emitting diodes (DUV-LEDs) are the critical components in air water purification, disinfection & sterilization, analytic use (forensic), resin curing, biochemistry sensing application. The temperature dependent behavior of the Micro-pixeled DUV-LEDs has never been studied. Here, the temperature dependence of electroluminescence (EL) spectra of the brightest and smallest Micro DUV LEDs has been studied over a wide range of temperatures ($T=10K$ to $T=300K$), under an injection current (DC pump) of 20mA for the first time. It is found that light emitted efficiency increases with a decrease in temperature due to the non-radiative carrier is freeze out at a low temperature in DUV-LEDs. Micro-pixeled DUV LEDs have high Al-content $Al_xGa_{1-x}N$ are susceptible to the formation of defects like dislocations where non-radiative freeze-out occurs at low temperature, resulting in high electroluminescence (EL). The primary reason for this increases the improvement in the injection efficiency. We will present temperature-dependent comparative data for current-voltage (I-V) and emitted light-current (L-I) data for conventional and Micro-pixeled DUV-LEDs. The results will be explained by modeling the DUV-LED structures. This study enhances our understanding of recombination mechanisms in the micro-pixeled DUV-LED’s structure.

Paton, Mariajosé

Mentor(s): Dr. Sayward Harrison

Opportunities for HIV Prevention among Sexual and Gender Minoritized Youth in the Carolinas

Residents of the Carolinas—especially those from sexual and gender minority backgrounds—face unique challenges for HIV prevention. Scaling-up use of Pre-exposure Prophylaxis (PrEP) among young men who have sex with men and transgender women (YMSM/TGW) is urgently needed in the southeastern United States. Past HIV research in the south has identified many individual-level factors (e.g., perceived stigma, disclosure concerns, lack of knowledge) that serve as prevention barriers. Those who work with this population in community-based organizations, clinics, and AIDS service organizations are well aware of the structural barriers for successful PrEP scale-up and are uniquely positioned to offer recommendations for opportunities, facilitators, and strategies to advance these efforts. This qualitative study aimed to describe key opportunities to advance HIV prevention among YMSM/TGW in the southern United States.

Semi-structured, key informant interviews were completed with 14 individuals working in HIV prevention across two southern US states (i.e., North Carolina, South Carolina) that are targeted in the federal Ending the HIV Epidemic plan. Three focus groups were also conducted with YMSM/TGW (N=23) residing in the two states. A deductive and inductive approach with multiple coders was employed to identify

themes related to opportunities for HIV prevention efforts.

Participants reported many facilitators for improving scale-up for HIV prevention. Increasing the capacity of healthcare systems and community-based organizations was a frequent theme throughout interviews. Recommendations for increasing capacity included building interagency and community collaborations and increasing funding, which requires seeking alternative funding mechanisms by state agencies. Increasing access to prevention was another frequently cited recommendation. Themes related to increased access included expanding telehealth, opportunities for self-testing, and utilizing emergency care settings as avenues for screening and prevention. Staff and providers also reported approaches they take to facilitate prevention efforts, including training, advocacy, and report building with the population.

Understanding and addressing areas for successful HIV prevention in the Carolinas is critical to ending the HIV epidemic. Policymakers, healthcare providers, and public health professionals should consider the socio-environmental context of these states and prioritize local, community-based partnerships to implement strategies to reduce the HIV burden in the southeastern United States.

Peka, Samantha

Co-Author(s): Brianna Drake

Mentor(s): Dr. Adam Pazda

Religious Priming and Benevolent Sexism: Women's Resistance

Benevolent sexism refers to the ideal that women are morally pure and delicate, thus it's perceived as a positive form of prejudice (Radke et al., 2016). Previous research has indicated that religion endorses and justifies benevolent sexism to maintain social stability and gender inequality. I propose a study to test the influence of supraliminal religious activation on women's endorsement and acceptance of benevolent sexism. This study will examine whether supraliminal religious priming increases women's endorsement of benevolent sexism and decreases their likelihood of protesting benevolent sexist incidents. Participants will be exposed to religious content via a Scramble Sentence Task (SST) and asked to complete the Ambivalent Sexism Inventory and report their likelihood to protest benevolent sexist incidents.

Pilarzyk, Katy

Mentor(s): Dr. Michy Kelly

The Role of PDE11A4 in Age-Related Decline of Social Memories

Associative memories (aMEMs) are more susceptible to age-related cognitive decline than are recognition memories (rMEMs) for reasons that are not well understood. Age-related increases in phosphodiesterase 11A (PDE11A), an enzyme that breaks down cAMP/cGMP and regulates social behaviors, may be a fundamental mechanism underlying age-related cognitive decline of aMEMs. PDE11A4 is almost exclusively expressed in the ventral hippocampal formation, a brain region key to many types of aMEMs. cAMP and cGMP signaling are decreased in the aging and demented hippocampus (HIPP), consistent with our observations of aging increases in HIPP PDE11A4, particularity within the membrane compartment. We have seen significantly elevated PDE11A4 in HIPP of demented vs. non-demented aged humans with a history of TBI. Therefore, we hypothesized that age-related increases in HIPP PDE11A4 occur in a compartmentalized manner and impair social associate long-term memories (aLTMs). To test this hypothesis, we 1) prevented age-related increases in PDE11A4 using a PDE11A KO mouse, 2) reversed age-related increases in membrane PDE11A4 by disrupting PDE11 homodimerization and, 3) mimicked age-related increases in PDE11A4 by virally overexpressing PDE11A4 in the HIPP of old PDE11A KOs. We found that while Pde11a WT mice demonstrate age-related cognitive decline of remote aLTM, old Pde11a KOs show robust remote aLTM for STFP on par with that of young Pde11a WTs. Disrupting PDE11A4 homodimerization in old Pde11a WTs, it was sufficient to reverse age-related increases in PDE11A4 and rescue age-related decline of social LTMs. Lastly, mimicking age-related increases in PDE11A4 expression in the HIPP of old PDE11A KOs was sufficient to cause aging-like deficits of social LTMs. We found that the combination

of aging and surgery impairs both aLTMs and hippocampus-dependent remote LTMs when PDE11A4 is present. Together, these data suggest that reversal/mimicry of age-related increases in HIPP PDE11A4 is sufficient to rescue/cause deficits in social aLTMs and the combination of PDE11A4 and TBI may accelerate normal age-related cognitive decline to dementia.

Piper, Meryssa

Mentor(s): Dr. Katherine Ryker

Introductory geology in a hybrid world: A case study of inquiry levels used at 5 institutions in Fall 2020.

Inquiry-based instruction has been proven to increase science literacy skills, course engagement, and self-efficacy. However, prior works indicate that STEM fields, particularly geology courses tend to be more confirmation-based, where students are expected to memorize facts rather than produce findings. In addition to the analyses relying on published laboratory manuals, they also focus solely on activities that were designed to be taught face to face. With the transition to virtual and hybrid instruction the type of instruction and its impact are relatively unknown. Here we present the inquiry levels of all introductory geology laboratory activities utilized within five universities by six professors. This study is the first to establish the inquiry levels of geology labs developed in-house, which some have speculated may have a higher level of inquiry than those available in published lab manuals. Understanding how these laboratory activities are taught will also allow us to examine varying levels of interest and conceptual learning of undergraduate students completing labs on a similar topic but at different levels of inquiry.

Polite, DJ

Mentor(s): Dr. Matt Childs

Democracy, Citizenship, Puerto Rican Autonomy under the U.S. Jim Crow Empire

This project unites the U.S. South and Puerto Rico to a joint history of Jim Crow and imperialism. The U.S. South was much more than an unwilling, intransigent obstacle to imperialism due to deep seated racism. Such characterizations do not capture the vision that Southerners brought to the debate and how it would shape the process of empire and modern nation-building as not merely reminiscent of Jim Crow. And likewise, Puerto Ricans at the turn of the 20th century were not simply subjected to empire, but as a migrant population they were marked with the stamp of U.S. racism, as well as imperialism. They used the courts, the political system, and archives to achieve greater freedom to live. But whether it be through citizenship, attempts to create a self-governing state, or to achieve race liberation, the options available had their limits. In many respects, then, this dissertation further elucidates the construction of new tools of oppression through the form of the expanding U.S. state, and the tools that could be used by individuals to challenge that oppression. It is of lesser consequence in assessing the extent to which these movements were successful or not. These lessons not just inform the US-Puerto Rico colonial relationship to today, but the greater development of the United States federal state and its relationship to the racialized others of the world under its ever-expanding empire at home and abroad.

Pope, Brittany

Mentor(s): Dr. Susan Wood, Dr. J. Mark Davis,

Microglial Regulation of Stress Susceptibility in Female Rats

Social stressors often precipitate the onset of anxiety disorders and women are more likely than men to suffer from these stress-related pathologies. While the neural mechanisms promoting anxiety in females are unclear, the locus coeruleus (LC) is a stress-sensitive brain region known to facilitate behavioral and cardiovascular (CV) responses to social stress, two endpoints altered under conditions of hyperarousal. Importantly, social stressors induce neuroinflammation, likely sourced from microglia, which plays a

causative role in generating anxiety-like behavior. However, the specific role for microglia in regulating stress susceptibility is unknown. Here, we target microglia in two ways: in study 1 we use lipopolysaccharide (LPS), a potent microglial activator, and in study 2, we administer liposomal clodronate (CLD), a compound toxic to microglia, to reduce microglial expression. In study 1, female rats were treated with intra-LC vehicle or LPS (0, 1, 3, or 10 $\mu\text{g}/\text{side}$). Forty-five min post-infusion, rats were handled and placed back into their home cage for a 15-min control period. Immediately following, rats witnessed an aggressive social defeat encounter between two male rats (witness stress; WS). Behavior was video-recorded during control and WS, and blood and brain were collected following WS. Findings showed WS increased stress-evoked burying (an anxiety-like response) and intra-LC LPS augments this anxiety-like response. Additionally, intra-LC LPS (3 μg) increases plasma corticosterone and interleukin-1 β . Alternatively, study 2 examined the effect of partial microglial depletion on behavioral and CV responses to repeated WS. Following recovery from implantation of CV transmitters (HD-S11, DSI) and bilateral LC cannulae, female rats were treated with intra-LC vehicle (empty liposome) or CLD (25 $\mu\text{g}/\text{side}$). Three days later, rats underwent WS for 15 min/day on 5 consecutive days. While WS exposure increased anxiety-like burying, partial microglial depletion in the LC attenuated this response. Interestingly, intra-LC CLD's effect on hyperarousal was independent of CV responses as there was no effect on heart rate or blood pressure on day one of WS, but there was an exaggerated pressor response on day five. These studies highlight a novel role for microglia and indicate that microglial targeting may be effective in regulating behavioral indices of social stress-evoked hyperarousal.

Quire, Hannah

Mentor(s): Dr. Breanne Grace, Dr. Allison Marsh

Gifted Education in South Carolina in the Age of COVID-19

The purpose of this project was to gauge how the COVID-19 pandemic impacted gifted education across the state of South Carolina. I disseminated a survey in July of 2020 and again in January of 2021 across social media in order to capture responses at two different points in the pandemic, and the main target audience were the parents and guardians of children currently enrolled in gifted and talented programs across the state. Questions included personal information regarding respondents' demographics, the schools their student(s) attended, and the type of gifted and talented program their student(s) was/were enrolled in, as well as qualitative short answers regarding how virtual education occurred for their students, how they felt about it, and how things differed with the gifted and talented programming. The sample consisted of 38 respondents, representing 20 distinct elementary and middle schools across the state. Of those who completed the survey, 18 had more than one child enrolled in a gifted and talented program. This project aims to contextualize their responses amidst a body of literature on virtual learning and virtual gifted education in particular, in order to better help us understand how the COVID-19 pandemic has affected our K-12 students and their families as well as our gifted and talented education processes, while also allowing us to make a plan for more accessible and positive virtual gifted education experiences after the pandemic.

Raghu, Sowmya

Mentor(s): Dr. Jamil Khan

HEAT TRANSFER PERFORMANCE INVESTIGATION OF A MINICHANNEL HEAT SINK WITH ASYMMETRIC AIRFOIL FINS

One of the prominent methods in geometrical modifications for heat transfer enhancement are fins, which provide an increment in the exposed surface area to the coolant which leads to the improvement in thermal performance. Numerical investigations of novel asymmetric airfoil fins in various configurations are conducted. Numerical simulations are conducted to determine Nusselt number (Nu), friction factor(f) and performance evaluation parameter(η) for circular pin fin, NACA 0012 airfoil fin (2 configu-

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rations) and Leibeck L0013 (3 configurations). The hydraulic diameter of the mini channel is 909 μ m with the channel aspect ratio (height to width) of 0.1. In this study, single phase laminar flow conditions with water as coolant are studied for Reynold's number between 200-1000. For the mini channel with Leibeck L1003 pin in a staggered- flipped configuration, the Nu was enhanced by a minimum of 26% at Re = 300 and maximum of 50.3% at Re = 1000. The Performance Evaluation Parameter (PEP) reached a maximum value of 1.53 corresponding to the highest Reynold's number chosen in the flow regime indicating better thermal performance at higher Reynold's numbers.

Ramey, Kaitlyn - Co-Author(s): Seth Byland

Mentor(s): Dr. Abbi Lane-Cordova

Leisure Time Exercise During and After Pregnancy and Postpartum Weight Retention

Introduction and Purpose: Pregnancy is associated with increased changes in body weight that can shape long-term health in women. Previous studies have shown that prenatal physical activity correlated with less gestational weight gain. Little is known about how leisure time exercise, both during and after pregnancy combined, affects postpartum weight retention. The purpose of our study was to determine the likelihood of postpartum weight retention in women who did versus did not perform sufficient exercise during pregnancy and 6 months – 3 years after delivery.

Methods: A total of 67 women who delivered a singleton infant 6-months to 3-years ago were included in this study (mean age=32.59 \pm 0.66 years; mean BMI=28.51 \pm 0.97 kg/m²). Participants self-reported whether they lost the weight gained during pregnancy (yes/no). They also self-reported current leisure time exercise and recalled mid-pregnancy exercise using a validated questionnaire. We used established cut-offs to define women as insufficiently active at both during and after pregnancy (n= 10), sufficiently active at one time point (n=24), or sufficiently active at both time points (n=33), according to National Physical Activity Guidelines.

Results: Of the participants who were sufficiently active during pregnancy and after pregnancy, 22/33 (67%) of women lost all the weight. For the participants who were insufficiently active at one time point and sufficiently active at the other time point, 9/24 (37.5%) lost all the weight. Of those who were insufficiently active at both time points, 6/10 (60%) lost all the pregnancy weight. There was no significant difference between the three groups (p<0.09).

Conclusion: Women who performed a sufficient amount of exercise at both time points were more likely to lose the weight gained during pregnancy, though this finding did not reach statistical significance. Further research with larger sample sizes is recommended to establish the relationship between postpartum weight retention and longitudinal patterns in exercise during and post-pregnancy.

Rampalli, Krystal

Mentor(s): Dr. Christine Blake, Dr. Amos Laar, Dr. Ed Frongillo, Dr. Ken Erickson

Perspectives of urban Ghanaian adolescents on healthy eating habits

Ghana, a West African country, is no exception to global trends of dietary shifts, rapid urbanization, and rising non-communicable diseases (NCDs). Most of the population is under age 25 (57%), which presents both challenges and opportunities. Adolescents (ages 10-19), in particular, are vulnerable to diet-related health risks as they experience significant life changes alongside environmental changes. There is a need to understand what, how and why adolescents eat the way they do in Ghana. This study explored perspectives of urban adolescents regarding healthy and unhealthy food and relationships to portion sizes. The Measurement, Evaluation, Accountability, and Leadership Support for NCDs (MEALS4NCDs) Project, led by the University of Ghana, measured the degree of unhealthy food marketing to provide evidence

for creating healthier food environments for Ghanaian children. In July-August 2020, 48 interviews with government school students (14-17 years old) in six districts across the Greater Accra Region were conducted. Interviews were done in the schools in English, audio recorded, and transcribed verbatim. Transcripts were coded with NVivo 12 using a thematic analysis. All students demonstrated basic nutrition knowledge and conceptualized healthy eating as “not eating too much”, “a balanced diet,” “not eating late,” and “not eating cold foods.” Connections between NCDs and consumption of foods high in fats, sugars, and salts were rarely made. All students consumed items differing to what they described as a “healthy diet.” Students expressed food safety as indicative of healthy food, emphasizing food prepared in a “hygienic environment by a hygienic person,” “a hot temperature,” and “covered.” Participants did not understand portion sizes beyond “too much of anything is bad” and stated contexts where they would consume smaller or larger portion sizes, such as around strangers (less) or unsure of next meal (more). Participants admitted peer pressure and food advertising claims informed their food choices and demonstrated minimal knowledge of marketing tactics. Despite having some nutrition knowledge, students voiced limited agency in food decisions, citing financial and cultural constraints. Interventions should include strategies educating students and parents about diet-related NCDs and deceptive marketing tactics used to promote unhealthy foods.

Ranganathan, Radhika

Mentor(s): Dr. Oluwole Babatunde, Dr. Swann Adams, Dr. Whitney Zahnd

Disparities In Molecular Testing Among Female Breast cancer Patients

Purpose: Our objective was to characterize the extent of lack of molecular testing among female invasive breast cancer patients overall and by sociodemographic, geographic, and tumor characteristics.

Methods: We analyzed data on female invasive breast cancer patients diagnosed between 2010 and 2016, the most recent years where all three testing indicators were required to be collected by registries, from the population based, Surveillance Epidemiology and End Results (SEER 18) database. Rural-Urban Commuting Codes (RUCC) were used to define patients as rural and urban. Descriptive analyses were performed to compare rural and urban patients on socio-demographic, and molecular testing characteristics. Cochran-Armitage test for trends was performed to assess temporal trends in rural-urban, racial/ethnic, poverty & insurance level differences among the female breast cancer patients who did not undergo estrogen receptor (ER), progesterone (PR) and/or human epidermal growth factor2 (HER2) testing.

Results: Among the included 414,600 patients in the analyses, 40,624 (9.8%) were from rural counties. Compared to urban patients, a higher proportion of rural patients were white, Medicaid insured, and lived in a county with higher poverty and lower education. A nominally lower proportion of rural patients were not tested for important molecular markers(e.g., 1.78% in rural vs. 2.33% in urban for HER2). For all tests, a higher proportion of Hispanic and Black women were not tested. Across rural-urban, racial, and socioeconomic & groupings, improvements in testing rates were detected over time although there were racial/ethnic, insurance status, and poverty level differences. For example, lack of HER2 testing improved from 3.14% to 1.65% in white patients ($p < 0.001$), but was consistently higher in Black patients 3.77% to 2.25% ($p < 0.001$). Similarly, Medicaid patients had the highest proportion of no HER2 testing throughout the study period.

Conclusions:

While lack of molecular testing of breast cancer patients is rare, racial/ethnic and income related disparities have been identified. To reduce the widening racial and income disparity in mortality, it is imperative to ensure that Black women and women living in poverty receive guideline-concordant testing and treatment.

Regmi, Hem

Co-Author(s): Moh Sabbir Saadat

Mentor(s): Dr. Sanjib Sur, Dr. Srihari Nelakuditi

ZigZagCam: Pushing the Limits of Hand-held MmWave Imaging

This poster proposes ZigZagCam, a system that approximates traditional Synthetic Aperture Radar (SAR) imaging on mobile millimeter-wave devices. The system is capable of imaging through obstructions, like clothing, and under low visibility conditions. Unlike traditional SAR that relies on mechanical controllers or rigid bodies, ZigZagCam is based purely on the hand-held, fluidic motion of the mmWave device. It enables mmWave imaging in hand-held settings by re-thinking the traditional motion compensation, compressed sensing, and voxel segmentation. Since mmWave imaging suffers from poor resolution, specularity, and weak reflectivity from objects, the reconstructed shapes could often be imperceptible by humans. To this end, ZigZagCam designs a machine learning model to recover the high spatial frequencies in the object to reconstruct an accurate 2D shape and predict its 3D features. We have customized ZigZagCam for security applications, but the model is adaptable to different applications with limited training samples. We implement our system on off-the-shelf components and demonstrate performance improvement over the traditional SAR, qualitatively and quantitatively.

Reid, Lauren

Mentor(s): Dr. Angela Liese, Dr. Anwar Merchant, Dr. Marco Geraci, Dr. Jason Mendoza

Household Food Insecurity and Glycemic Control in Youth and Young Adults with Type 2 Diabetes

Screening for household food insecurity (HFI) is recommended because of its impact on diabetes management. While HFI has been shown to be associated with poor glycemic control in adults with type 2 diabetes (T2D) and youth and young adults (YYA) with type 1, the association between HFI and glycemic control in YYA with T2D is not known.

This cross-sectional study included T2D YYA (n=395) from the 2015-2020 SEARCH for Diabetes in Youth Study (14-35 yrs; median age: 25.2 yrs). HFI was defined as affirming ≥ 3 items on the US Household Food Security Survey Module. HbA1c values were available for 271 participants. It was measured in a sample of whole blood and analyzed as a continuous variable. Glycemic control was dichotomized into optimal/suboptimal ($\leq 9\%$) vs. high risk ($> 9.0\%$) based on HbA1c. Survey data on experiencing severe hypoglycemia or diabetic ketoacidosis (DKA) in the last 12 months was available for 292 participants. Logistic and linear regression were used for modeling the association of HFI with binary and continuous outcomes, respectively.

Approximately 34% of YYA with T2D reported HFI in the past 12 months. The mean HbA1c of the YYA with HFI was 9.2%, 54% had HbA1c $> 9.0\%$, and 19% reported experiencing DKA or hypoglycemia. YYA who were food secure had a mean HbA1c of 9.5%, 54% had HbA1c $> 9.0\%$, and 8% reported acute complications. No associations were observed between HFI and HbA1c or glycemic control. YYA with HFI had 2.3 (CI: 1.1-5.2) times the odds of experiencing DKA or hypoglycemia as those without HFI, after adjusting for age, gender, race, parent education, household income, insurance, clinic, diabetes duration, use of continuous glucose monitoring, and medication regimen.

Our data suggests that HFI among YYA with T2D is a quite common, affecting more than a third of our sample and is associated with acute diabetes-related complications. These results warrant longitudinal studies in this particularly vulnerable group to establish if alleviating HFI reduces frequency of DKA and hypoglycemia episodes.

Rentschler, Katherine

Mentor(s): Dr. Ana Pocivavsek

The Kynurenic Acid Synthesis Inhibitor PF-04859989 Prevents Acute Kynurenine-Induced Sleep Disturbances in Rats

Kynurenic acid (KYNA) is a tryptophan metabolite implicated in the etiology of psychotic disorders including schizophrenia and bipolar disorder. KYNA, an endogenous astrocyte-derived antagonist of $\alpha 7$ nACh and NMDA receptors, is synthesized from kynurenine by the enzyme kynurenine aminotransferase II (KAT II). Sleep disturbances and comorbid parasomnias remain a common complaint among patients suffering from psychotic disorders. Elevated KYNA levels have been detected in cerebrospinal fluid and postmortem brain tissue from afflicted patients, and elevated KYNA is thought to causally contribute to impaired sleep-wake behavior and associated cognitive deficits. To investigate the acute effects of KYNA on sleep in vivo, telemetry devices were surgically implanted to record electroencephalography (EEG) and electromyography (EMG) polysomnography from freely moving Wistar rats. The recordings allowed us to assess cortical oscillations and muscle activity associated with rapid-eye movement (REM) sleep, non-rapid eye movement (NREM) sleep, and wakefulness parameters. Presently, acute administration of the precursor to KYNA, kynurenine (100 mg/kg), at zeitgeber time (ZT) 0 elicited a $\approx 15\%$ decrease in REM duration in males and females during the light phase. Females also exhibited a decrease in wakefulness followed by a compensatory increase in NREM sleep during the dark phase. To combat these deficits, we designed a within animal study ($n=9$ per sex), and treated rats with the KAT II inhibitor PF-04859989 (30 mg/kg) 30 minutes prior to acute kynurenine administration (100 mg/kg) at ZT 0. PF-04859989 attenuated kynurenine-induced deficits in REM sleep in males and females, and dark phase NREM and wake changes in females. Interestingly, in males PF-04859989 increased NREM duration and decreased wake duration across 24 hours in both vehicle and kynurenine-treated trials, which suggests that PF-04859989 may have slight sedative properties. Furthermore, PF-04859989 enhanced NREM delta power in kynurenine-treated males during the dark phase. For female subjects, all sleep-wake parameters for PF-04859989 and PF-04859989 + kynurenine treatments were comparable to vehicle treatments, noting the absence of PF-04859989-induced sedation seen in males. Taken together, KAT II inhibition may serve as a potential therapeutic avenue for improving sleep disturbances associated with neurocognitive disorders and have a sex-dependent impact on somnolence and arousal.

Richard, Chelsea

Mentor(s): Dr. Suzanne McDermott

Maternal Longstanding Physical Disability and Increased Risk for Small for Gestational Age Infants: Is Prescription Opioid Use on the Causal Pathway?

Women with a diagnosis of multiple sclerosis, spinal cord/traumatic brain injury, spina bifida, cerebral palsy, or stroke (henceforth, longstanding physical disability (LPD)) are at high risk of chronic pain and adverse birth outcomes. Chronic pain is an indication for prescribing opioids, which are also related to an increased risk of adverse birth outcomes. There is limited knowledge for how LPD and prescription opioid use before or during pregnancy impact the risk of having a small for gestational age (SGA) infant. We hypothesize that pregnant women with LPD will have a higher risk of having an SGA infant compared to women without LPD and that prescription opioid use before and during pregnancy will mediate the association with SGA. Using a 3:1 propensity score matched sample from a cohort of Medicaid beneficiaries in South Carolina, causal mediation and Poisson regression analysis were employed. Prescription opioid use ('opioids') was measured in total morphine milligram equivalents (MMEs), and SGA was defined using cut-offs from Alexander et al (1996). Three models were obtained: (1) LPD predicting opioids during pregnancy mediated by opioids before pregnancy; (2) LPD predicting SGA mediated by opioids during pregnancy; (3) LPD predicting SGA adjusted for opioids before and during pregnancy. All models were adjusted for covariates. Significantly more women with LPD had an SGA infant (15.27%) than those without

LPD (13.46%; p-value: 0.02). The association between LPD and opioids during pregnancy was 62.05% mediated by opioids before pregnancy (95%CI: 16.55-100.00%). The association between LPD and SGA was not mediated by opioids during pregnancy (-0.23%; 95%CI: -1.16-0.70%). Those with LPD were at 18% higher risk of SGA (95%CI: 1.06-1.32) than those without LPD, after adjustment. Among those with LPD, there was no significant difference in risk of SGA between those with MMEs over 90 and those with no MMEs during pregnancy (adjustedRR: 0.88; 95%CI: 0.63-1.21). For women with LPD, their increased risk of SGA is not explained by the level of opioids during pregnancy. Instead, this may be explained by some characteristic of the disability. Therefore, it is imperative that obstetricians be disability-informed and understand the unique needs of this population.

Roland, Mary

Mentor(s): Dr. Jason Kubinak

B-cell-intrinsic MHCII Signaling Promotes Microbiota Diversity

The expression of major histocompatibility complex class II (MHCII) molecules is essential for the formation of germinal centers (GC) in lymphoid follicles, which are the primary sites for the generation of T-cell-dependent (TD) high-affinity antibody responses. Gut peyer's patches (PPs) are the dominant peripheral lymphoid tissues that give rise to TD antibody (primarily immunoglobulin A (IgA)) responses generated against the gut microbiota. While it is anticipated, a requirement of B-cell-intrinsic MHCII expression for GC formation has never been formally described. Additionally, while anti-commensal TD IgA responses have been shown to regulate microbiota composition and function, to what degree B-cell-intrinsic MHCII influences this process is also undefined. Here, we use a RAG1-/- adoptive transfer model where RAG1-/- mice are either reconstituted with naive CD4+ T cells and MHCII+ B cells or naive CD4+ T cells and MHCII- B cells to address these gaps in our knowledge. Results from these experiments demonstrate that B-cell-intrinsic MHCII signaling is a strict requirement for GC-TFH cell development. Consequently, B-cell-intrinsic MHCII signaling promotes the generation of high-affinity anti-commensal IgA responses in the gut, which lead to increased species richness within the fecal but not small intestinal microbial community. Collectively, our data suggest that B-cell-intrinsic MHCII signaling is crucial for the generation of high-affinity anti-commensal IgA responses generated against the gut microbiota, and that this response favors a more diverse bacterial community.

Rose, Aubrey

Mentor(s): Mrs. Debera Zvejnieks

Developmental Regression Analysis and Investigation of Genotype Correlations in Individuals with Classic Rett Syndrome

Rett syndrome (RTT) is a neurodevelopmental disorder impacting 1 in 10,000 females worldwide, making it one of the most common causes of complex disability in girls. RTT is caused by pathogenic variants in the MECP2 gene, and is characterized by developmental regression, stereotypical hand movements, and an abnormal gait. Despite consistency in the presence of these core features, a wide range of features and varying severity can be observed in girls with RTT. Similarly, the particular type of MECP2 variant present also differs between patients. The set of features that a patient presents with is often referred to as phenotype, and the specific genetic variant a patient has is called the patient's genotype. Some previous studies have assessed correlations between genotype and phenotype in patients with RTT. While past research revealed some correlations, they were limited by small sample size and inconsistencies in data collection methods. This study uses data from the Rett Syndrome Natural History Study (RSNHS), a nationwide study that has been enrolling patients for the past 15 years. Data analyzed as part of this research includes information from 1,199 patients, collected using standardized questionnaires over a period of up to 14 years. Analysis focuses on further characterizing developmental regression and features present in patients with RTT. The study also elucidates genotype-phenotype correlations in RTT, including

patients with less common variants in MECP2. Analysis of these correlations focuses not only on overall severity but also on details of development and the presence of particular features. Results are consistent with previous analyses of genotype-phenotype correlations in RTT, and suggest that multiple features of RTT, including overall severity, regression onset, motor skills, and head circumference, differ significantly based on the type of MECP2 variant present. These correlations could provide important prognostic information for families with a new diagnosis of RTT.

Rovane, Aimee

Mentor(s): Dr. Robert Hock

An Ecological Momentary Assessment of Emotion Socialization in Families with Autism Spectrum Disorder

Parent stress exerts a large influence on child challenging behavior problems in autism spectrum disorder (ASD), and one potential mechanism for this relationship is the emotion socialization processes between parents and children. Parents of children with ASD exhibit poorer coping skills/emotion regulation (ER) strategies and demonstrate greater expressed emotion (e.g., more criticism) toward their children. The current study seeks to provide an ecologically valid approach to understanding family emotion socialization patterns when ASD is present, particularly related to the association between parent stress and behavior problems.

The aims of the study are to determine: 1.) What ER strategies do parents use during a challenging behavior and 2.) Do ES processes (i.e., parent ER, ES style, and expressed emotion) moderate the relationship between baseline parent stress and child behavior problems?

Participants were mothers (N = 20) of children with ASD who were recruited for an ecological momentary assessment (EMA) study examining family patterns in ASD. Participants completed the Parenting Stress Scale, Child Adjustment and Parent Efficacy Scale – Developmental Disability, Difficulties with Emotion Regulation Scale, Coping with Child Negative Emotion Scale, and Family Questionnaire at baseline. Parents then participated in a 7-day EMA study, wherein they received 5 prompts per day and answered questions about their child's behavior and what ER strategy they used. Proportion scores were calculated for each strategy, and 3 regression models were constructed to test moderation effects of the ES processes.

Parents were more likely to help or distract their child (M = 42.2% of total responses), hold in their emotion (M = 27.6%), use a calming strategy (M = 22%), and express their emotion/raise their voice (M = 20.2%) compared to other ER strategies. Of the 3 ES variables, only expressed emotion was a predictor ($p < .001$) for behavior problems, and no ES variables moderated the association between parent stress and behavior problems.

Studying momentary parent ER in response to child behavior is necessary for understanding how to best improve outcomes for both parents and children with ASD. In addition, understanding the ES processes that contribute to child behavior problems has implications for therapeutic targets.

Sajjad, Mohsin

Mentor(s): Dr. Sandeep K. Chaudhuri, Prof. Krishna Mandal

Growth of single crystal Cd(0.9)Zn(0.1)Te(y)Se(1-y) crystals for room-temperature high-resolution nuclear detectors

Recently, Cd(0.9)Zn(0.1)Te(y)Se(1-y) (CZTS) has emerged as a new wide bandgap semiconductor material for the applications of high-resolution room-temperature nuclear detectors. These detectors can be widely utilized in the field of medical imaging, Homeland security, environmental monitoring, nuclear non-proliferation, and space astrophysics. By using the vertical Bridgman technique, large volume Cd(0.9)Zn(0.1)Te(y)Se(1-y) single crystal ingots were grown successfully. Various electrical and optical characterizations were performed on fabricated planar devices. Very low leakage current (≤ 1 nA) at an operat-

ing bias voltage of ≥ 100 V and a high bulk resistivity of $\sim 10^{10}$ ohm-cm was found from current-voltage (I-V) characterization. The highly crystalline structure of the grown crystals was confirmed by X-ray diffraction (XRD) analysis. Energy dispersive x-ray spectroscopy (EDX) showed uniform elemental stoichiometry of the samples. The mobility-lifetime product and drift mobility in all the samples of those compositions were calculated for both electrons and holes. For analyzing radiation detection capability, pulse height spectroscopy was performed using a Cs-137 gamma source on the fabricated detectors. Fully resolved gamma peaks with an energy resolution of $<2\%$ at 662 keV confirmed the potential of this material to be used for room-temperature high-resolution semiconductor radiation detectors.

Sakamoto, Iris

Mentor(s): Dr. Sarah Tryon, Mr. Devin Kellis, Mrs. Kris Ford-Kaigler, Dr. Marlene Wilson

Individual differences in freezing and ultrasonic vocalizations during fear learning and extinction in female rats

While post-traumatic stress disorder (PTSD) affects only a small proportion of trauma-exposed individuals, women are twice as likely to develop PTSD compared to men, even when controlling for rate and type of trauma exposure. This disparity suggests the existence of distinct neurobiological processes, mediated by sex, that predispose some individuals to be more resistant to extinguishing learned fear. Similar differences exist in rodent fear conditioning and extinction, though female rodents are considerably understudied. We hypothesized that female rats would exhibit individual differences in fear extinction similar to those that we have observed previously in males. The present study examined freezing behavior, grooming, rearing, and burying, plus both 22kHz and 50kHz ultrasonic vocalizations (USVs) of female Long Evans rats (N=14) during fear acquisition, context recall, cued extinction learning, extinction recall and generalization to a novel tone. Rats were divided into extinction competent (EC) and extinction resistant (ER) phenotypes based on a median split of freezing behavior during the extinction learning trial. Freezing behavior did not differ between EC and ER groups during fear learning, context recall, and generalization, but ER rats froze significantly more than EC rats during extinction learning and extinction recall. Unlike previous studies in males, female rats exhibited very few “distress” 22kHz USVs with no significant differences were observed between EC and ER groups in number, average duration, or other parameters of 22kHz USVs in any trial. In contrast, 100% of female rats produced 50kHz USVs, in much higher numbers than have been seen previously in males. Female EC rats emitted significantly more 50kHz USVs than ER rats during acquisition, extinction recall, and generalization. Of note, during the first 1-3 minutes of trials prior to the tone, which was used to assess unconditioned freezing, EC rats produced significantly more 50kHz calls than ER rats. These results suggest that like males, female rats display individual differences in both freezing and vocalizations during fear learning and extinction, although males appear to vocalize more in the 22kHz range while females show a distinct pattern and higher number of 50kHz USVs. [Support: VA Merit I01BX001374 (MAW); Magellan Scholars award (IS)]

Sangtian, Stacey

Mentor(s): Dr. Roozbeh Behroozmand, Dr. Yuan Wang, Dr. Julius Fridriksson

Impairment of Speech Auditory Feedback Error Detection and Motor Correction in Post-Stroke Aphasia

The present study investigated how damage to left-hemisphere brain networks in persons with post-stroke aphasia (PWAs) impairs their ability to overtly detect errors in speech auditory feedback. We used the altered auditory feedback (AAF) paradigm to externally induce speech errors by randomly shifting the pitch frequency of the online auditory feedback up or down at ± 100 cents in 34 PWAs and 25 neurologically healthy control participants under two experimental conditions: 1) active vocalizations of a steady speech vowel sound “ah,” and 2) passive listening to the playback of the same self-produced vocalizations. Randomized control trials were included between AAF trials where no pitch-shift stimuli were

delivered to the auditory feedback during vocalization or listening tasks. Following each vocalization or listening trial, participants pressed a button to indicate whether they heard a change (i.e. error) in their speech auditory feedback (“Yes” or “No”). Analysis of A, a non-parametric measure of sensitivity to signal presence, revealed a significant main effect of group with PWAs performing closer to chance compared to controls in both vocalization and listening conditions. Moreover, we found that speech error detection deficit during listening in PWAs was significantly correlated with their impaired vocal error correction magnitude in response to pitch-shifted auditory feedback during vocalization. Further analyses of behavioral measures and corresponding EEG signals are forthcoming. These preliminary findings support the idea that overt detection of speech errors in auditory feedback is impaired in PWAs and that damage to left hemisphere brain networks contributes to this impairment.

Schneider, Gustavo

Mentor(s): Dr. Elise Ince

Twelve of One or a Dozen of the Other: How Numerical Expressions Influence Preferences

Upselling (i.e., when a sales associate/bot recommends adding an item to the basket) occurs routinely in the marketplace. We investigate how consumers evaluate upselling offers that embed numerical quantities. We introduce the concept of numerical expressions—non-numerical quantifiers such as a pair or dozen—and demonstrate that consumers’ purchase intentions are higher when the upselling offers are framed using numerical expressions (e.g., buy a dozen items) relative to their numerical counterpart (e.g., buy 12 items).

Schuck, Percy

Mentor(s): Dr. Jason Stewart

CST interacts with the cohesion complex and promotes sister chromosome cohesion

Sister chromatid cohesion is established during DNA replication by loading of the cohesin complex on newly replicated sister chromatids. Cohesin must then be maintained until mitosis to prevent segregation defects and aneuploidy. Aneuploidy is a driver of tumorigenesis and cancer evolution. How sister chromosome cohesion (SCC) is established and maintained until mitosis remains incompletely understood and emerging evidence suggest that replication stress can lead to premature loss. Here, we report that the RPA-like, single strand DNA-binding protein CTC1-STN1-TEN1 (CST) aids in SCC. CST primarily functions in telomere length regulation as well as less characterized roles in general DNA replication and repair. Following depletion of CST subunits, we observed an increase in the complete loss of SCC. Furthermore, we find that CST interacts with the cohesion complex and that their interaction is increased following treatment with various replication inhibitors. Based on our findings, we propose that CST aids in the maintenance of SCC at stalled replication forks to prevent premature cohesion loss.

Sewell, Mary Elizabeth

Co-Author(s): Grace Lady, Alyssa Raygoza

Mentor(s): Dr. Melissa Duffy

COVID Impact on Academics: Examining Undergraduate Students’ Academic Experiences, Challenges, and Coping Strategies

Within weeks of the World Health Organization labeling COVID-19 a pandemic, approximately 20,000 higher education institutions had ceased normal operations and moved to online instruction (Aucejo, et al., 2020; Brown, 2020; Ferreira, 2020). Southern US states in particular faced some of the highest incidence per capita in the nation (Querolo, 2021). Given the breadth of academic changes, there is a need to understand students’ experience and how they navigated challenges during this time. The purpose of this study was to examine the impact of COVID-19 on undergraduate students’ academic experiences,

challenges, and coping strategies using a mixed methods design. Undergraduate students (N=229) participated from two southeastern US universities in the fall of 2020. Using an online survey, participants completed an adapted version of the Coronavirus Impact Scale (Stoddard & Kaufman, 2020) to assess impact on routines, access to social supports, family discord, stress, and academic performance. The survey also included demographics and open-ended items about academic impact. Semi-structured interviews were conducted with a subset of participants (n=15) to gain a deeper understanding of the nature of their experience. Results of survey data demonstrated that the majority of participants (60.7%) reported a moderate to severe impact of COVID-19 on experience of stress and/or academic performance. Open-ended responses to surveys (n=218) and interviews (n=15) illustrated 4 key areas of impact: social, emotional, motivational, and academic. Participants largely connected academic impact to difficulties in adjusting to online learning, disconnection from learning with peers, increased workload, decreased confidence, and lack of direct access to faculty. Participants also described reduced motivation for learning, difficulty concentrating, and increased procrastination. This study provides insight into factors that may contribute to students' stress and how COVID-19 impacted their academic experience. Findings will be discussed in terms of their relations to key learning and emotion theories including the Transactional Model of Stress and Coping (e.g., Lazarus & Folkman, 1984) and Self-Determination Theory (e.g., Deci & Ryan, 1985). Results may encourage institutions to examine pedagogical approaches to online instruction during the pandemic. Responses from participants who successfully navigated these experiences can provide important insight into supports for students.

Shih, Yiwen

Mentor(s): Dr. Peiyin Hung

Prevalence of Chronic Pain and High-Impact Chronic Pain Among U.S. Adults Aged 18 and Above By Malignancy

Research Objective: To assess the prevalence of cancer diagnosis among U.S. adults with chronic pain.

Study Design: This cross-sectional study obtained data from the 2019 National Health Interview Survey. Rao-Scott Chi-Square tests were conducted to investigate differences in cancer diagnosis by demographics among adults with chronic pain, using population-weighted distributions. The study further identified respondents by their impact level and utilized the same procedure as above to understand the distribution of malignancy by respondent characteristics among those with high-impact chronic pain.

Population Studied: A total of 31,304 respondents, accounting for 50,197,823 nationwide adults, aged 18+ and who reported with chronic pain were included.

Principal Findings: About 20.5% of adults had chronic pain in 2019. Of those with chronic pain, 16.2% had ever diagnosed with malignant conditions (95% CI: 15.2-17.2). Females, non-Hispanic whites, those with bachelor's degree or higher, living in the South region, those were married, and those aged less than 65 with private insurance, and those aged 65+ covered by Medicare and/or Medicaid, living in large fringe metro areas had higher prevalence of cancer burden. Chronic pain with malignancy was prevalent in adults aged 65-84, whereas chronic noncancer pain was prevalent in adults aged 45-64. Nearly 12.7% of adults suffered from high-impact chronic pain; of these adults with high-impact chronic pain, 82.1% were noncancer chronic pain. There were no significant differences in malignancy diagnosis by gender, marital status, urbanicity, regions, and insurance coverage among those with high-impact pain level. Of those with high-impact pain, non-Hispanic blacks, compared to their non-Hispanic whites and Hispanic counterparts, were less likely to have high-impact chronic pain with malignancy.

Conclusions: Nearly one in five American adult suffered from chronic pain and about one-fifth of them had been diagnosed with malignancy. About 13% of chronic pain population experienced high impact pain level; one-fourth of them were noncancer pain. Both chronic pain and high-impact chronic pain were prevalent among non-Hispanic whites. The distributions of high impact chronic pain were different in age group, educational level, and race/ethnicity between adults having chronic with or without cancer, although the latter two variables were insignificant.

Silverman, Allie

Co-Author(s): E.K. Hoffman, Jazmine Hasty

Mentor(s): Ms. Quinyana Brown

Creating and Implementing a Free Safe Sex Supply Pickup Service at UofSC - Carolina Condoms

During the COVID-19 pandemic, the University of South Carolina has made every effort to protect the health of its students and employees. These efforts include limiting the number of students in the Center for Health and Well-Being, where the Sexual Health Office is housed. In addition to providing psychoeducational STI testing appointments and consultations, presentations, and outreach, the Sexual Health Office provides UofSC students with free safer sex supplies, including internal and external condoms, dental dams, and sexual lubricant to proactively promote sexual health on campus. Compounded by cancelled outreach events and virtual STI consultations, there has been a significant decline in the number of free safer sex supplies distributed between Fall 2019 and Fall 2020 (72.01% decrease). The pandemic also resulted in a decline in the number of outreach events in Fall 2020 (33% decline) and in-office consults with students, excluding STI testing appointments (25% decline) as compared to Fall 2019.

This decrease is not indicative of a decline in student need for free safer sex supplies, but rather points toward the necessity of an innovative, virtual, and socially distant solution. To account for the loss of distribution and ensure that free safer sex supplies continue to be accessible for students during the COVID-19 pandemic, the Sexual Health Office created “Carolina Condoms,” an online system for students to order condoms online and pick them up in the Center for Health and Well-Being. Carolina Condoms, which will begin distribution in March 2021, allows students to place orders for pre-packaged condom variety packs on the Student Health website and pick up on the same day from the Center for Health and Well-Being. Carolina Condoms will allow students to stay sexually healthy during the COVID-19 pandemic.

Sim, Rok

Mentor(s): Prof. Stanley Dubinsky

Pseudo-passive noun objects of English need and Korean philyo

With similar semantics, the English verb “need” and Korean verb “philyo” appear with objects that are not true passives but which have passive meaning. This is noted by Jespersen (1927/1954), who observes that “need” takes “-ing” objects which are “understood passively”. So, in English, speaking of one’s house, one might say it “needs to be cleaned” or “needs cleaning”. Similarly for Korean, one might say that a “cip” [house] “chengso toy-nun kes-i philyo-hay” [needs ‘a be-cleaned-thing’] or “chengso-ka philyo-hay” [needs clean]. This paper argues that the non-passive alternates in English and Korean (“cleaning” and “chengso-ka”) both function as nouns, even though they are lexical verbs.

For English, we present the evidence that “cleaning” is a noun when following “need”: (i) it can appear with the article “a” as in “needs a cleaning”, (ii) an object of “cleaning” appears before, rather than after, it (“needs house-cleaning” and NOT “needs cleaning of the house”), and (iii) when “need” is followed by a phrasal verb like “look up”, the -ing form cannot have the intensifier “right” (NOT “the word needs looking RIGHT up” - OK “the word needs to be looked RIGHT up”).

For Korean, we find evidence “chengso” [clean] is a noun when it is the object of “philyo” [need]: (i) “chengso” must have the nominative case marked “ka”, (ii) an object of “chengso” in this construction, e.g. “cip” [house], cannot be marked with the accusative case marker “ul”, and (iii) when “chengso” is the object of “philyo”, it cannot take the noun-forming suffix “kes” (in contrast, “kes” appears when “philyo” takes a passivized phrase as its object).

We conclude: (i) gerundive objects of “need” and bare verb objects of “philyo” are “lexically” (not gram-
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matically) passivized, and (ii) the means of inserting “cleaning” and “chengso” as objects of “need” and “philyo” are distinct. Lexically passivized “clean” is converted into a noun with the “ing” suffix. In contrast, lexically passivized “chengso” is directly inserted as a noun, since these forms, “verbal nouns”, are unspecified for grammatical category (noun or verb) and take on whatever category properties are required at the point of insertion.

Simmons, Chad

Mentor(s): Dr. Alissa Armstrong

Examining the role of adipokines in modulating the *Drosophila melanogaster* ovarian germline stem cell lineage

Signaling pathways that relay nutrient status throughout the body can be disrupted by obesity and nutrient deprivation, but the underlying mechanisms are not completely understood. *Drosophila melanogaster* is a model where ovarian stem cells are sensitive to changes in nutrient availability. One of our main goals is to identify factors secreted from the fat tissue that communicate nutritional information to the ovary. We are using data from larval studies to take a candidate approach in identifying adipokines that play a role in regulating oogenesis. During *Drosophila* larval development, knockdown of several adipokines, unpaired 2, eiger, stunted, and growth blocking peptides, lead to stunted growth. Unpaired 2 (upd2) is secreted from the fat body in response to dietary fat and sugars and activates the JAK/STAT pathway to promote growth and fat storage. Eiger (egr) is an ortholog of human tumor necrosis factor that can cause cell death when overexpressed in the imaginal discs of larval *Drosophila*. We want to examine the role of upd2 and egr in communicating to the ovary in adult *Drosophila*. We found that these adipokines are expressed in adult adipose tissue. Using genetic tools, we induce RNAi-mediated knockdown of egr and upd2 in adult adipocytes to measure the effects on germline stem cells and their progeny in the ovary. Based on previous studies showing upd2’s role in lipid storage and tissue growth, we predict that upd2 knockdown in the fat will affect lipid content in the fat body and negatively influence germline stem cells present in the ovary. Given that egr is a tumor suppressor gene, we predict that egr knockdown in the adult adipocytes will disturb ovarian homeostasis. Using cell biological tools, we are currently examining adipocyte lipid content and size, as well as oocyte development when egr and upd2 expression are altered in adult adipocytes.

Sitter, Kimberly

Mentor(s): Dr. E. Scott Huebner

The BMSLSS: Measurement Invariance and Latent Mean Differences Across Black and White Early Adolescents

In light of the national Equity Movement, there is increased interest in the well-being and experiences of Black and minority individuals in the US. The literature on youth well-being has indicated life satisfaction (LS) as a predictor of positive youth functioning (Suldo, 2016). Extant studies have examined youth LS across diverse groups, however, the appropriateness of such cross-group comparisons with various LS measures has not been universally investigated. Thorough evaluation of the psychometric properties of LS measures is necessary for appropriate interpretation of results in studies comparing findings across diverse groups. The Brief Measure of Students’ Life Satisfaction Scale (BMSLSS; Seligson, Huebner & Valois, 2003) is a widely used brief self-report measure of child and adolescent LS. Although acceptable reliability and validity have been demonstrated for the BMSLSS, no studies to date have examined measurement invariance of the BMSLSS across diverse samples of racial groups in the US. Thus, measurement invariance across Black and White youth was explored through use of multi-group confirmatory factor analysis (MGCFA), which assesses various levels of measurement invariance (configural, metric, and scalar invariance). Each level of invariance builds on the previous level by implementing more stringent constraints of equality on model parameters in order to demonstrate stronger levels of invariance.

Findings provide preliminary support for use of the BMSLSS with Black and White youth, both individually and in comparative research regarding early adolescent LS. Specifically, results supported configural and metric invariance but problems were indicated in the examination of full scalar invariance. Thus, a partial scalar invariance model was identified and demonstrated adequate model fit. Latent mean analyses across the full and partial scalar invariance models indicated higher LS scores reported by White students. Latent mean differences in LS scores across Black and White students in the present study evidence the importance of considering the influence of unequal power and privilege experienced by youth based on their minority status and warrant greater examination of the impact of differing experiences that minority youth face. The BMSLSS may effectively be used as a brief indicator to measure aspects of early adolescent's well-being in a psychometrically sound way.

Smith, Allison

Mentor(s): Dr. Toni Torres-McGehee

Examination of Female Athlete Triad Components within Competitive College Cheerleaders

The female athlete triad (Triad) is an interrelated syndrome that links low energy availability with or without an eating disorder (LEA), menstrual disturbances, and low bone mineral density (BMD) within women. The Triad components have been documented individually within aesthetic sports but has rarely been presented as the combined Triad. Competitive cheerleading is classified as an aesthetic sport due to the subjective judging, the revealing uniforms, and the lean body type of those who participate. Due to the increased athletic demands of the current sport of cheerleading, there is potential for athletes to be at risk for all three components of the Triad. There has been little research focused on cheerleading with no studies examining all three components of the Triad. Therefore, the purpose of this study was to examine the prevalence of Triad components within competitive cheerleaders at the college level.

Methods: Participants (n=20) LEA was assessed through a 7-day dietary and exercise log, the Eating Disorder Inventory 3 (EDI3) and the EDI3 symptom checklist and anthropometric measurements. Menstrual disturbances were assessed through the medical history questionnaire and analysis of a blood sample. Low BMD was assessed through a dual-energy x-ray absorptiometry (DXA) scan evaluated the total body, the lumbar spine, and bilateral hips. Descriptive statistics were used for all dependent variables will be calculated. Significance level will be set at $P < 0.05$ for all analyses. Energy availability (kcal/kg lean body mass) will be calculated for each participant. Low energy availability will be defined as < 30 kcal/kg lean body mass. Cross tabulations and chi-square analysis will used to determine the distribution and correlation between LEA and disordered eating risk from the EDI-3 scores. Regression analysis will determine associations between anthropometric measures, LEA, and physical activity level to physiological responses (metabolic and reproductive hormones). Repeated measures ANOVAs and T-tests will be used to identify differences in energy availability (EA), exercise energy expenditure (EEE), bone mineral density (BMD), eating disorder/disorder eating risk and anthropometric measurements such as height and weight across seasons.

Results: TBD; data still being analyzed.

Conclusion: TBD

Smith, Kaitlyn

Mentor(s): Dr. Stanley Dubinsky

Ethnolinguistic Conflict in the US South and Global South

The Language Conflict Project is an ongoing digital humanities project housed at the University of South Carolina. Our goal is to gather data about ethnolinguistic conflict across the world, compare that data, and eventually attempt to predict linguistic conflict before it becomes violent. The Language Conflict Project is in the process of producing an online encyclopedia of linguistic conflict, and our undergraduate research-

ers write encyclopedia entries about linguistic conflict in countries and regions where language differences have led to conflict. In my capacity as both the managing editor of the project and as an instructor using the project to teach composition, I have recognized one salient aspect about language rights conflicts in many of our research projects: the question of modernity. In many cases, like the United States and Mongolia, the language or dialect of one ethnolinguistic group is associated with rurality, backwardness, and a drag on national or regional progress that prevents the nation from becoming fully modern or cosmopolitan.

My Discover UofSC presentation will consider the striking similarities between cultural stereotypes of Mongolians in and near China and citizens of the South in the United States. Both regions are traditionally more rural and pastoral than the rest of the area, and yet both have provided natural resources that contribute to the economic success of the rest of the nation. In both the US South and Mongolia, language is seen as one of the markers of backwardness or lack of education that prevents national progress. Research by Leigh Anne Duck and Jennifer Greeson has suggested that the US South functions as a space onto which the nation can project both their fear and nostalgia about the past. Similarly, Mongolia is similarly stereotyped as a “repository of authentic nomadic values and as an undeveloped backwater” (Billé 237). These stereotypes and resulting forms of discrimination are often linguistic in nature, and my presentation will argue that the place of these regions within imagined national modernities is a detriment to the linguistic rights and expression of their inhabitants.

Soltanmohammadi, Elham

Mentor(s): Dr. Hippokratis Kiaris,

Unfolded protein response in young and old outbred deer mice

The vast majority of proteins enter the endoplasmic reticulum (ER) for folding and assembling and only properly assembled proteins advance from the ER to the cell surface. The ER responds to the burden of unfolded proteins in its lumen (ER stress) by activating intracellular signal pathways termed the unfolded protein response (UPR).

Endoplasmic reticulum (ER) stress has been linked to various metabolic pathologies, neurodegeneration and aging. Although various mechanistic aspects of the resulting unfolded protein response (UPR) have been elucidated, its regulation in genetically diverse populations remains elusive. In this study we evaluated the expression of ER chaperones in the lungs, liver and brain of young (7 months old) and old (2-3 years old) outbred deer mice (*P. maniculatus* and *P. leucopus*). Chaperones' expression was highly variable between species, tissues and ages suggesting that levels of expression of individual chaperones do not change consistently during aging. Despite this variation, a high degree of coordination was maintained between chaperones' expression indicating the tight regulation of the UPR which is consistent with its adaptive activity to maintain homeostasis. In the brain though of older *P. maniculatus*, at which neurodegenerative changes were detected, loss of coordination was revealed, especially between BiP and either of GRP94 or calnexin which indicates that de-coordination rather than aberrant expression is linked to deregulation of the UPR in aging. These findings underscore the involvement of UPR in the onset of aging-related pathologies and suggest that beyond levels of expression, concerted activation is of primal significance to attain homeostasis. These findings emphasize the value of genetically diverse models and suggest that beyond levels of expression of individual targets the coordination of transcriptional networks should be considered when links to pathology are explored.

Somera,

Mentor(s): Dr. Jim Fadel

Anatomical correlates of age-related dysfunction

The basal forebrain (BF) is comprised of several nuclei including the substantia innominata, medial septum, nucleus basalis and diagonal band of Broca which are involved in cognitive functions including atten-

tion, motivation, and arousal. BF neurons are particularly vulnerable to dysfunction and degeneration in aged humans and, more dramatically, in diseases such as Alzheimer's disease (AD). Age-related BF dysfunction may reflect diminished afferent regulation as well as an altered local glial environment. We have previously shown reduced orexin/hypocretin innervation of BF in aging, a phenomenon that may link afferent dysfunction with altered microglial homeostasis. There is little research examining these relationships involving afferent neuronal and glial cell populations in the BF as it relates to aging. The purpose of this study is to compare neuronal and glial populations to identify anatomical factors susceptible to age-related homeostatic dysfunction in the BF. Several lines of evidence demonstrate the responsiveness of the BF to homeostatic stimuli including food related stimuli. Using a food-paired stimulus to examine effects of aging on physiologically-relevant afferent stimulation of this area, we deposited the retrograde neuronal tracer, cholera toxin B (CTb) in BF of aged (26-28 months) and young (2-3 months) F344/Brown Norway F1 hybrid rats and trained them for 7 days. We then combined neural tract-tracing with functional and phenotypic markers of activation to elucidate neural circuits that may underlie age-related loss of activation of BF neurons using immunohistochemistry. Additionally, to show that loss of orexin afferents affects inflammation in the BF via microglial dysregulation, we administered a miRNA-expressing lentivirus designed to knock down orexin expression (LV-prepro-OX) in the BF in young and aged rats. We then analyzed phenotypic changes in microglia using immunohistochemistry and ELISA against a panel of pro- and anti-inflammatory cytokines. Aged rats showed altered activation of BF afferents located in the medial prefrontal cortex, infralimbic cortex, nucleus accumbens, and ventral tegmental area. Furthermore, changes in morphological and cytokine correlates of microglial activation following orexin loss can be seen in aged rats. Together, these studies compare specific neuronal and glial populations of young and aged rats to identify anatomical factors susceptible to age-related dysfunction.

Spencer, Matthew

Mentor(s): Dr. Cory Schnell, Dr. Samuel DeWitt

The Disruptive Impact of Public Transportation Expansion on Crime Trends: A Time Series Analysis of Light Rail Train Stations in Charlotte, NC

Physical locations can attract or generate crime; one example is public transportation infrastructure which can increase the risk of crime in surrounding areas. Prior research often utilizes cross-sectional designs to examine the spatial relationship between crime and place. This study designs a natural experiment based on the recent expansion of Charlotte, NC light rail train service. The time series of crime incidents at the street segments in different spatial buffers around the train stations are contrasted using interrupted time series analyses. Three temporal periods are examined: a pre-expansion period (2005-2016), a construction period (2017), and a post-expansion period (2018-2019). This permits observation of the short-term disruption or "shock" of long-term patterns of crime at place by the light rail expansion. Our preliminary findings suggest the expansion of the light rail system did influence crime patterns for the spatial areas around both the new and old train stations. These findings have several implications for a range of stakeholders.

Stanley, Jacob

Mentor(s): Dr. Douglas Wedell

Decision Making in the Information Age: Effect of Number of Alternatives and Spatial Arrangement on Choice Context

Decision making is heavily influenced by the context in which the decision is made. The attraction effect and compromise effect are two well documented contextual manipulations that create a strong shift in choice preference. Preference for one of two equally valued alternatives has been shown to be significantly altered by the addition of a third alternative into the context. These effects have been extensively replicated using three alternative choice sets; however, modern technology has made decisions with many

possible alternatives more common, as in online shopping. In two experiments we tested for the presence of the attraction and compromise effects in contexts with nine alternatives. Experiment 1 (n = 50) used a within-subject design to present grocery items varying in price and quality. Presentation of alternatives was randomized on the screen. Half the choice sets contained three alternatives, and the other half contained nine alternatives, with decoys favoring different alternatives on half the trials. Significant preference reversals were found for both attraction and compromise decoys in the three alternative sets. These effects were significantly reduced for the nine alternative sets, with a significant attraction effect and no significant compromise effect. Experiment 2 is ongoing and tests for the effect of presentation order on the magnitude of the attraction and compromise effects in choice sets with nine alternatives. We hypothesized that organizing alternatives by price or quality would facilitate comparisons that would lead to stronger context effects as compared to random ordering. In experiment 2, attraction and compromise choice sets were listed in one of three organizational formats: best to worst price, best to worst quality, or randomized. Although context effects are shown to be robust in experimental settings with three alternatives, our goal was to see if they generalize to more realistic situations in which there are a larger set of alternatives to choose from, as when shopping online.

Sultan, Muthanna

Mentor(s): Prof. Mitzi Nagarkatti, Prof. Prakash Nagarkatti

Single cell RNA sequencing identifies multiple genes related to T regulatory cells induced in Cannabinoid treated Staphylococcus Enterotoxin B (SEB) induced Acute Respiratory Distress Syndrome (ARDS)

COVID19/ARDS has been declared by World Health Organization (WHO) as an outbreak and significant threat to public health globally. ARDS has claimed 250,000 deaths in USA and 1.3 million globally while more than 11 million people have been infected in USA and 54 million globally, while there is no specific effective treatment until this moment. In this study, we used a single dose of Staphylococcal enterotoxin B (SEB) (50 μ g) intra-nasally which acts as a superantigen to induce Acute Respiratory Distress Syndrome (ARDS). The inhalation of SEB, which is a category B agent of bioterrorism as defined by CDC, leads to robust activation of T cells and cytokine storm that causes significant damage to the lungs. In the current study, we induced SEB-mediated ARDS in C57BL/6 mice and investigated if treatment with anandamide (AEA), an endocannabinoid would attenuate ARDS. Our data demonstrated that a dose of (40mg/kg) of AEA significantly improved the clinical parameters including lung function tests in mice with SEB-induced ARDS when compared to SEB+VEH controls, as determined by plethysmography. Analysis of single cell RNA sequencing (scRNASeq) of lungs of SEB+AEA mice showed significant increase in genes related to T regulatory cells and their subsets such as CD4, CCL4, MAF, GATA3, IKZF2, CTLA4, IL2-RA, NT5E, LAG3 and SELL when compared to SEB+VEH. The results have been confirmed by RT-PCR. Additionally, our flow cytometry data demonstrated significant induction of markers related to T reg population when compared to SEB+VEH. Pro-inflammatory cytokine storm is considered one of the outcomes of ARDS. Our ELISA data indicated that pro-inflammatory cytokines such as TNF α and IL6 significantly decreased in SEB+AEA compared to SEB+VEH. Together, our scRNASeq data demonstrated that the endocannabinoid, AEA attenuated ARDS and inflammation mediated by SEB by improving the clinical function parameters of lung through induction of T regulatory cells which mediated the suppression of T cell activation and decreased proinflammatory cytokine storm.

Sung, Yu-Hsien

Mentor(s): Dr. Tobias Heinrich

Electing justice: identify voter preferences for prosecutors' attributes

The United States is long viewed as the most punitive country in the world. For decades, political elites from America's two main parties have constantly used the tough-on-crime appeal as a winning strategy

at campaigns to gain public supports. This is especially the case for local prosecutors. As the gate keepers of criminal justice system who are elected by the public, prosecutors have strong incentives to be harsh rather than lenient when dealing with defendants, and this helped shape the tough sentencing regime as we know it today. However, a different trend has emerged in recent years in the US: a new cohort of progressive prosecutors, who advocate an end to mass incarceration, drug treatment programs in lieu of long sentences, and reversing wrongful convictions. Being tough-on-crime now become a political liability for many politician elites. Even longstanding incumbents can at times be unseated by voters who regard them as “too tough.” All of this is compelling evidence that citizens’ preferences toward prosecutors are more variables and prosecutorial elections can at times more salient than conventional theory suggests. In this article, I investigate voters’ preferences for elected prosecutors with a conjoint survey experiment using the case of the U.S. My findings suggest that electoral rules and the provision of information strongly influence voters’ choice in prosecutorial elections. In partisan races, party identification drives voters’ choices of prosecutors. When partisan cues are absent, voters make use of experience and gender attributes to guide their choices. Moreover, when policy positions are provided, it reduces the effect of partisan vote.

Szewczyk, Curtis

Mentor(s): Dr. Claudia Benitez-Nelson, Dr. Erik Smith

Temperature Sensitivity of Aquatic Organic Matter Degradation Varies as a Function of its Source and Lability

The presence of declining dissolved oxygen (DO) concentrations is a widespread concern for coastal zones, and is a leading cause of water quality impairment in the Southeastern United States. The black-water Waccamaw River, located in coastal South Carolina, suffers from long-term DO impairment despite efforts to manage point source inputs of organic matter (OM). The watershed contributing to the Waccamaw River contains both natural forested wetlands and expanding urbanization, providing two distinct non-point sources of OM input. We performed a series of experimental manipulations to assess the potential relationship between temperature and organic matter quality and its impact on aquatic OM degradation. This relationship has been suggested and debated within the microbial soil science community, however, assessments of the potential temperature-quality relationship within aquatic systems is lacking. We hypothesize that this relationship likely exists within aquatic systems, and if so, may be a mechanism of DO impairment in this OM-rich system. A focus on temperature sensitivity is imperative because observed and predicted warming would further enhance OM degradation, and thus DO consumption, disparately. To test this hypothesis, 5-day DO consumption rates were quantified in water samples collected from the Waccamaw River, nearby forested wetlands, and stormwater detention ponds that were incubated at 3 different experimental temperature regimes. Ancillary measurements, such as chlorophyll-a, nutrient/carbon concentrations, and OM optical characteristics allowed for the comparison of OM source across sites. Results showed that DO consumption increased with temperature across sites. Although all source waters increased in their OM degradation (as measured by DO decay coefficients), temperature sensitivity of OM degradation (as expressed by Q10 values) suggest that the more refractory OM from forested wetlands has a higher sensitivity to warming than the more labile OM from stormwater detention ponds. Our findings suggest that with ongoing climate change, it may be that naturally OM-rich ecosystems, such as the Waccamaw River, will be increasingly susceptible to elevated OM degradation and associated DO impairment, even in the absence of increased anthropogenic OM inputs due to urbanization.

Tandon, Keah

Mentor(s): Ms. Jennifer Asouzu, Ms. Katie Morton, Mr. Hamilton Wasnick, Dr. Amber Fallucca
Employers’ Perspectives on Beyond-the-Classroom Experiences

ences (internships, study abroad, service learning, etc.) positively impact undergraduate student success. One way that student success can be measured is through post-graduation employability and career readiness. Since the employers' perspective on the benefits of participation in BTC experiences for career readiness is understudied, employers who frequently hire University of South Carolina graduates were surveyed for their perceptions. This presentation uses the local data to explore employers' perspectives on the relationship between beyond-the-classroom experiences and career readiness during the recruitment and hiring process.

Thomas, Asia

Mentor(s): Dr. Samuel McQuillin

Screening Utility of the Classroom Performance Survey for Virtual or In-Person Learning

The proposed study will help to aid school leaders during COVID-19 in their educational decision-making after evaluating a commonly used yet under-researched measure of school functioning called the Classroom Performance Survey (CPS). The CPS has been modified during the current study to assess students' academic skills, attitudes, and behaviors in both the virtual and in-person learning context. In light of a national pandemic, the results of the study will help to promote continued or adapted use of a measure that can be used to predict high-stakes academic and behavioral student outcomes during a time when students' needs are considerably high. As a screening tool, the modified CPS can also be used to inform targeted intervention for schools participating in Multi-tiered Systems of Support. In previous research investigating the utility of the most recent version of the CPS with adolescent populations, Brady et al. (2012) provided results for both reliability and construct validity. The current study, however, will be used to evaluate predictive and incremental validity of a modified version of the CPS using an Elementary School population. The CPS subdomain scores (i.e., academic and interpersonal skills subdomains) will be used in isolation and combination to forecast future student outcomes including GPA, standardized test scores, discipline history, and attendance. Finally, educators will also gain a sense of how students school-wide are performing across areas that are important for school success during dual-modality instruction.

Tjoelker, Madeleine

Mentor(s): Prof. Whitney Dobek

Previvor and High-Risk Breast Cancer Patients' Opinions on a Specialized Management Clinic

Approximately 5-10% of cancers are thought to be hereditary, caused by pathogenic variants in genes associated with inherited cancer syndromes. Previvors, individuals who have a higher predisposition to cancer due to genetic or other risk factors, have specific healthcare and psychological needs that may be better served by a specialized management clinic. This study compared the experiences of previvors who had access to a specialized management clinic with those who did not, in order to better understand the unique needs of previvors. This study utilized a mixed methods design including an online survey and semi-structured phone interview. Overall, previvors with access to a specialized management expressed less stress, less delay in care, access to a simplified clinical process, and the thorough education needed to make informed decisions. Previvors who did not have access to a specialty clinic desired a team of specialists familiar with genetics, a forum to ask questions, and a clinic that would ensure their care meets the current recommendations. This study demonstrates the need for specialized management clinics designed with previvors' needs in mind in order to provide these patients with the most appropriate care.

Tucker, Curisa

Mentor(s): Dr. Nathaniel Bell, Dr. Cynthia Corbett, Dr. Audrey Lyndon, Dr. Tisha Felder

INVESTIGATING THE IMPACT OF PATIENT-CENTERED MEDICAL HOMES ON RACIAL DISPARITIES IN SEVERE MATERNAL MORBIDITIES USING MEDICAL EXPENDITURES PANEL SURVEY DATA

Background: Among U.S. women who survive pregnancy and childbirth, 50,000 will go on to experience life-threatening pregnancy-related complications, also known as severe maternal morbidity (SMM). SMM is disproportionately experienced among minorities. The redesigning of U.S. primary care into patient-centered care through designated medical homes (PCMH) has the potential to improve outcomes and experiences with care following childbirth.

Purpose: Estimate the association between enrollment in a medical home and racial disparities in quality of care for women who experience an SMM during the childbirth period.

Design: Longitudinal analysis of pooled panel data from 2801 respondents who gave birth using the Medical Expenditure Panel Survey (MEPS) for the years 2007 through 2016 of self-reported primary care experiences and clinical care outcomes. Generalized Estimation Equation (GEE) models were used to estimate racial-specific relative risks of SMM (using CDC criteria), adjusting for pre-existing, enabling, and need-based factors. An SMM was counted if it occurred in the same round or plus/minus one round of the respondent's birth. Survey weights were adjusted in all statistical analyses.

Preliminary Results: The respondents in our sample were grouped into four racial categories: White (71%), Black (19%), Asian (6%), and Other (3%). The mean age was 28, 58% of the respondents had a high school diploma or higher, 53% were married, and 38% were never married. In the weighted analysis, an SMM was experienced by 1.2% (n=66) of respondents, and approximately 25% of our sample were enrolled in a PCMH (n=1338). PCMH enrollment was not statistically associated with SMMs (p-value=0.55). Using White respondents as the reference group, the predictive probabilities of SMM for White and Black respondents was 1.1%, 2.2% for Asian respondents, and 0.2% for respondents in the Other race category. The overall interaction effect of racial differences for SMM was not statistically significant (p-value=0.57).

Potential Implications: For certain populations, PCMHs may provide an opportunity for improved maternal outcomes and may reduce racial/ethnic disparities in SMM, but more research is necessary.

Ul Hassan, Noor

Mentor(s): Dr. William Mustain

Unitized reversible fuel cell for electrochemical energy storage and energy conversion

A Unitized Reversible Fuel Cell (URFC) is a device capable of operating in both power production (fuel cell, FC) and energy storage (electrolysis cell, EC) modes. URFCs are considered a key enabler of intermittent renewable energy technologies, as they can store and convert chemical energy to electrical energy depending on supply and demand. One of the most attractive aspect of URFCs is the advantage of high energy density vs. existing battery systems. URFCs coupled with wind or solar power systems could potentially complete the cycle and maintain supply vs demand balance. In this combination, URFCs are highly attractive for remote areas applications where power lines/infrastructure is not feasible due to various techno-economic reasons. Performance, cost, and durability of the catalyst materials are the key factors that govern the commercialization of H₂-based energy devices such as unitized regenerative fuel cells (URFCs). Taking advantage of URFC system's alkaline operating environment, lower system costs can be achieved through the use of platinum group metal-free (PGM-free) materials, low cost membranes and other inexpensive component materials. In this work, we present high performing bifunctional electrodes with high round trip efficiency. This work discusses various directions of URFCs development in an effort

for its commercial viability.

Umari, Fattona

Co-Author(s): Farsheed Umari

Mentor(s): Dr. Robin Dawson

A qualitative exploration of beliefs about the use of face coverings among adult South Carolinians

Background/Significance: The rapid spread of the novel coronavirus (COVID-19) across the globe has resulted in a devastating impact on economies, healthcare systems, and societies. The United States leads the world in the number of total confirmed cases and deaths. To mitigate the spread of COVID-19, traditional personal protective public health measures (e.g., physical distancing, proper hand hygiene) have been strongly encouraged and during certain periods, even mandated. Community use of face coverings plays an important role in helping curb the spread of COVID-19. Despite current efforts by health protection agencies in promoting the use of face masks/coverings and the implementation of mask mandates, some are still reluctant to wear them.

Purpose: To explore beliefs that drive face coverings behaviors in South Carolina.

Methods: This qualitative descriptive study was guided by the Theory of Planned Behavior and Reasoned Action. Adult residents (≥ 18 years) living in South Carolina were recruited via purposive and snowball sampling on social media sites (i.e., Facebook, Instagram). Data included audio-recorded, semi-structured remote interviews that were then transcribed and analyzed using a thematic analysis.

Results: Seventeen participants, ranging in age from 18 to 65 years, completed interviews. The majority were white and female. Five emergent themes were identified: 1) Lack of trust in traditional sources of health information; 2) Entrenched beliefs and disinterest lead to erroneous COVID-19 knowledge; 3) Wearing a mask symbolizes weakness; 4) Individual rights conflict with community responsibility; and 5) Mask mandates do not affect private behaviors.

Conclusions/Implications: Healthcare professionals, including nurses, should understand the most common reasons why individuals are resistant to disease-mitigating public health strategies and be available to have conversations that recognize why erroneous beliefs occur. There is a need for consistent, continuous messaging on the individual and community benefits to the appropriate use of face masks/coverings.

Uriegas, Nancy

Mentor(s): Dr. Toni Torres-McGehee

Examination of Eating Disorder Risk among University Marching Band Artists

Background: Marching band artists are a physically active population, composed of approximately 27,000 people in the United States. University marching band artists face many of the same physically active demands and mental stressors as student athletes, potentially predisposing them to injury, illness, and risk for eating disorders (EDs). The purpose of this study was to examine ED risk across sex in university marching band artists, and to determine the type of risk based on the Eating Disorder Inventory-3 (EDI-3) and Eating Disorder Inventory-3 Symptom Check List (EDI-3 SC). A secondary aim examined marching band artists and pathogenic weight control behavior use across sex.

Methods: This was a cross-sectional study. A total of 150 marching band artists (female: $n=84$, male: $n=66$, age= 19.9 ± 1.1 years) from three National Collegiate Athletic Association Division I university marching bands participated in the study. We screened for ED risk using the EDI-3, and the EDI-3 SC.

Results: Overall, marching band artists were at risk for EDs, using only the EDI-3, 45.3% ($n=68$) were at risk, with females at significant higher risk than males [$\chi^2=5.228$, $p=.022$]; using only the EDI-3 SC, 54%

(n=81) were at risk and no significant differences were found across sex. Overall, 48% of all participants reported dieting and 20.7% engaged in excessive exercise to control weight. Significant differences were found between sex and purging to control weight [$\chi^2=3.94$, $p=.047$] and laxative use [$\chi^2=4.064$, $p=.044$], females engaging in behavior more than males.

Conclusions: Eating disorder risk was prevalent for both female and male marching band artists, with females displaying higher risk for EDs than males. Furthermore, marching band artists are engaging in pathogenic behaviors to control their weight. Healthcare providers (e.g., physicians, athletic trainers, physical therapist, dietitians, etc.) working in this setting should be aware of the risk factors displayed in marching band artists, and be able to provide education, prevention, and clinical interventions to this population. Additionally, marching band administrators should be aware of all medical risk factors and the benefit of having a healthcare provider (e.g., athletic trainer) to oversee the healthcare and wellness of marching band artists.

Wahle, Steve

Mentor(s): Dr. Allison Marsh, Dr. Breanne Grace

The Veteran Pedestal Dilemma

n all volunteer U.S. military has been continuously engaged in a war for nearly 20 years. However, only a small portion of the U.S. population has deployed in support of combat operations while even fewer have experienced combat. Additionally, most Americans have not been touched by the Post 9/11 wars. There have been no drafts, rations, victory gardens, nor war bond campaigns. In response to this unique war effort there have been various attempts to express gratitude toward military members and veterans. The various forms of gratitude have placed veterans on a pedestal up and away from other members of the community.

While this may all be well intentioned, it has marginalized many veterans and deepened a divide between the military and civilian populations. The number of veteran-centric organizations that compose the “sea of goodwill” have swelled since September 2001. The nonprofits, businesses, and government agencies that offer this goodwill reinforce the space between those who have military service and those who do not.

As part of my collaboration with Columbia VA Health Care System mental health providers, I am presenting on the implications of putting veterans on a pedestal. This presentation will be offered as part of the Adaptive Reorientation Seminar series. Topics considered will be a brief history of veteran benefits, veteran perspectives, and reframing “veteran issues”.

Wasson, Jewel

Mentor(s): Ms. Janice Edwards

Essential Informational Needs of Parents Receiving a Turner Syndrome Diagnosis: Parent and Genetic Counselor Perspectives

Turner syndrome affects approximately 1 in 2,500 live female births, and etiology includes the partial or complete loss of the second X-chromosome in phenotypic females. Prenatal and postnatal outcomes are different, as there is a high risk of fetal demise in the prenatal period while individuals who survive to birth can ultimately live long lives despite certain health complications and neurocognitive differences. Current recommendations state that counselors should be involved in the diagnostic procedure; however, there is little consensus on the content of information that parents need about Turner syndrome when receiving a diagnosis. Guidelines for what information to include during an initial diagnosis do not yet exist. The aim of this study was to identify which informational items related to Turner syndrome are considered most essential by parents and genetic counselors.

A survey including 100 informational items related to Turner syndrome was sent to genetic counselors and parents whose children were diagnosed with Turner syndrome prenatally or postnatally. Participants

ranked each informational item as essential, important, or not too important for an initial diagnosis, and a Likert scale was used to quantify and rank each item in order in level of importance. Information that both genetic counselor and parent groups ranked within the top 30 items was deemed “essential” for an initial discussion of a Turner syndrome diagnosis.

Of the top 30-ranked items for each group, 21 informational items were deemed essential for an initial prenatal diagnosis, and 20 informational items were deemed essential for an initial postnatal diagnosis. Thirteen items were deemed essential for an initial discussion of a Turner syndrome diagnosis overall. There were also statistically significant differences in the item ratings between each survey group, which included prenatal genetic counselors, postnatal genetic counselors, and parents who have received either a prenatal or postnatal diagnosis for their child. Findings of our study identified which items are most important for an initial discussion of a Turner syndrome diagnosis both in the prenatal and postnatal period and may provide a guide for what providers should focus on when presenting an initial Turner syndrome diagnosis to parents.

Watson, Brittany

Mentor(s): Dr. Melissa Moss

A Cell-Based Biosensor for Early Alzheimer’s Disease Detection

Introduction: Alzheimer’s disease (AD), a neurodegenerative disease characterized by progressive cognitive decline, is a leading cause of dementia in people over the age of sixty. Early disease detection could result in more effective treatment; however, early diagnostic tests are not currently available. Accumulation of amyloid plaques comprised of aggregated amyloid- β protein ($A\beta$), neuronal death, and blood-brain barrier (BBB) breakdown characterize AD. The BBB is formed by a tight monolayer of endothelial cells, which is distinguished by tight junctions, the absence of openings, and few pinocytotic vesicles. Tight junctions are required for a healthy, intact monolayer and render relatively high transendothelial electrical resistance (TEER). As permeability of the monolayer increases, the TEER values decrease. AD-associated breakdown of the BBB is correlated with vascular $A\beta$ deposition, suggesting that aggregated, pathological $A\beta$ can modulate TEER. If validated, these concepts could provide the basis for a cell-based biosensor to detect AD-associated $A\beta$ aggregates.

Materials and Methods: Primary human brain microvascular endothelial cells (HBMVECs) were cultured on a suspended membrane coated with plasma bovine fibronectin to mimic the BBB. Cell culture media was supplemented with hydrocortisone to promote barrier properties. HBMVEC monolayers displaying physiological TEER were treated with monomeric $A\beta$ or oligomeric $A\beta$ aggregates, and TEER measurements were monitored over time.

Results and Discussion: Oligomeric $A\beta$ aggregates, but not monomeric $A\beta$, induced a reduction of TEER. This result demonstrates that pathogenic $A\beta$ aggregates are uniquely responsible for inducing endothelial monolayer permeability. Aggregate concentration also correlated inversely with the magnitude of TEER change. This unexpected result might be explained by assembly of oligomers into larger aggregates at higher concentrations. This work validates the ability of TEER measurements to selectively identify physiologically active $A\beta$ oligomers.

Conclusions: These results provide a conceptual basis for the design of a cell-based biosensor for early AD detection that leverages selective BBB breakdown by pathogenic forms of $A\beta$. Future work will translate this experimental system to a biosensor platform. In parallel, the nucleation-dependent nature of $A\beta$ aggregation will be leveraged to amplify oligomer concentrations to facilitate detection of physiological concentrations of early $A\beta$ aggregates.

Wen, Shaoshuang

Mentor(s): Dr. Katherine Barbieri

Interstate Rivalry and Sanctions: An Unprobed Link

Existing scholarly research on sanctions has largely ignored the role of international relations and its effects on sanctions propensities. My dissertation reconsiders sanctions use and sanctions effectiveness by establishing an empirical link between conflictual interstate relationships and sanctions. I explain sanctions onset and outcomes looking at variation in target third-party rivals. I argue that ongoing interstate rivalry with third states invites sanctions. This is because third-party rivals limit the targets' capability to evade the intended economic costs of the potential coercion as the targets are motivated to devote their finite resources to prevent power shifts and attacks from their adversary with higher political priority compared to resisting sanctions. In turn, senders are more likely to use sanctions when the current international environment favors their bargaining positions during sanctions afterward, considering the credibility and capability of rivals' attacking the target. Additionally, I demonstrate the negative effect of the target's third-party rivals on target acquiescence following sanctions, arguing that target states have incentives to misrepresent their true resolve and capabilities by resisting sanctions when they are involved in an ongoing international rivalry with third states. I find support for my expectations in statistical tests spanning 1960-2005. My findings hold important policy implications, for scholars and policymakers, amid contemporary sanctions against Iran, the Arab League boycott of Israel, and sanctions against North Korea.

Westbrook, Holly

Mentor(s): Dr. Annie Bourbonnais

DON cycling in the Eastern Canadian Arctic Archipelago from isotopic data

The Eastern Canadian Arctic Archipelago (CAA) is a nitrogen limited region with high glacial coverage and relatively little riverine input relative to other Arctic regions. Climate change is expected to drastically alter the input of inorganic nitrogen (N) sources within the next decades with increasing river discharge and melting of permafrost and glacial sheets. In addition to inorganic N, dissolved organic N (DON) could represent a significant source of nutrients for primary producers in Arctic ecosystems, but few DON data for the Arctic region exist. A recent study in the Eurasian coastal Arctic revealed a dynamic DON cycling with riverine DON being consumed as it traveled along the shelves. In this study, we used stable isotopes to investigate DON cycling in the Eastern CAA. We analyzed the $\delta^{15}\text{N}$ of DON and nitrate for more than 100 surface seawater and 11 riverine samples covering the CAA in July-August 2019. We also measured the $\delta^{18}\text{O}$ of seawater to inform about water sources (i.e., riverine or marine). We interpreted our isotopic data to determine DON sources as well as production and consumption processes in the CAA. Our data suggest that DON cycling in the CAA is complex. Nitrate was the dominant form of dissolved nitrogen in most rivers, which had low DON concentrations (0-). In contrast, DON was the only source of dissolved nitrogen in the CAA surface waters. In several areas the fraction of freshwater was positively correlated with a lower DON concentration, indicating that riverine inputs in the CAA, mostly glacial in origin, act to decrease overall DON concentrations in surface waters. However, higher DON concentrations associated with a low $\delta^{15}\text{N}$ of DON were observed in some nearshore areas, which is more consistent with the input of riverine DON observed in other regions (Laptev Sea and Western Arctic). Additionally, in the Nares Strait and Southern Baffin Bay, we observed a significant negative correlation between chlorophyll a and DON concentrations, which suggest DON consumption by phytoplankton. This study helps establish a baseline to assess future change in nutrient regime for this climate sensitive region.

Wilson, Sarah

Mentor(s): Prof. Amit Almor

Lexical and syntactic priming in dialogue

People will subconsciously imitate one another in gesture, body posture, speech rate, and many other behaviors during a dialogue. Speakers also align with one another across multiple linguistic levels to ensure effective communication. The Interactive Alignment Model (Pickering & Garrod, 2004) assumes alignment is driven by automatic, subconscious priming mechanisms between speakers. This study examines how speakers prime one another to repeat a grammatical structure that has been recently produced, a phenomenon referred to as syntactic priming. Multiple linguistic factors have been shown to influence syntactic priming. In particular, the repetition of specific words such as nouns or verbs has been shown to enhance syntactic priming, an effect termed “lexical boost”. Moreover, the use of a non-repeating verb that nevertheless shares a preference or “structural bias” for a certain grammatical structure with a previously mentioned verb can also enhance syntactic priming. Bernolet and Hartsuiker (2010) found in a priming study in Dutch that a verb’s bias for a particular argument structure modulates syntactic priming: priming was strongest when the syntactic structure contradicted the verb bias.

The current study extends upon Bernolet and Hartsuiker’s (2010) study of verb bias effects in syntactic priming in two ways: first, by replicating the verb bias effects in syntactic priming in English, and second, by including a condition with verb repetition in order to compare the magnitude of syntactic priming associated with overlap of verb structure bias to lexical boost effects. The present study tests the hypothesis that verb bias produces greater syntactic priming effects when the priming structure opposes the verb’s structural preference, and that verb repetition between structures will enhance priming effects regardless of a verb’s bias. This study contributes to research on lexical and syntactic priming, which in turn advance the understanding of how speakers make linguistic choices and the development of complex, psycholinguistic models of syntactic priming and linguistic alignment during interactive dialogue.

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Worden, Austin

Mentor(s): Dr. Jay Potts

Establishing the Molecular Regulation of Toroids

The use of three-dimensional (3D) culture systems, such as hydrogels, provides a distinct advantage over two-dimensional systems when examining cellular behavior and interactions. These hydrogels have been used in numerous ways including tissue repair and engineering, drug delivery, and 3D matrices. When cultured on top of a hydrogel, cells migrate to form a ring-like structure termed a toroid. The toroid formation appears to be a near universal process. We have shown that at least a dozen different cell types make toroids only when they are cultured on the surface of the gel. These migrating toroidal cells are long, thin and looks like the spokes of a wheel as they migrate towards the center of the gel. This migration mimics the in vitro migration patterns seen during embryonic development and some cancers. Interestingly, when cells are cultured inside of the hydrogel, there is a slight contraction of the gel, but no toroid is formed. Recently, our lab discovered that the CXCL12-CXCR4 pathway, the pathway implicated in numerous diseases including cancer and HIV, was upregulated during toroid formation and downregulated for mixed-in gels. Of note is the fact that no cancer cell line we have tried (<4) can form toroids when cultured on the surface of the collagen hydrogel. While there are still a number of signaling pathways to examine, preliminary data suggests that inhibiting PI3K and N-Cadherin results in a significantly delayed,

but not eliminated, toroid formation. My work will establish toroid formation as a novel 3D model for high throughput investigation of molecular mechanisms involved in the directed migration used during embryonic development, stem cell migration, and cancer differentiation.

Wright, Pamela

Mentor(s): Dr. Cynthia Corbett

Health-Related Quality-of-Life and Exercise Perceptions among Women with Polycystic Ovary Syndrome

Background: Polycystic ovary syndrome (PCOS), the most common chronic endocrinopathy, is associated with risk factors that increase the likelihood of cardiovascular disease, diabetes, and depression. First-line management recommendations include exercise. However, exercise benefits, barriers, and outcome expectations among women with PCOS and the potential association of these perceptions with health-related quality-of-life (HRQoL) are unknown.

Purpose: Explore HRQoL, potential exercise barriers and facilitators, and exercise outcome expectations among premenopausal women with PCOS.

Methods: In this descriptive study, online survey respondents (n=935), recruited from PCOS social support websites, included women aged 18-42 who self-reported a PCOS diagnosis. Survey data was collected using Qualtrics (Provo, Utah) and transferred to SPSS (Chicago, Illinois) and cleaned. Descriptive statistics were computed for each variable. Multiple regression will be performed to explore associations between HRQoL, exercise barriers, facilitators, outcome expectations, and depressive symptoms.

Results: Respondents were 32 ± 10.6 years of age, mostly White (72%), well-educated (56% had a college degree), married (69%), and employed full-time (65%). Mean HRQoL was 2.7 ± 0.6 with subscales ranging from 2.4 ± 0.7 to 3.2 ± 1.1 . Mean scores were calculated for exercise benefit/barrier ratio (0.9), exercise outcome expectations (2.4 ± 0.8), and depressive symptoms (20.4 ± 5.8).

Conclusions: Preliminary results indicate that respondents reported low HRQoL, particularly in the psychosocial/emotional domain and the physical domains of obesity, menstruation, and hirsutism. Exercise barriers were perceived greater than exercise benefits. Barriers included facility issues (e.g., gym fees), time commitment, and lack of social support. Overall, the respondents had low exercise outcome expectations and high depressive symptoms. These characteristics may interfere with exercise participation among women with PCOS. Research is needed to discern effective strategies for exercise initiation and maintenance and to evaluate the effects of exercise on HRQoL and depressive symptoms among women with PCOS.

Keywords: polycystic ovary syndrome, health-related quality of life, exercise barriers and facilitators, exercise outcome expectations

Wright, Pamela

Mentor(s): Dr. Michael Wirth, Dr. James Hebert, Dr. Swann Adams

CRP as a Predictor of Depressive Symptoms in African Americans

Background: African-Americans (AAs) who experience depressive symptoms have a more severe, prolonged depression with increased disease burden and disability compared to other racial groups. Although chronic systemic inflammation is a well-established mechanism in the pathogenesis of depression, the literature is mixed regarding its association in AAs. Physical activity is a potential modulator of both depressive symptoms and c-reactive protein (CRP), a marker for chronic, systemic inflammation.

Purpose: The objective was to examine the association between depressive symptoms and CRP in AAs from a church-based program in South Carolina and assess physical activity as a possible effect modifier.

Methods: Participants (n=414) were from the Healthy Eating and Active Living in the Spirit (HEALS) lifestyle intervention (2009-2012). The Center for Epidemiological Studies Depression Scale (CES-D) was administered to measure depressive symptoms (outcome) and participants' blood samples were collected to measure high-sensitivity CRP (hs-CRP, exposure). Using baseline data, descriptive statistics and regression analyses were performed and results were stratified by physical activity levels.

Results: Participants were middle-aged (54.9 ± 11.8 years), mostly female (79%), married (61%), with some college (35%), and employed full-time (53%). Although 85% reported good to excellent perceived health, most participants were obese (BMI 33.5 ± 7.5 kg/m²) and had ≥ 1 chronic health condition. The mean hs-CRP level was 2.73 mg/L (SD ± 2.38 mg/L). The mean score of depressive symptoms was 5.29 (SD ± 4.76). High CRP levels were significantly and positively associated with higher levels of depression. Among those meeting physical activity guidelines, the CESD score increased 0.09 (± 0.04) for every-one unit increase in CRP.

Conclusions: The study revealed higher depressive symptom scores in participants with higher hs-CRP levels, especially in those who met the recommended physical activity guidelines. More research is necessary to delineate the relationship between variables and determine protective factors to reduce health disparities among AAs.

Wu, Xinyi

Co-Author(s): Zhenyao Wu

Mentor(s): Prof. Song Wang, Prof. Lili Ju

A One-Stage Domain Adaption Method for Unsupervised Nighttime Semantic Segmentation

Semantic segmentation of nighttime images plays an equally important role as that of daytime images in autonomous driving,

but the former is much more challenging due to poor illuminations and arduous human annotations.

Here, we propose a novel domain adaption method for nighttime semantic segmentation without using labeled nighttime image data.

Yang, Gene

Mentor(s): Prof. Dongkyu Lee

Tuning thermoelectric properties by controlling oxygen vacancies in epitaxial La_{1.85}Sr_{0.15}CuO₄ thin films

Thermoelectric (TE) power generation is one of the promising energy conversion technologies, which can overcome global warming issues. The efficiency of TE power generators mainly depends on the power factor $S^2\sigma$, where S and σ are thermopower and electrical conductivity, respectively. S and σ are determined by an intrinsic material parameter, therefore, the discovery of highly efficient thermoelectric materials is essential to develop high-performance TE generators. While conventional TE materials such as Bi₂Te₃, Bi_{2-x}Sb_xTe₃, and Bi₂Te_{3-x}Sex offer good TE properties, these materials are composed of toxic, naturally rare, and heavy elements. Alternatively, transition metal oxides (TMOs) have attracted growing attention for TE power generators because TMOs are lighter, cheaper, and less toxic than conventional TE materials. Recent studies have demonstrated the potential of TMOs as promising TE materials owing to a wide range of electronic properties. However, developing TMOs with high TE efficiency is a huge challenge due to the conflicting combination of oxide properties: electrical conductivity and thermopower, which need to be optimized to maximize the TE efficiency. To overcome this obstacle, nanostructuring of oxide materials could be one of the most promising approaches. In particular, the use of oxide thin films

can enable the modulation of oxygen defects, which play a critical role in controlling electrical conductivity and thermopower. In this work, we explore the relationship between oxygen defects and thermoelectric properties using a model system, $\text{La}_{1.85}\text{Sr}_{0.15}\text{CuO}_4$ (LSCO) in which the TE properties are highly sensitive to the oxygen defects. Pulsed laser deposition is employed to deposit LSCO thin films with different oxygen stoichiometry. With tensile-strained thin films, we perform post-annealing treatments in reducing and oxidizing conditions that enable either creation or removal of oxygen vacancies, respectively. Measurements of TE properties demonstrate how the TE properties of the LSCO thin films are influenced by controlling oxygen vacancies. We find that changes in the TE properties are strongly associated with the formation of oxygen vacancies in LSCO films. Our work illustrates that controlling the oxygen defect is a new strategy to design highly effective oxide materials which can result in a high thermoelectric power factor.

Yang, Jingyi

Mentor(s): Prof. Sayward Harrison

Adaptation and Validation of a Chinese Version of the Bullying, Harassment, and Aggression Receipt Measure (BullyHARM)

School bullying has negative impacts on children's learning, physical health, and socio-emotional well-being and is a growing concern in China. However, few validated scales for measuring bullying among Chinese children exist. The Bullying, Harassment, and Aggression Receipt Measure (BullyHARM) measures bullying among children in the United States (US) with 22-items to assess six bullying domains (i.e., physical bullying, verbal bullying, social/relational bullying, cyberbullying, property bullying, sexual bullying). This study aimed to describe the development and preliminary validation of a Chinese version of BullyHARM. The Chinese version was adapted via forward-backward translation then administered to a random sample of 394 students ($M=13.25$ years, $SD=.46$) in Beijing, China. One item from the physical bullying subscale was dropped due to low endorsement frequency, yielding a final 21-item scale. The final scale displayed strong internal consistency ($\alpha=.93$). Factor structure and model fit were examined using confirmatory factor analysis (CFA). The model that displayed the best fit was a first-order model consisting of six factors ($RMSEA=.02$, $CFI=.99$), consistent with US findings. Findings suggest that BullyHARM-China is reliable and assesses six domains of bullying. Future research is needed to compare Chinese children's performance on BullyHARM-China with other bullying, psychosocial, and educational measures

Zhang, Li

Mentor(s): Dr. Igor Roninson, Dr. Campbell McInnes

Design, synthesis, and optimization of novel CDK8/19 degraders as potential anti-cancer agents

Cyclin-Dependent Kinase 8 (CDK8) and its homolog CDK19 play a key role in transcription. They potentiate transcription factors in cancers via both kinase-dependent and kinase-independent activities that contribute to tumor growth, metastasis, and drug resistance. First-generation CDK8/19 inhibitors have entered clinical trials, however, can only block enzymatic functions and thus lead to resistance through mutations. There is a need to develop new drug modalities targeting CDK8/19 by different mechanisms. Proteolysis Targeting Chimeras (PROTACs) are bifunctional molecules that induce target protein degradation, should thus eliminate all functions of the target protein through the ubiquitin-proteasome system and hence represent a promising strategy. Here we present our efforts in the design, synthesis, and optimization of novel CDK8/19 degraders. Based on the CDK8/19 inhibitor Senexin C, a series of PROTAC molecules have been designed, synthesized in-house, and evaluated for their CDK8/19 degradation efficiency. From the resulting SAR information, further optimization was carried out and led to highly efficient PROTAC molecules. A PROTAC library targeting CDK8/19 including both individual CDK8 or CDK19 and CD8/19 dual degraders was generated. Further studies to improve the potency, selectivity, and degra-

dation efficiency of PROTAC molecules are in progress.

Zhang, Youwen

Mentor(s): Prof. Hippokratis Kiaris

Identification of Rassf1 as ATF4 Target Gene During Endoplasmic Reticulum Stress

Accumulation of unfolded or misfolded proteins in the endoplasmic reticulum (ER) causes ER stress and triggers the unfolded protein response (UPR). The UPR is a protective process that restores cellular homeostasis by controlling protein translation, folding, and degradation in response to ER stress in cells. It is known that ER stress causes cell cycle arrest, however, the molecular mechanisms and the role of the UPR underlying cell cycle arrest still need to be investigated. Gene expression correlation analyses, at the whole transcriptome level, in primary fibroblasts from genetically diverse deer mice following induction of ER stress revealed that Rassf1 was strongly correlated to UPR target genes, including ATF4, GRP78, GRP94 and DDIT3. Exposure of primary *Peromyscus* fibroblasts to tunicamycin conformed that during ER stress Rassf1 expression is stimulated. Predicted transcription factor analysis in both mouse and human genomes revealed the presence of ATF4 consensus binding sites in Rassf1 promoter. Co-transfection of ATF4 and Rassf1 promoter-luciferase reporter plasmids demonstrated that over-expression of ATF4 significantly activated Rassf1 promoter activity, which indicates the interaction between ATF4 and Rassf1. ATF4, a downstream target of eIF2 α phosphorylation, was reported to participate in cell cycle arrest in different cell lines. RASSF1 is a putative tumor suppressor gene that is inactivated in a variety of human tumors. In addition to G1 arrest, RASSF1 promotes growth arrest in the G2/M phase of the cell cycle and endogenous RASSF1 also interacts with and stabilizes microtubules. Based on our results, we propose that RASSF1 may be activated by ATF4 under ER stress and mediate cell cycle arrest in the G1 and G2/M phases. The study provides important new insights into the molecular mechanisms by which Rassf1 mediates its biological effects on cell cycle arrest under ER stress. Functional studies exploring how Rassf1 activation is integrated during ER stress are in progress.

Zhang, Ran

Mentor(s): Dr. Shan Qiao

Build and share a better life for children: an evaluation of the “Hello Kids” project

The “Hello Kids” project launched in November 2015 aims to improve children whose parents leave them at hometown for better job opportunities in big cities (left-behind children) and those affected by natural disasters and emergencies in China through the donation of “Hello Kids” packages (school supplies and daily necessities). The project focuses on children’s development and emphasizes children’s participation. By the end of December 2019, the “Hello Kids” project has covered 30 provinces and donated 190,986 sets of daily student packages and 20,720 sets of post-disaster emergency packages, benefiting 211,706 children.

The project evaluation was carried out to assess organization management, implementation process, and impact of the project. Evaluation data were collected by: (1) literature review and document review; (2) questionnaire survey from children, parents, and project staff with a total of 6,148 valid questionnaires from 137 schools. (3) 12 semi-structured interviews with school principals, project manager, and staff; (4) comparative analysis of similar projects.

The evaluation suggests that the “Hello Kids” project responds to the urgent need for children’s care and protection and the public’s enthusiasm for donations. By making up for the lack of school supplies and daily necessities and cultivating children’s interests in arts and sports, the project improves the school performance of left-behind children. About 96% of the children reported that the products they received had a significant impact on their study and life. For parents, the care packages, as a communication medium, increase the interaction time between parents and children in outdoor activities, communication, and tutoring homework, shorten the emotional distance between children and parents, thus promoting chil-

dren's development both physically and psychologically. Seven sustainable development suggestions are proposed based on the evaluation results: (1) expand and update the products of the care package; (2) build brand image; (3) ensure the stability of the project implementation by collaborating with the volunteer service system, local non-profit organizations; (4) strengthen the guidance and training of project personnel in the process of project implementation; (5) promote positive parent-child relationship and family education; (6) optimize the beneficiary selection process; (7) establish a solid and reliable project information management system.

Zhao, Liang

Mentor(s): Dr. Song Wang

Scene Text Detection and Recognition in Marine Corp Archives

Text detection techniques in computer vision has recently advanced substantially with the development of the deep neural networks. However, most are focusing on modern eye-catching images and sharing a strong assumption that text instances are roughly in a complete linear shape and therefore adopted relatively simple context to describe them such as the highlighted billboard in studies. In our MIRC datasets, the images are captured in random scenes and the text instances are highly interrupted by other objects. So we try to develop a more flexible representation that can fit well the text instances of these arbitrary shapes, orientations, distortions in these random and complex contexts.

Specifically, the collection of MIRC videos with 16mm and 35mm were randomly captured. First, an automated process having high efficiency and accuracy of the cataloging capability while also providing the depth of information at the frame level will be predominately needed to sort out the historical films. Second, we are focusing on utilizing deep neural network techniques to refine the detection and recognition process of complicated scene texts.

Postdoctoral Scholars

presentations

Al-Sammarraie, Nadia

Mentor(s): Professor Swapan Ray

Blocking Bone Morphogenetic Protein Signaling for Protection of Neurons and Astroglia in Co-culture Model of Spinal Cord Injury

Spinal Cord Injury (SCI) is a debilitating injury that causes significant impairment of patient's activity and quality of life. Autophagy or "self-eating" is a central molecular mechanism that regulates tissue homeostasis in health and diseases. Impairment in autophagic activity occurs after SCI, affecting neuronal viability and myelination. Calcium ion (Ca^{2+}) is an intracellular messenger that regulates wide variety of cellular functions in healthy and disease states. Elevated Ca^{2+} has been implicated in neuronal demyelination and death after SCI. However, Ca^{2+} mediated regulation of autophagy and apoptosis in SCI remains largely elusive. Bone morphogenetic proteins (BMPs) are multifunctional proteins involving in neuronal development and diseases. Elevated BMPs show deleterious effect on SCI and they have been linked to deterioration of locomotor function following injury. Whether elevated Ca^{2+} interacts with BMPs signaling to cause impairment of autophagy and promotion of neuronal apoptosis in SCI remains unknown. We hypothesized that elevated Ca^{2+} could activate BMP signaling to impair autophagy flux in cell culture model of SCI. We aim to understand interplay between the increased intracellular Ca^{2+} and overexpression of BMP4 and their effects on neuronal and astroglial cell death after injury. Next, we aim to study whether inhibition of BMP signaling can increase autophagy flux and attenuate cell death. We co-cultured PC12 (neuronal cells) and C6 (glial cells) in RPMI 1640 medium supplemented with 10% fetal bovine serum and 1% penicillin and streptomycin for one day and subjected to these treatments: calcium ionophore A23187 (4 mM), BMP4 (50 ng/ml), BMP4 (50 ng/ml) + calcium ionophore A23187 (4 mM), or Noggin (100 ng/ml) + BMP4 (50 ng/ml) + calcium ionophore A23187 (4 mM) for another day. We assessed cell viability using MTT assay and cell morphology using Shandon™ Kwik-Diff™ Stains followed by Biotek Cytation 5 Imaging Reader using 20x objective lens. Our results showed that calcium ionophore reduced cell viability and injured PC12 and C6 cells in co-culture. Inhibition of BMP4 signaling improved cell viability and morphology of the cells in co-culture. In conclusion, our results indicated that inhibition of BMP4 signaling could be a therapeutic avenue to block cell death in SCI.

Chakrabarti, Mrinmay

Mentor(s): Professor Mohamad Azhar

Resveratrol inhibited aortic valve calcification and stenosis in AVM cells and TGF β 1 overexpressed mice model

Calcific aortic valve stenosis (AS) is the most prevalent heart valve disorder in developed countries. Old age, male sex, and congenital form of bicuspid aortic valve (BAV) are major risk factors of calcific AS. Unfortunately, there is no medical treatment, and without surgery, calcific AS leads to death. Surgical specimens from calcific aortic valve disease patients have increased levels of the transforming growth factor beta1 (TGF β 1). We observed that overexpression of the constitutively active form of TGF β 1 in valve interstitial cells caused calcific AS in older male mice. At molecular level, TGF β 1 hyper-activation resulted in increased interaction of activated SMAD3 with RUNX2 in aortic valves and also inhibited NAD $^{+}$ -regulated poly-ADP(ribose)polymerase (PARP1)- and tyrosyl-tRNA synthetase (TyrRS)-dependent ADP-ribosylation of RUNX2, resulting in increased RUNX2-dependent osteoblast differentiation of valve interstitial cells. Several earlier cell culture studies and animal models indicated beneficial effects of resveratrol on different cardiovascular diseases. Our cell culture studies with atrioventricular mesenchymal (AVM) cells confirmed complete inhibition of calcification in osteogenic media following 100 μM resveratrol treatments for 10 days. We also observed reduced calcification in the aortic root region following retro-orbital injection of 10 mg/kg resveratrol for 12 alternate days. We are actively involved to determine the molecular mechanisms of resveratrol mediated inhibition of aortic valve calcification/stenosis. Together, our results

show that TGF β 1 causes calcific AS through upregulation TGF β signaling molecules, and resveratrol could be a novel therapeutic strategy to undermine the detrimental effect of aortic valve calcification and AS.

Coman, Paul

Mentor(s): Professor Ralph White

Li-ion Thermal Runaway at Low-Temperatures

It is already commonly known that Li-ion batteries can catch fire when overheated, short-circuited, or mechanically abused. However, thermal runaway at very low ambient temperatures is still under investigation and requires further studies to validate the phenomena. Charging Li-ion batteries at low temperatures will cause Li-metal plating and dendrite growth on the anode. In some situations, the dendrites can reach the cathode and cause a short circuit. This presentation will show two thermal runaway cases occurring on a large cell cycled at very low temperature: one case when thermal runaway was triggered, followed by fires and explosions, and another when only venting occurred. It was found that in addition to Li-metal, Li-carbides were also present on the surface of the electrodes, and when gassing occurs, Li-dendrites might break and be carried by the gas bubbles.

Kittikhunnatham, Preecha

Mentor(s): Professor Natlia Shustova

Fundamental Understanding of the Electronic Properties of Hybrid Frameworks as a Function of Metal Node Structure and Composition

Metal-organic frameworks (MOFs) are organic-inorganic hybrid crystalline materials with ultra-high porosity constructed by connecting metal nodes (e.g., metal ions or metal clusters) through organic linkers. This class of material can have remarkably high surface areas and well-defined pores, and these unique characteristics allow MOFs to be ideal candidates for many applications, such as gas storage, gas separation, sensing, energy storage, and heterogeneous catalysis. Recently, MOFs have displayed semiconducting properties that could be achieved through their rational design. These semiconducting properties can enable MOFs to be utilized for various electronic applications, such as chemiresistive electronic sensor. Among many efforts to tune the electronic properties of MOFs, which has a strong relationship with its semiconducting behavior, one attractive strategy is the modification of the metal nodes by engineering heterometallic nodes i.e., incorporation of a second metal. Although the presence of such metal sites has been shown to cause significant changes in the electronic structure of MOFs, systematic studies to understand the effect of the metal nodes on electronic structures of MOFs are still needed to unlock the full potential of these systems for their electronic applications. Therefore, we investigated the relationship between the metal nodes (i.e., their composition and geometry) and the electronic properties of MOFs using a variety of experimental techniques in addition to theoretical investigations. Our investigation on metal node modification allowed us to systematically establish structure-electronic property trends in several MOFs, that will be discussed in this presentation. Furthermore, I will also highlight the necessity a comprehensive analysis of trends in the various extended structure motifs, which are critical for engineering heterometallic systems with on-demand electronic properties.

Ma, Yuxi

Mentor(s): Dr. Dongkyu Lee

Strain Influence on the Oxygen Reduction Reaction of Epitaxial La_{0.8}Sr_{0.2}CoO₃ Thin Films

Oxygen reduction reaction (ORR) of mixed ionic electronic conducting oxides is one of the key factors

which determines the performance of related applications, such as solid oxide fuel cells,¹ gas sensors,² memristors,³ etc. It is recently reported that tensile strain can improve the ORR kinetics of epitaxial oxide thin films by controlling the formation of oxygen defects, migration of oxygen species, and electronic structure.⁴ However, due to the limitation of conventional ORR measurement methods including electrical impedance spectroscopy and isotope exchange depth profiling tensile strain. In this work, we synthesize epitaxial La_{0.8}Sr_{0.2}Co_{3-δ} (LSC82) thin films on single-crystalline LaAlO₃ and SrTiO₃ substrates via pulsed laser deposition, to induce compressive and tensile in-plane lattice mismatch strain, respectively. By employing X-ray diffractometry, the as-deposited samples are characterized to ensure if the films are epitaxial and fully strained. The values of oxygen surface exchange coefficient (*k*_{chem}), which represents the rate of ORR, are measured by electrical conductivity relaxation from 700 to 500°C between the oxygen partial pressures of 0.1 and 0.5. Additionally, we perform atomic force microscope and X-Ray photoelectron spectroscopy with the films before and after ORR testing to monitor any possible surface chemical and microstructural changes due to the Sr segregation, which is one of the main degradation mechanism for (La,Sr)CoO₃ type materials.⁵⁻⁸ We find that (1) a compressive-strained LSC82 thin film shows a lower *k*_{chem} and a higher oxygen migration activation energy for ORR at the surface comparing with a tensile-strained thin film; (2) a compressive-strained thin film shows a higher density of the segregated Sr at the surface after the measurement of ORR kinetics compared to a tensile-strained thin film. Our finding demonstrates that (1) the surface chemistry of LSC82 is strongly dependent on the strain applied to the crystal lattice, which in turns influence the ORR kinetics; (2) the degradation caused by Sr segregation can be mitigated by applying tensile strain to the crystal lattice. This work will demonstrate the key role of epitaxial strain in the ORR kinetics, which can provide a new avenue to designing high performance energy materials for clean energy conversion and storage devices.

Mehrabi, Amir

Mentor(s): Professor Nicole Hair

Examining parental perceptions and decisions to uptake child influenza immunizations: assessing the H1N1 pandemic's impacts on vaccination rates

Introduction: The historical 2009 H1N1 Influenza pandemic resulted in a declared state of emergency nationally, with ensuing diminished vaccine confidence and amplified fears of infection. Examining previous literature, a void exists in relation to parental perceptions and decisions for U.S. child immunizations.

Methods: National Immunization Survey (NIS) data was used as a series of weighted consecutive annual surveys to synthesize a longitudinal panel dataset (2003 to 2018). Population adjusted measures of influenza like illness (ILI) by state and season from CDC's FluView and ILI Net were also used. Quasi-experimental (QE) approaches including segmented interrupted time series (ITS), and fixed effects model (FEM), logistic estimations were executed.

Results: The segmented ITS regression for NIS-Child yielded statistically significant post-estimation average marginal effects (AMEs). The pandemic yielded a 12.57 percentage point (pp), 95% CI [10.28, 14.32], immediate level increase in the probability of a child being immunized, on average, and a 3.77 pp, 95% CI [-4.32, -2.55], sustained slope decrease annually post-pandemic. Pre-pandemic, a 1.64 pp, 95% CI [1.47, 1.81], sustained increase annually was evident. Restricted scale epidemics (RSEs) yielded AMEs that were statistically significant for RSEs in 2012, 2013, and 2014. AMEs were 1.79 pp, 95% CI [-2.22, 0.38], 5.23 pp, 95% CI [-6.27, -4.77], and 1.92 pp, 95% CI [2.74, 1.10], decreases, on average, respectively. The respective trend increases post RSEs were 0.85 pp, 95% CI [0.74, 0.96], 0.34 pp, 95% CI [0.28, 0.40], and 1.24 pp, 95% CI [1.12, 1.35], on average. Sensitivity analysis FEM regressions for NIS-Child yielded AME coefficients that were generally statistically insignificant. For NIS-Teen, AMEs were statistically insignificant with the exception of three variables, indicating a 1.31 pp increase, and a 0.135 pp, and 0.212 pp decrease, on average.

Conclusion: Preliminary escalations in the probability of uptake were evident post-pandemic, followed by

gradual annual decreases. Public health immunization professionals should expect these trends and adapt accordingly. They should anticipate decreases following smaller scale epidemics. Uptake behavior is not sensitive to weekly fluctuations in ILI severity for children, but slightly sensitive for teens during peak and late phases of the influenza season.

Milosavljevic, Snezana

Mentor(s): Dr. Ana Pocivavsek

Sex differences in anxiety-like and anhedonic behavior of adult rats exposed to elevated kynurenic acid during neurodevelopment

Emerging evidence indicates that the kynurenine pathway (KP) of tryptophan catabolism is implicated in the pathophysiology of psychotic disorders, including schizophrenia (SZ) and bipolar disorder (BPD). The KP metabolite kynurenic acid (KYNA) is elevated in the postmortem brain tissue and the cerebrospinal fluid (CSF) of patients with SZ and BPD. Preclinically, we mimic prenatal insults causally linked to the development of SZ and BPD by elevating KYNA during neurodevelopment using our well-established embryonic kynurenine model. Pregnant rats are fed kynurenine (kyn; 100 mg/day) from embryonic day (ED) 15 to ED 22 (control: ECon; kyn-treated: EKyn) to elevate KYNA in the fetal brain. In adulthood, increased hippocampal and frontal cortex KYNA elicits sex-dependent impairments in learning and memory formation. Most recently, we also determined sex-specific differences in sleep and home cage activity. Thus, we presently further investigate the behavioral phenotype of adult ECon and EKyn male and female offspring in two distinctive paradigms, open field (OF) test and sucrose preference (SP) test, to assess locomotor activity, anxiety, and anhedonic behavior. In OF, we measured exploratory activity for 30 minutes in ECon and EKyn rats during either the light phase (n= 14 ECon male; 12 EKyn male; 12 ECon female; 15 EKyn female) and dark phase (n= 11 ECon male; 11 EKyn male; 14 ECon female; 13 EKyn female) to evaluate the impact of circadian phase. Analysis of 1-minute time bins of distance traveled and velocity revealed a main effect of time in male offspring, irrespective of prenatal treatment, and an interaction between time and prenatal treatment during the dark phase in female offspring. To assess anxiety-like behavior, we evaluated the time spent in the center of the arena and determined a significant time x phase x prenatal treatment interaction in males and a significant time x prenatal treatment interaction in females during the dark phase only. In SP, we determined that only EKyn females display a trend in less sucrose consumption compared to controls. Taken together, our findings imply sex specific changes in anxiety-like and anhedonic behavior in the EKyn offspring, translationally relevant to the study of psychotic disorders.

Rutkovsky, Alexandria

Mentor(s): Dr. Mitzi Nagarkatti

Resveratrol inhibits TCDD-mediated induction of myeloid-derived suppressor cells and their functions

Previously, we showed that 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD), an AhR ligand and a potent and persistent toxicant, induced murine myeloid-derived suppressor cells (MDSC) by migration from bone marrow (BM) to peritoneal cavity (PC). In the current study, we show that Resveratrol (3,4,5-trihydroxy-trans-stilbene; RSV), yet another AhR ligand reduces TCDD-induced MDSC induction. The number of Cd11b+Gr1+ cells induced by TCDD in the PC was decreased when assessed by flow cytometry following RSV treatment. Transcriptome analysis of Gr1+ PC cells showed TCDD treatment led to an increase in the quantity of metabolic process pathway genes expressed. The bio-energetic profile of these cells showed that RSV treatment lowered basal and compensatory glycolysis as well as glycolytic proton efflux rate thereby decreasing the energetic demands induced by TCDD. To further examine general metabolic function, we profiled liver cells in the TCDD and TCDD+RSV groups and found RSV significantly

decreased ALT levels and the number of IL-17 expressing cells compared to TCDD alone, promoting an anti-inflammatory role for RSV during co-administration. In silico profiling of select metabolic genes in a human hepatoma cell line exposed to the AhR ligands, showed significant alterations similar to changes in transcriptome data from TCDD-treated MDSCs. Additionally, RSV mitigated the suppressive function of TCDD-treated PC MDSCs on conA-induced splenic T-cell proliferation as assessed by the 3H-thymidine incorporation assay. Furthermore, assessment of myeloid marker expression by flow cytometry demonstrated that AhR ligands alter immune cell subsets with tSNE highlighting a pronounced role for the differentiation of PC CD11b+ populations which was not prominent in BM. TCDD also influenced T-cell maturation causing thymic atrophy. Thus, when thymocytes were cultured with TCDD in the presence or absence of RSV, TUNEL assay showed RSV significantly decreased TCDD-induced apoptosis of thymocytes. Overall, the data demonstrated that RSV decreased TCDD-induced immune suppression by altering the dynamics of various myeloid cell populations in terms of numbers, metabolism and immunosuppressive potency. (Supported by NIH grants P01AT003961, P20GM103641, R01AI123947, R01AI129788 and R01ES19313)

Tam, Cheuk Chi

Mentor(s): Dr. Xiaoming Li

Prescription opioid misuses and psychosocial-behavioral correlates among people living with HIV: A systematic review

Background: In the US, prescription opioid misuse (POM) has become an essential public health concern due to its severe consequences such as fatal overdoses. People living with HIV (PLWH) are particularly vulnerable to POM since chronic pain is a common symptom related to HIV/AIDS. Existing literature has highlighted psychosocial influences on POM. However, scant psychosocial-based intervention programs have been developed for addressing POM in PLWH. This may be due to the lack of a sufficient understanding of POM and psychosocial correlates among PLWH. The current study aims to review and synthesize empirical findings about POM and psychosocial-behavioral correlates among PLWH. Methods: A systematic review was conducted among a total of 21 empirical studies (20 quantitative and one qualitative) from 1980 to 2020 reporting POM statistics (i.e., prevalence, individual POM behaviors) and psychosocial or behavioral correlates among PLWH. Results: Reviewed studies revealed that the prevalence of POM in PLWH ranged from 2.1% to 73.3%, which varied by study samples, individual POM behaviors, drug classes, measures, and recall time periods. A relatively high POM prevalence was reported among PLWH who were homeless/indigent or these who received substance use treatment, followed by PLWH in veterans or military, PLWH on the chronic opioid therapy or with chronic, PLWH who injected drugs, and PLWH who were men having sex with men. The most common POM aberrant behavior was 'Taking/obtaining opioids without prescription'. The most commonly misused opioid medication was Oxycodone. Review literature using multivariate analyses identified several psychosocial-behavioral factors associated with POM in PLWH, including socio-demographic factors (age, gender, race/ethnicity, income/SES), pain-related factors (e.g., pain interference and pain anxiety), medication-related factors (e.g., receipt of a prescription), psychiatric symptoms (e.g., depression), POM perceptions (POM intention), substance use (e.g., illicit drug use), and antiretroviral treatment non-adherence. Conclusion: POM in PLWH is prevalent and merits a high attention. Future research would benefit from applying a theoretical framework to examine psychosocial and behavioral mechanisms on POM in PLWH. POM intervention research tailored for psychosocial factors is warranted in PLWH.

Tryon, Sarah

Mentor(s): Dr. Marlene Wilson

The role of the cholinergic system in individual differences in fear extinction.

Dysregulated fear extinction is a hallmark characteristic of patients suffering from Posttraumatic Stress Disorder (PTSD). We have previously shown rodents similarly display individual differences in fear extinction whereby some rats extinguish a fear memory (extinction competent; EC) and others show enduring fear responses (extinction resistant; ER) despite repeated exposure to a conditioned stimulus in a safe environment. The basolateral amygdala (BLA), a brain region critical for fear, receives converging glutamatergic and cholinergic input. We have previously shown in naïve rodents that presynaptic muscarinic acetylcholine receptors (mAChR) inhibit glutamatergic transmission from cortical inputs into the amygdala. Since this inhibition varies between individuals, we hypothesized this cholinergic inhibition of cortical inputs would differ between EC and ER individuals. Male Long Evans rats were divided into EC and ER groups based on a median split of freezing during extinction learning in a Pavlovian fear paradigm. Following behavior, glutamatergic transmission in the BLA was evoked using external capsule stimulation and electrophysiological field responses were recorded during the bath application of increasing doses of the muscarinic agonist muscarine (0.3 μ M, 1 μ M, 10 μ M). Results showed mAChR activation inhibited corticoamygdalar transmission in a dose-dependent manner and was blocked by the muscarinic antagonist atropine. At the lowest muscarinic dose, ER rats displayed greater inhibition of glutamatergic responses than EC rats. To examine influences of endogenously released acetylcholine, we also began characterizing fear behaviors and brain cholinergic markers, including vesicular acetylcholine transporter (VAcHT) and choline acetyltransferase (ChAT), in a transgenic ChAT::Cre rat model. We examined groups of Cre+ versus Cre- male and female transgenic ChAT::Cre rats in Pavlovian fear learning and extinction, and found group differences in freezing during context recall, cued extinction learning, and ultrasonic vocalizations emissions. Cre+ transgenic rats also displayed enhanced VAcHT and ChAT immunofluorescence in the basal forebrain and BLA compared to Cre- rats. This significant overexpression of cholinergic markers suggests transgenic ChAT::Cre rodent lines, while valuable tools when examining the cholinergic system, are not optimal for examining cholinergic regulation of individual differences in fear behaviors. [Support: VA Merit I01BX001374 (MAW); ASPIRE1 (SCT); Magellan Scholars/Capstone (GG)]

VanderVeen, Brandon

Mentor(s): Dr. Angela Murphy

Emodin as a complementary dietary therapy targeting chemotherapy-induced wasting

Chemotherapeutic, 5 Fluorouracil (5FU), is one of the most common therapies administered to cancer patients across several cancer types; however, its efficacy is diminished by patient acquired resistance and 5FU's pervasive off target effects. Among these off target effects is the loss of skeletal muscle mass, termed cachexia. Cachexia contributes to functional dependency and poor treatment outcomes ultimately increasing healthcare costs and decreasing survival. Weakness and fatigue remain the most consistent complaints of cancer patients undergoing chemotherapy often occurring directly through skeletal muscle mass loss and disrupted metabolic homeostasis. Emerging evidence suggests that disruptions to the mitochondria are central to chemotherapy-induced skeletal muscle mass loss and modulations to skeletal muscle mitogen activated protein kinases (MAPKs) appear to play a role in chemotherapy-induced mitochondrial dysfunction. Emodin, a natural anthraquinone derivative found in various Chinese medicinal herbs, has been proposed to improve 5FU's treatment efficacy. Emodin has been shown to improve skeletal muscle glucose metabolism as well as reduce lipid accumulation with insulin resistance, and our preliminary results show that Emodin prevented 5FU-induced body weight and function loss and Emodin suppressed the induction of skeletal muscle MAPKs. While there are no current FDA approved therapies for chemotherapy-induced cachexia, Emodin's ability to prevent body weight loss, improve whole body

functional outcomes, and suppress muscle MAPKs provides strong rationale for investigative inquiry into its chemo-cachexia preventative effects. The primary goal of the proposed study is to understand the mechanisms of Emodin's protection against 5FU-induced skeletal muscle toxicities. The central hypothesis is that Emodin alleviates 5FU-induced mitochondrial dysfunction through the suppression of MAPKs. Our results suggest that Emodin can ameliorate 5FU induced body weight loss that associated with improved exercise tolerance and increased fatigue resistance. Additionally, our results suggest that p38 and ERK1/2 are activated following 1 week of 5FU and Emodin prevents this activation. Together these results suggest that Emodin can improve body weight maintenance by mitigating 5FU-induced skeletal muscle toxicities.

Weaver, Cory

Mentor(s): Dr. Fabienne Poulain

Characterization of novel transgenic zebrafish lines for analysis of retinotectal circuitry

Information processing in the brain relies on complex networks of neuronal circuits. How these networks develop is a major question for modern neuroscience. In particular, the contribution of small-scale microcircuits remains poorly understood due to a lack of suitable experimental models. Owing to its optical transparency and easy genetic manipulation, the zebrafish (*Danio rerio*) is well-suited for studying vertebrate visual circuits. In zebrafish, retinal ganglion cells (RGCs) transfer visual inputs from the eye to processing centers in the optic tectum which in turn evoke behavioral responses. Well-established transgenic lines drive expression in RGCs, but no tectal-specific lines have been reported that are suitable for functional studies. In this study, we characterized two candidate transgenic lines generated in a large enhancer trap screen. Using time-course confocal imaging, we found each line exhibits novel expression patterns in the developing optic tectum with limited off-target activity. 119A drove uniform transgene expression in tectal soma while 1749A labeled only a subset of tectal neurons. Single-cell imaging revealed 1749A drives expression only in tectal radial glia, making it the first transgenic line of its kind. Given the important developmental role of radial glia in other brain regions and the novelty of the line, we characterized 1749A in more detail. Time-lapse imaging revealed enhancer activity as early as 30 hours postfertilization (hpf) resulting in two distinct cell populations in the central and peripheral regions of the midbrain. As early as 48 hpf, cells in the dorsally located central region appear to divide with daughter cells migrating laterally into the periphery. While some migrating cells stop in the peripheral region, others exhibit rapid ventral migration upon reaching the temporal edge of the midbrain. Interestingly, ventrally migrating cells appear to leave behind a trailing process resembling the formation of cortical radial glial processes. Presumptive division and lateral migration continue as late as 96 hpf when visual development is nearly complete. In future studies, we will detail the spatiotemporal characteristics of tectal radial glia development, proliferation, migration and process extension. In addition, we will investigate the relationship between RGC axon innervation and radial glia formation at the tectum.

Wilson, Kiesha

Mentor(s): Dr. Mitzi Nagarkatti

Treatment of SEB Induced ARDS with CBD Ameliorates Fatal Inflammatory Response

The SARS-CoV-2 virus also known as COVID-19 has claimed the lives of over 240,000 Americans and 1,270,000 people worldwide. With cases consistently rising daily. Understanding the mechanisms behind this disease are vital at this time yet working directly with the virus is to be proceeded with caution. Staphylococcus enterotoxin B (SEB) induced Acute Respiratory Distress Syndrome (ARDS) mimics the cytokine storm presented in patients with severe COVID-19 and is a safer alternative than working with infected samples. This model system also results in different presentation of severity of illness with mice

of different genetic backgrounds, as does COVID-19. When C3H/HeJ mice are dual dosed with SEB, their survival rate drops to 0% within in 5 days. In this study we introduced Cannabidiol (CBD) for 3 days pre and post SEB dosing and found that the survival rate was increased to 100% indefinitely. Initial, evaluation of whole single cell data comparing Naïve to SEB induced ARDS mice illustrated that there was an increase of Neutrophils, inflammatory macrophages, and a loss of lung epithelial cells. To characterize the mechanism by which CBD treatments are working to ameliorate the inflammatory response, we found that CBD treated mice had significant reduction in TNF- α and IL-1 β . The expression of these cytokines is directly associated with the presence and activation of inflammatory macrophages and neutrophils presented in ARDS. MicroRNA microarray differential expression analysis has shown a significant fold change in expression of mmu-miR-124-3p, mmu-miR-21a-5p, mmu-miR-455-3p, and mmu-miR-140-5p that are directly associated with regulation of TNF- α and IL-1 β expression, associated with respiratory disease and inflammation. This data can potentially be utilized for therapeutic purposes in treating COVID-19 ARDS.

Medical Scholars

presentations

Alappat, Anna

Co-Author(s): Sydnie Mick

Mentor(s): Dr. Kerry Sims

Validation of Risk Calculator to Predict Cesarean Delivery Among Women Undergoing Induction of Labor at Prisma Health Richland Campus

OBJECTIVE: To validate a predictive risk calculator for cesarean delivery among women undergoing induction of labor

METHODS: We performed a retrospective cohort study of all women who had singleton live births after undergoing induction of labor from 32 0/7 to 42 6/7 weeks of gestation at the Prisma Health Midlands-Richland Campus from 2017 to 2019. The primary objective was to validate an already existing predictive model estimating the probability of cesarean delivery after induction of labor using antenatal factors obtained from de-identified chart review records.

RESULTS: From 2017 to 2019, there were 3,401 live births at Prisma Health Richland, of which over 3000 women with singleton gestations underwent induction of labor. Among these women, approximately 23% were delivered by cesarean. The risk calculator correctly predicted about 80% of successful vaginal deliveries.

CONCLUSION: This validated predictive model uses seven variables that were obtainable from the patient's medical record and discriminates between women at increased or decreased risk of cesarean delivery after induction of labor. This risk calculator, found at [https:// ob.tools/iol-calc](https://ob.tools/iol-calc), can be used in addition to the Bishop score by health care providers in counseling women who are undergoing an induction of labor and allocating appropriate resources for women at high risk for cesarean delivery.

Alkhatib, Bailey

Mentor(s): Dr. Subhashini Yaturu

Progression of Echocardiographic Changes In Veterans with Prediabetes

The American Diabetes Association defines prediabetes as a fasting plasma glucose of 100-125 mg/dL, and HbA1c of 5.7 – 6.4%, or 2-hr glucose on glucose tolerance test between 140-199 mg/dL. Nearly 38% of US adults meet these criteria. Hyperglycemia puts patients at risk for a plethora of conditions including: progression to Type 2 Diabetes Mellitus, oxidative stress, atherosclerotic cardiovascular disease, and diabetic cardiomyopathy wherein cardiac structural maladaptation and diastolic function can ensue. While diagnostic markers exist, they are inconclusive in the prediction of pathogenesis and early progression to T2DM. The aim of this study is to evaluate cardiovascular risk factors with emphasis on lipid parameters and echocardiographic changes in patients with prediabetes. The data for this single center, retrospective study was obtained from the William Jennings Bryan Dorn Veteran Hospital in Columbia, SC. All available subjects with prediabetes between January 2013 to June 2018 were included. Of the 72,604 individuals included in the study, 52,995 had follow up data. The follow up data showed a 37% progression to Diabetes Mellitus. Of those patients who progressed to T2DM, 79% had HTN and 21% had coronary artery disease compared to 54% and 10% in those who did not progress, respectively. 5,678 patients who surpassed the range for prediabetes had echocardiograms with follow up data. 4,498 of these patients had echocardiograms with calculated ejection fractions that showed a decreased ejection fraction. Approximately half of the initial echocardiograms indicated left atrial enlargement. The follow up echocardiographic data is being analyzed. The results will be disseminated within the poster.

Amin, Sheena

Co-Author(s): Milaan Shah

Mentor(s): Dr. Andrew Sides

Kaposi Sarcoma in a Young Patient with Newly Diagnosed HIV

Kaposi sarcoma, a malignancy associated with Human Herpesvirus-8, is marked by the malignant proliferation of endothelial cells in blood and lymphatic vessels. AIDS-associated Kaposi sarcoma is the most common form in the United States and typically presents in males between the ages of 40 and 50. The incidence of Kaposi sarcoma in America is relatively low at 6 cases per million Americans each year, and it rarely presents in younger adults. The purpose of this case report is to help physicians recognize when to do further workup for malignancies associated with HIV, especially in patients in an atypical age range and without classic findings for the disease.

This case report describes a 22-year-old African American MSM with no reported past medical history who presented to the ED with a one-week history of sore throat, fever, fatigue, diffuse cervical lymph node enlargement, and night sweats. On admission, he had a platelet count of 10K and a hemoglobin of 4.9. Further workup indicated that the patient was positive for Epstein-Barr virus and HIV, with an initial CD4 count of 141. CT of the neck revealed extensive adenopathy in the anterior and posterior cervical regions and supraclavicular regions; abdominal CT revealed splenomegaly at 16.7 cm. These findings raised suspicion for lymphoma, and bone marrow and lymph node biopsies were ordered.

Surgical pathology of the lymph node confirmed the diagnosis of Kaposi sarcoma.

This case highlights a rare manifestation of HIV in younger patients, especially those in the United States. The patient also lacked many of the classical skin changes associated with Kaposi Sarcoma, which made the diagnosis less apparent in the differential. The major teaching point of this case is to be thorough during HIV workup to ensure proper identification and treatment for more uncommon associated malignancies/diseases.

Amin, Sheena

Co-Author(s): Milaan Shah

Mentor(s): Dr. Andrew Sides

A Case of Anti-NMDA Encephalitis With Bilateral Ovarian Teratomas

Anti-NMDA receptor encephalitis is an autoimmune encephalitis precipitated by antibodies generated against NMDA receptors, resulting in abnormalities in behavior, cognition, memory, and movement¹. Anti-NMDA receptor encephalitis is believed to affect one out of 1.5 million people per year and most commonly occurs as a paraneoplastic disorder associated with an ovarian teratoma². Removal of an associated ovarian teratoma generally causes significant improvement in the patient's condition and results in the complete resolution of symptoms³. Thus, accurate detection and early treatment are crucial for superior outcomes in these rare cases.

This case presents a 19-year-old African American female with a strong family history of epilepsy who was brought to the ED after having two weeks of headaches, multiple seizures over the course of the previous two days, and behavioral changes as described by her mother and sister. After admission, her symptoms progressed from postictal psychosis with hallucinations and somnolence to full loss of consciousness. An MRI of the brain was conducted and found to be normal. This was followed by a lumbar puncture which revealed an elevated opening pressure of 55 cmH₂O. The constellation of symptoms and elevated lumbar pressure raised the suspicion of a paraneoplastic syndrome, and a subsequent CT of the abdomen and pelvis revealed a 5 x 4.2 cm ovarian cyst. Further examination of the features of the cyst with ultrasound revealed areas of calcification. IVIG treatment was started for treatment of suspected

paraneoplastic related encephalitis. After a discussion with neuroradiology about the differential, repeat examination of the same MRI and CT abdomen and pelvis revealed minimal hyperintensities within the temporal lobes bilaterally in the former and evidence of previously unidentified bilateral dermoid cysts in the latter. Testing for NMDA CSF came back positive, and the patient underwent left salpingophorectomy and right ovarian cystectomy.

This case report discusses the early use of IVIG, communication with radiology, and the importance of maintaining a broad differential. After a thorough review of the literature, this is the only case we have encountered in which NMDA encephalitis has presented with bilateral ovarian teratomas.

Antosz, Kayla

Mentor(s): Dr. P. Brandon Bookstaver, Dr. Joseph Kohn, Dr. Julie Ann Justo, Dr. Majdi Al-Hasan, Dr. Alexander Milgrom, Mr. Benjamin Tabor

Cost Effectiveness and Clinical Outcomes of Long Acting Lipoglycopeptides Used in Transitions of Care

Background: Dalbavancin and oritavancin are long-acting lipoglycopeptides (LaLGPs) FDA-approved for one-time only dosing for skin and skin structure infections. The use of these agents in serious, deep-seated infections requiring protracted antibiotic courses is of increasing interest. The purpose of this study is to evaluate the clinical use of LaLGPs in patients requiring protracted antibiotic courses who are not ideal candidates for oral or outpatient parenteral antibiotic therapy.

Methods: This is a retrospective, observational, matched cohort study at Prisma Health Midlands of adult patients who received a LaLGP or standard of care for deep-seated infections due to gram-positive bacteria. Patients who received a LaLGP were matched 1:1 to standard of care by age +/- 10 years, infection type, microorganism, and socioeconomic factor. Cost effectiveness is evaluated as total health care related costs between the two groups. Clinical success is determined as a composite endpoint of mortality, recurrence, or need for extended antibiotics. Secondary outcomes include hospital length of stay and total antimicrobial related cost of care.

Results: In progress

Conclusions: In progress

Baginski, Bryana

Co-Author(s): Regan Van Metre

Mentor(s): Dr. Alfredo Carbonell, Dr. Jeremy Warren, Dr. Wil Cob

Effect of various abdominal wall reconstruction skin closure techniques on surgical site occurrences

Introduction: The effect on skin closure technique and its relation to hernia repair technique on surgical site occurrences (SSO) and surgical site infection (SSI) is largely unknown. We hypothesize that layered subcuticular skin closure with cyanoacrylate skin adhesive is protective of surgical site infection compared to standard stapled closure.

Methods: A retrospective review utilizing the Abdominal Core Health Quality Collaborative (ACHQC) database of all patients at Prisma Health – Upstate. All patients with open abdominal wall reconstruction (AWR) of midline incisional hernia defects with retromuscular polypropylene mesh placement from January 2013 - February 2020 were included. Patient demographics, comorbidities, type of hernia repair with mesh location, method of skin closure, and SSOs were collected. Skin closure method was divided into two groups, reflecting a temporal change in practice: staples (historical control group) versus subcuticular suture with cyanoacrylate skin adhesive (study group). Primary endpoint was SSI and SSO. Secondary

endpoints were SSO or SSI requiring procedural intervention (SSOPI / SSIPI). Standard statistical methods were utilized.

Results: A total of 834 patients were analyzed, with 263 treated with stapled skin closure, 571 with subcuticular and adhesive closure. On univariate analysis, incidence of SSI was significantly lower in the study group (11.8 vs 6.8%; $p=0.002$), as was the need for SSIPI (11.8 vs 6.7%; $p=0.015$). Rate of SSO was not significantly different between groups (28.1 vs 27.2%), but the rate of SSO requiring intervention was lower in the study group (14.1 vs 9.3%; $p=0.045$).

Conclusions:

Layered skin closure technique, including subcuticular closure and adhesive, may reduce the risk of surgical site infection after open AWR. A prospective randomized trial is planned to confirm these findings.

Barfield, Matthew

Mentor(s): Dr. Benjamin Jackson

A Cost Analysis of Ankle Fractures Treated by Orthopedic Surgeons With or Without Foot and Ankle Fellowship Training at Ambulatory Surgery Centers and Hospitals

Ankle fractures are commonly treated by many different types of orthopedic surgeons. Fellowship vs non-fellowship training often adds different perspective, use of specialty specific implants, comfort with outpatient procedures, and may contribute to cost differences between surgeons. Additionally, whether a surgery is performed in a hospital as inpatient or outpatient or performed in an ambulatory surgery center may affect the cost of these procedures as well. In an era of cost containment these factors should be evaluated to optimize the value to our patients.

To assess the impact of fellowship training on the value of care provided, the difference in cost of ankle fracture open reduction internal fixation (ORIF) procedures between foot and ankle trained orthopedic surgeons (FAFTOS) and non-foot and ankle trained orthopedic surgeons (NFAFTOS) over the past 10 years was retrospectively evaluated. We additionally evaluated the cost differences of ankle fracture ORIFs between hospitals, hospital-owned ambulatory surgery centers (ASCs), and physician-owned ASCs. The study also assessed the costs effects of inpatient versus outpatient procedures and ankle ORIF procedure volume of the surgeon observed within the timeframe of the study.

Data was collected for patients who underwent an ankle ORIF procedure performed by an orthopedic surgeon in our hospital system and local ASCs in the past 10 years. Statistical analyses were performed to observe potential cost differences amongst all variables.

It was found that procedures performed by FAFTOS were significantly less costly than those performed by NFAFTOS when performed at ASCs but not at hospitals. Procedures performed at ASCs were found to be significantly less costly than those performed at hospitals. Additionally, it was found that procedures performed at hospital-owned ASCs were less costly than physician-owned ASCs. It was also found that procedure cost decreased with an increase in surgeon volume. Based on our results, a procedure performed by a foot and ankle trained orthopedic surgeon in a hospital-owned ASC is the lowest cost option available for an ankle ORIF, and an increase in volume of ORIFs is associated with a further decrease in cost.

Barré, Alyssa

Mentor(s): Dr. Steven Trocha, Dr. Christine Schammel, Dr. Hubert Fenton

Gastric Adenomyoma: a case report, updated review of the literature, and algorithm for preoperative diagnosis

Gastric adenomyoma is a rare, benign neoplasm. It is often mistaken for another process such as a gastrointestinal stromal tumor and not identified until after surgical excision. There is no necessity for surgical excision for gastric adenomyoma unless the lesion is obstructing or bleeding. General knowledge of this

neoplasm is lacking among physicians. In case reports, this tumor was either incidentally discovered and removed or found during workup for nonspecific GI symptoms and removed because of suspicion for gastrointestinal stromal tumor. Multiple papers state that surgical excision is necessary for diagnostic clarity. We present an updated review of literature and a case of gastric adenomyoma, as well as define an algorithm using immunohistochemical stains (desmin, CKIT, DOG1, PDGF) for diagnosis of gastric adenomyoma in a noninvasive manner in order to potentially avoid unnecessary surgical procedure.

Benvie, Samantha

Co-Author(s): Sydney Rush

Mentor(s): Dr. Alejandro Luis, MD, Ms. Julie Murray, BSN, RN, TCRN

The Utilization of Whole Blood in the Traumatically Injured Patient

In October 2020, the Prisma Health Richland Hospital Trauma Department implemented a new policy allowing qualifying trauma patients to receive whole blood transfusions. Before this implementation, all patients requiring blood transfusions received component therapy in a fixed ratio of 6:6:1 of red blood cells (RBCs), plasma, and platelets. Further infusions are based on individualized data compiled from thromboelastography (TEG), prothrombin time (PT), partial thromboplastin time (PTT), and platelet count (PLT). The use of whole blood in massive transfusions dates back to World War II and is thought to reach endpoints of resuscitation faster than component therapy. The endpoints of resuscitation include hemoglobin (Hgb), international normalized ratio (INR), and lactate. Whole blood transfusions have many advantages over component therapy, including a reduced number of transfusions and the need to re-transfuse patients in the following hours and days post admission; whole blood transfusions should improve patient survival and other outcomes. To see how this new policy impacted trauma outcomes at Prisma Health Richland Hospital, we reviewed 39 patients in the trauma registry that received whole blood. The patients were compared on time taken to reach successful resuscitation end-points: hemoglobin > 10 ng/dL, INR > 1.0, and lactate < 2.0. These endpoints were then evaluated in comparison with other trauma patients who received component therapy. We hypothesize that patients who receive whole blood should reach the end-points of resuscitation faster than those receiving component therapy and will require fewer additional transfusions during their hospital stay.

Blair, Bailey

Co-Author(s): Jane Goodwin, Alexander Strigenz, Basil Chaballout

Mentor(s): Ms. Julie Martin, Dr. Connie Arthur, Dr. Ronnie Funk, Dr. Jeffery Edenfield, Dr. Anna Blenda

Galectin Protein Concentrations Increased in Patients with Breast, Lung, and Colon Cancer of Different Stages

Galectins are proteins with high affinity β -galactoside-binding sites, enabling their participation in a variety of extracellular and intracellular signaling pathways through interactions with glycoproteins relevant to oncogenesis. Galectins are a part of the innate immune system and have also been identified as key players in the tumor microenvironment because of their interactions with components of the adaptive immune system including T cells (CD8+, CD4+, and T-regulatory cells). The known contributions of galectins-1, -3, -7, -8, and -9 to angiogenesis, metastasis, cell division, and evasion of immune destruction led us to assess mRNA expression of the LGALS1, 3, 7, 8, and 9 genes (N=12820) in breast, lung, and colon cancer patients using the in silico University of California Santa Cruz Xena database. This study compares the average galectin levels in patient samples analyzed by enzyme-linked immunosorbent assay (ELISA) from each stage of breast, lung, and colon cancer, using ten patient serum or plasma samples collected from the Prisma Health Cancer Institute Biorepository from each stage. Galectin-3 had a statistically significant increase all stages for breast, lung, and colon cancer compared to healthy controls. Galectin-1 was increased in stages I, III, and IV for breast cancer, stages I, II, and III for lung cancer, and stages I-IV for

colon cancer. All stages of breast cancer and colon cancer, and stages I, II, and IV were increased for galectin-9 compared to healthy controls. In conclusion, there were significant differences in the galectin levels in patients with these cancers compared to healthy controls, but not significant variability between the stages or a sequential increase as may have been expected as cancer progressed to higher stages, suggesting dysregulation of galectins occurs early in oncogenesis. The patient galectin profiles will be incorporated into an existing patient database as well to potentially identify patients who could benefit from clinical trials that are underway for specific galectin inhibitors.

Bland, Sydney

Co-Author(s): Haley Krachman

Mentor(s): Dr. Christine Schammel

Atypical Ductal Hyperplasia

Patients diagnosed with invasive breast cancer on biopsy typically have a consistent treatment plan over the course of their disease; however, there are discrepancies regarding the significance and appropriate treatment of pre-invasive lesions identified on biopsy, including atypical ductal hyperplasia (ADH). Following IRB approval, all females diagnosed/treated with breast cancer at a single institution between 2016-2019 were retrospectively evaluated. All patients who underwent a breast core biopsy that revealed ADH only and had a subsequent resection for their disease were included in the study. Resection histology was noted and patients were classified as 'upgraded' if the resection specimen contained DCIS/IDC or ILC. Patients were classified as 'not upgraded' if resection histology was atypical lobular hyperplasia (ALH) or ADH only. Overall, 110 patients met the study criteria, but only 97 underwent resection including 51 (53%) of which exhibited upgraded histology upon resection (23 DCIS, 13 LCIS, 13 IDC/ADH, 2 ILC/ADH); 15 were not upgraded (52%). Treatment for upgraded patients was mastectomy (65%), radiation therapy (27%), and anti-hormonal (83%). Only four patients (3.67%) had a documented recurrence (follow-up 2 years). While some literature has recommended imaging as appropriate follow-up for ADH only biopsies, our data suggests that while the morbidity of resection and anti-hormonal cannot be ignored, the morbidity of an under diagnosed lesion also must be considered, warranting conservative therapy.

Boal, Zach

Mentor(s): Dr. Thomas Cook

Pack a Small Bag: Creating a Standardized Global Health Supply Kit

Global health is an important and rewarding part of medical practice for many resident physicians, attending physicians, and other healthcare professionals. The environments into which these medical professionals enter often have varying access to supplies which may be critical for diagnosing and treating patients. It is often difficult to predict which of these supplies are most critical to bring versus which supplies could be left behind. While many different organizations and institutions offer global health opportunities, there is not yet a standardized format for the type and amount of supplies which should accompany these teams. The goal of this project was to create a simple and effective system for providing healthcare teams with necessary supplies as they participate in global health opportunities.

Bouknight, Abigail

Mentor(s): Dr. Laura Holden, Dr. Courtney Dodson, Dr. Derek Rhodes

Automatic dispensing cabinet optimization in a large, academic medical center

BACKGROUND: Automated dispensing cabinets (ADCs) have been utilized as a component of the decentralized pharmacy model since the late 1980s as a strategy to improve efficiency (ISMP). While the benefits of ADCs are certainly recognized, assessing optimization of such machines is important to ensure operational efficiency in the healthcare system. Mathematical algorithms are one approach to optimiza-

tion by evaluating inventory management and adjusting maximum and minimum par levels. The hope with this method is that once an ADC is optimized, there will be a reduction in the number of stock-outs and improved vend:fill ratios. The purpose of this study is to implement a mathematical algorithm on pre-identified machines and evaluate its effectiveness at improving ADC output.

METHODS: Four ADCs, two intensive care units and two cardiac telemetry units, will be selected for optimization via a previously validated mathematical algorithm. The algorithm will be applied to each medication that has been identified as standard stock. Minimum and maximum par values for each of these medications will be manually adjusted in the ADCs based on the algorithm. Each machine will be analyzed after 60 days of operating under the optimization algorithm. Overall total stock-outs and vend:fill ratios will be evaluated in the before and after periods.

RESULTS: In progress

CONCLUSIONS: In progress

Brandt, Nicolas

Mentor(s): Dr. Susan Wood

The Effects of Pyridostigmine Bromide and Stress on Cardiovascular Function: An Examination of Gulf War Illness

The Persian Gulf War (1990-1991) involved the deployment of approximately 700,000 US troops. These soldiers were administered the reversible acetylcholinesterase inhibitor pyridostigmine bromide (PB) as prophylaxis against the threat of nerve gas. Upon returning home, soldiers exhibited a chronic symptomatology that became known as Gulf War Illness (GWI). These symptoms include an aberrant cardiovascular profile with features such as increased heart rate, disrupted vagal tone, and increased incidence of hypertension and heart attack. Although the etiology of GWI remains unclear, PB has been repeatedly implicated as a contributing factor. This study examines the roles of PB and stress with respect to cardiovascular function in an animal model of GWI.

The 32 rats in this study were implanted with cardiovascular telemetry and randomly assigned to one of four conditions: Vehicle-Non stressed control (NSC), Vehicle-Stress, PB-NSC, and PB-Stress. On days 1-14, the rats in the PB groups were administered daily doses of PB (1.3mg/kg). On days 5-14, rats in the stress groups were subjected to 6 hours of daily restraint stress. Rats were then left undisturbed until a lipopolysaccharide (LPS, 100 mg/kg) challenge on day 25 (early phase) and day 90 (late phase) to determine the cardiovascular response to endotoxin exposure. ECGs and blood pressure responses were recorded. The early phase LPS challenge showed no significant effects on cardiovascular function. The late phase challenge showed significant increases in QRS duration for the Vehicle-Stress group and the PB-Stress group. The PB-Stress group exhibited a more rapid and consistent increase in QRS duration during this challenge. The data from this challenge also showed a sensitized blood pressure response in the Vehicle-Stress, PB-Stress, and PB-NSC groups.

These data provide support for the hypothesis that PB and stress affect cardiovascular function. This animal model reflected the chronic nature of GWI in that significant effects were shown only in the late phase challenge. This study reveals what appears to be a sensitized immune response in the rats treated with stress and/or PB. Future research should be directed toward examining ECGs of GWI patients to investigate any changes similar to those described in this study.

Branham, Timothy

Mentor(s): Dr. Richard Steet

Functional Analysis of COL1A1 Variant in Patient with Ehlers-Danlos Syndrome

The objective of this project is to define the pathogenicity of a novel COL1A1 variant present in a patient

with Ehlers-Danlos Syndrome (EDS). Our initial focus was to understand how type I collagen biosynthesis and function was affected, with an ultimate goal to elucidate how the variant was causing the phenotypic characteristics of EDS. Patient derived fibroblasts were used to perform functional analysis in order to seek a better understanding of the mechanisms contributing to pathology. Three primary experiments were performed: 1) Western blotting to compare type I collagen levels to type III collagen levels in COL1A1 patient fibroblasts in order to determine if the variant caused specific effects on the secretion and/or processing of type I collagen; 2) the same analysis following L-ascorbic acid stimulation to see if the increased collagen synthesis caused by this supplement would coax out a more pronounced effect in the patient cells; and 3) receptor tyrosine kinase (RTK) phosphorylation arrays to look into various RTK phosphorylation states in the patient cells. Although secretion and processing of type I collagen in the patient fibroblasts was not significantly affected under normal growth conditions, a more pronounced effect showing a decrease in collagen present in the media of patient cells was observed following L-ascorbic acid stimulation. The RTK array analysis revealed an increase in both Axl and PDGFR phosphorylation in the patient cells, indicating the possible involvement of these pathways. These preliminary experiments give insight into potential mechanisms by which the COL1A1 variant may be causing the clinical phenotype, but suggest that more research will be needed to fully define the functional impact of this COL1A1 variant and its link to EDS.

Braunstein III, Paul

Mentor(s): Dr. Joseph McQuail, PhD

Peripheral and Hippocampal Synaptic Glucose Metabolism in Aging

Aging is accompanied by irregularities in circulating glucose, altered secretion of glucocorticoids, and synaptic changes within the hippocampus, a brain region involved in cognition and regulation of homeostasis. These disturbances are especially pronounced in Alzheimer's disease (AD), supporting a theory wherein age-related deficits in neural glucose metabolism underlie bioenergetic disturbances that contribute to memory loss and dyshomeostasis in AD. With the goal of elucidating the precise features of brain aging that could feasibly mediate this relationship, we evaluated differences in peripheral glucose regulation and central expression of glucose metabolizing enzymes in young adult (6 months) and aged (24 months) male F344×Brown Norway F1 hybrid rats. First, we observed blood glucose levels were significantly elevated in aged rats, but insensitive to modulation by glucocorticoids released when challenged with an acute stressor. Second, the level of phosphofruktokinase-1 (PFK-1), which is the rate-limiting enzyme of glycolysis, was marginally greater in aged hippocampal synapses whereas the level of glyceraldehyde-3-phosphate dehydrogenase (GAPDH), another glycolytic enzyme, tended to decrease with age. Third, age-related changes to metabolic signatures in hippocampal synapses may be specific to glycolysis as we observed no difference in protein levels of representative enzyme subunits that comprise the mitochondrial electron transport chain, which is required for oxidative phosphorylation. Our initial findings demonstrate that normally aging rats are a translationally useful model to examine the antecedents and consequences of glucose dysregulation. Blood glucose levels in aging become uncoupled from the typical modulation by the HPA axis, which suggests defective glucocorticoid signaling is not the basis for these effects. Differences in peripheral glucose metabolism coincide with changes to glycolytic enzymes in hippocampal synapses without affecting mitochondrial abundance. Forthcoming work from our lab will examine the degree to which age-related alterations to peripheral and central glucose metabolism relate to memory function and how diets that modulate blood glucose and other energy sources can improve cognition and neural function in aging.

Broermann, Lynn

Mentor(s): Dr. Eugenia Broude, Dr. Gary Schools

Effects of HER2 and CDK8/19 inhibitors on tumor-associated macrophages in HER2+ breast cancer

Tumor-associated macrophages (TAMs) can either speed up or slow down cancer development and metastasis depending on their phenotype. M1 macrophages secrete pro-inflammatory cytokines, triggering an immune response. M2 macrophages secrete anti-inflammatory cytokines, suppressing the immune system. Few studies have explored the clinical impact of M1 and M2 macrophages in HER2+ breast cancers. HER2, a tyrosine kinase receptor, is overexpressed in 25-30% of human breast cancers. Lapatinib works as a targeted therapy agent by inhibiting the kinase activity of HER2, thereby suppressing HER2-triggered tumor-promoting signal cascade. SNX631, an inhibitor of CDK8/19 transcription-regulating kinases, was found to augment tumor-suppressive effects of lapatinib and to suppress lipopolysaccharide-induced M1 macrophage differentiation.

This study aims to compare the ratio of M1 to M2 macrophages in HER2+ tumor xenografts treated with combination of Lapatinib and SNX631 versus monotherapy. By subtracting the number of M1 macrophages labeled by anti-arginase 1 from the total number of macrophages labeled by F4/80, we can quantify M1 and M2 macrophages and determine how changes in M1/M2 macrophage ratio correlate with the tumor-suppressive effects of combination treatment.

Tumors from control, single drug, and combination treated animals were collected, stained with macrophage-specific antibodies (F4/80 (all macrophages), arginase I (M2) and IL-6 (pro-inflammatory cytokine from M1)), and analyzed using ImageJ. Image J works by running a custom script that uses artificial intelligence to classify macrophages based on their morphology and staining intensity. In this ongoing study, combination therapy thus far has resulted in the lowest number of F4/80 positive macrophages. In the future, a similar study will be repeated using additional antibodies in the advanced therapeutically relevant patient-derived xenografts (PDX) and with assessment of IL-6 expression to compare immune response between treatment groups.

Bryan, Ashley

Mentor(s): Dr. Timothy Averch

Your Ureteral Stent: Improving Patient Education to Decrease Triage Burden and Improve Care

This quality improvement project aimed to reduce the burden of phone calls regarding expected stent symptoms at the Prisma Health Richland Urology Office. Urology staff have reported that the amount of patients who call triage in regards to their ureteral stents, many of which are expected post placement symptoms, is making it difficult for them to properly address patient concerns and is overwhelming their workload. Patients are also experiencing unnecessary concern for symptoms that are normal and expected. From June to December of 2020, 282 patients received stents in their office. 75 of them contacted triage with many calling multiple times to raise the total number of calls to 138. By April 15th, we aim to decrease the percent of patients who call Prisma Health Richland Urology triage regarding their ureteral stents from 26.6% to 21% by providing patients with informational handouts on what to expect from their stent and what signs indicate they need to contact their physician. These handouts were distributed by the physicians at patients' appointment prior to surgery, in informational packets they received about their upcoming surgery, and by the NPs in Post Op starting on February 8th. Chart review will be used to record the amount of triage phone calls for this patient population to evaluate the improvement in patient education and reduction in call load. Staff will also be contacted at the end to evaluate if the intervention improved their workflow and if it is sustainable.

Bynarowicz, Taylor

Mentor(s): Dr. Christine Schammel, Dr. Steven Trocha

Comparing Transarterial Radioembolization (TARE) and Transarterial Chemoembolism (DEB-TACE) for Unresectable Hepatocellular Carcinoma with evaluation of Child-Pugh Score as a Prognostic Indicator

Hepatocellular carcinoma (HCC) is the fifth most common cancer and the third highest cause of cancer-related death worldwide, with a 5-year survival rate of only 20%. When deciding a course of treatment, liver function must be appropriately assessed using a scoring system such as the Child-Pugh (CP) classification, in addition to tumor grade and potential respectability. For those with intermediate stage HCC, drug-eluting bead transarterial chemoembolism (DEB-TACE) or transarterial radioembolism (TARE) is the standard of care, offering targeted chemotherapy or radiation doses to tumor-supplying vessels. The recommended treatment for patients with advanced stage HCC, or in patients not eligible for locoregional therapies, is the systemic chemotherapy sorafenib. The purpose of this study was to compare TARE, DEB-TACE, and sorafenib as treatments for HCC in patients with Child-Pugh scores A (normal liver function) through C (severe dysfunction).

Following IRB approval, all patients treated with unresectable HCC at a single institution between 1/1/2005-12/31/2015 were evaluated. Sixty-five patients met inclusion criteria. Twenty-nine patients received TARE, 11 received DEB-TACE, 18 received sorafenib and 7 patients received multiple treatments. The TARE group was primarily CP-A (51.7%) and B (41.3%), while those receiving DEB-TACE had equal percentages of CP-A and CP-B (45.4%) with a minority of CP-C (9.1%). Patients receiving sorafenib treatment represented more serious liver disease with 38.9% CP-B, 27.8% CP-C and only 22.2% CP-A. Interestingly, the patients receiving multiple treatments were primarily CP-A (71.4%). This difference was significant across groups ($p=0.025$). There was no significant survival difference for patients receiving TARE and DEB-TACE (median 178 days and 286 days, respectively). The group receiving sorafenib had the lowest median survival, while those with multiple treatments had the highest. However, within the sorafenib group, CP-C ($n=5$) patients had a median survival of 1101 days, substantially longer than patients in other groups. This suggests that systemic treatment can significantly prolong lifespan in CP-C patients, despite guidelines recommending supportive treatment only. Additionally, those undergoing multiple treatments had the longest survival and highest percentage of patients with preserved liver function raising the question of whether they would have been suitable candidates for transplant, had the opportunity been available.

Carle, David

Mentor(s): Dr. William Richardson, Dr. Tina Hardison

Comparison of Administration Time Delays in a Three Bag N-Acetylcysteine Treatment Infusion Protocol

Intravenous (IV) N-Acetylcysteine (NAC) is most effective in preventing acetaminophen-induced hepatic injury when administered early - ideally within 8-10 hours from the time of ingestion.² Most commonly IV NAC is given over the course of 21 hours via 3 separate bag infusions – a loading dose of 150 mg/kg over 60 minutes, followed by 50 mg/kg over 4 hours, then 100 mg/kg over 16 hours. More recent studies have suggested decreased frequency of adverse events through utilization of a “2 Bag method.”¹ A secondary advantage of a two bag method would be theoretically decreased opportunity for delay in dosages administered allowing for a more consistent administration of the proven treatment. We conducted a retrospective chart review of 35 patients that were treated with IV NAC infusions due to acetaminophen toxicity to evaluate for the presence and degree of delays in initiation of the different infusion bags of NAC. We hypothesized there would be significant differences in time between initiation of the various dosages of the “3 Bag method.” Statistical analysis of the results demonstrated a significant delay in administration of the third bag in comparison to initiation of the second bag.

Chaballout, Basil

Co-Author(s): Alexander Strigenz, Bailey Blair, Avery Funkhouser, Jane Goodwin

Mentor(s): Mrs. Julie Martin, Dr. Ronnie Funk, Dr. Jeffery Edenfield, Dr. Connie M. Arthur, Dr. Anna V. Blenda

Glycomic Profiling of Breast Cancer Patient Serum for Disease Classification Refinement

Serum levels of glycans and galectins, which are glycan binding proteins, are currently being studied as an emerging means to classify cancer stages. Alterations in glycosylation are known to correlate with tumorigenesis initiation, progression, and metastasis. For this reason, our study focuses on identifying and assessing the changes in glycomic and galectin expression profiles in serum samples of breast cancer patients in an effort to identify profiles that might be used to enhance cancer diagnosis and classification. Sera of forty breast cancer patients, ten from each stage, 1-4, was assessed to create a “cancer stage signature” including serum glycan profiling by mass spectrometric analysis and assessment of galectin detectable in serum by ELISA. Of the glycans assessed, six (H5N4F2, H5N5S1, H5N5F1, H6N5S3, H5N4F1S2, H5N3S1) had unique presence among breast cancer stages and three (H3N5F1, H4N5F1, H6N5S3) had significant serum concentration changes between stages, marking them as possible markers of breast cancer stage progression. In addition, galectins-1, -3 and -9 were elevated in later stages of cancers compared to earlier stages. These data will be deposited into our existing cancer patient database which includes information we have accumulated regarding tumor mutations and lifestyle factors of the individual patients assessed. Analysis of patterns across stages in our database will provide an opportunity for significant diagnostic and prognostic power. In addition, these glycomic signatures may have a practical application as a non-invasive diagnostic tool for tumor stage refinement.

Chu, Trinh

Mentor(s): Dr. Steven Saef

Self Report of Pain vs. Discomfort in the Emergency Department. Is There a Difference?

Background: Previous studies have reported that patients will deny being in pain but report feeling uncomfortable, for instance women with cardiac ischemia. We believed that Emergency Physicians (EPs) would find it useful to know if there was a significant difference in how their patients reported pain vs. discomfort.

Methods: This was a prospective cohort study conducted at an urban, academic ED. Adult patients (>=18yrs old) with a chief complaint that included pain of any sort who were willing and able to participate without duress were eligible. Surveys were administered by student teams asking patients to rate their pain and discomfort from 1-10 on visual analog scales. Patient characteristics including demographics, types of pain, duration of pain, location of pain, quality of pain or discomfort, and pain-modifying conditions were recorded on tablet computers. Data was entered into REDCap ©, Vanderbilt University and uploaded into SAS, Cary, NC for analysis.

Results: There were 289 patients enrolled in the study. Overall, 58% reported no difference between their discomfort and pain. 21% reported their discomfort to be greater than their pain and 21% reported their discomfort to be less than their pain. Fifty-two (18%) of patients reported chest pain. Of these, 52% saw no difference between pain and discomfort, 25% reported discomfort to be greater than pain and 23% reported discomfort to be less than pain. Seventy-three (25%) of patients reported abdominal pain. Of these, 58% reported no difference between pain and discomfort, 26% reported discomfort to be greater than pain and 15% reported discomfort to be less than pain.

Conclusions: Amongst ED patients who present with painful conditions, a clinically important number of patients reported discomfort to be greater than pain. Emergency Physicians (EPs) should be cognizant of this and include questions about discomfort in their clinical assessments.

Connolly, Kyleigh

Co-Author(s): Haley Fulton

Mentor(s): Dr. Lauren Fowler

Stress in EMS: Autonomic Imbalance and Burnout over 12-hour Shifts

Background: Provider burnout is a job-related stress syndrome and is a combination of exhaustion, decreased productivity, depersonalization and decreased feelings of personal achievement. Provider burnout rates are higher in Emergency Medical Technicians (EMTs) than in similar professions like nursing. EMT burnout causes poor health outcomes, higher absentee rates, patient care errors, and risky behavior. Decreasing burnout in EMTs is important for maintaining a high level of quality care, protecting provider health, reducing healthcare costs and overall system stress. EMTs experience a high level of multiple, sudden sympathetic arousal from high stress situations, affecting the autonomic nervous system (ANS) balance. The goal of this study is to identify if ANS imbalance changes with time of day or time in shift and if this affects providers' perception of burnout.

Materials and Methods: Forty medical students serving as EMTs on 12-hour shifts were tested prior to and following their shifts on heart rate variability (HRV). HRV, assessed by photoplethysmography, is a noninvasive, indirect, and valid method to identify ANS imbalance. The Maslach Burnout Inventory (MBI) for Healthcare Professionals was used to assess provider burnout.

Results: A one-way multivariate analysis of variance (MANOVA) determined there was a difference between time in shift (pre/post) and HRV ($p < .05$), with no effect on time of day (AM/PM). Post-shift sympathetic tone was significantly higher than pre-shift sympathetic tone, while post-shift parasympathetic tone was significantly lower than pre-shift parasympathetic tone. MBI results show high levels of emotional exhaustion, depersonalization and low levels of personal accomplishment in both males and females. Pearson's correlation showed no significant relationship between burnout and HRV.

Conclusions: HRV analysis showed increased sympathetic arousal post-shift while MBI results showed high levels of emotional exhaustion, depersonalization and decreased personal accomplishment in both males and females. Even with the increased sympathetic arousal and burnout measures, there was no significant relationship between ANS imbalance and burnout in providers over 12-hour shifts. Future research should evaluate stress and burnout in a population of career EMTs.

Davis, Elizabeth

Co-Author(s): Andrew Montgomery

Mentor(s): Dr. Morgan Rhodes

Improving the Influenza Vaccination Rates at the Family Medicine Center for the 2020-2021 Season

Annual influenza vaccinations are recommended for any persons over the age of six months between the months of August and March. Previously, the Prisma Health Family Medicine Center (FMC) has been very successful in their annual influenza vaccination rates. In a typical year, approximately 80% of patients are asked about influenza vaccination and either receive the influenza vaccine or have a documented declination for the vaccine. However, at the beginning of the 2020-2021 influenza season, FMC had a 49.8% influenza vaccination rate. The goal of this project was to assess the true FMC influenza vaccination rate.

This was a quality improvement (QI) project to analyze gaps in influenza vaccines. A list of gaps in influenza vaccines was provided by the Prisma Health Midlands Quality Network (PHMN). 704 patient charts were reviewed. Patients were excluded if they were not patients of FMC doctors or were seen in the urgent care setting (not primary care) only. Charts were updated accordingly if patients received vaccines

at outside facilities (community pharmacies, etc) or declined their flu shot. Once patients with a true need for influenza vaccine were identified, they were contacted by phone about receiving their flu vaccine and given instructions on where to do so. After this QI project, the rate of influenza vaccinations at FMC was 62.88% as of January 2021. Large contributors of this misrepresentation in gaps in influenza vaccines were patients who were not patients of FMC doctors (about 1/3) and patients who received their influenza vaccination at an outside facility (about 1/5).

Davis, Kelli

Co-Author(s): Alyssa Buono

Mentor(s): Dr. Erin Ricker

Code Curriculum at Your Fingertips: Pediatric Resident Code Curriculum Quality Improvement Project

Cardiopulmonary arrest is infrequent in pediatric patients, but requires rapid decision making, technical skills, and a well-coordinated response by the healthcare team for a successful outcome. Often, residents are the first responders in code situations but due to lack of experience, many remain uncomfortable leading and managing emergent codes. For this reason, a quality improvement project at Prisma Health Children's Hospital Midlands was developed in July 2018 to initiate a mock code curriculum involving monthly written assessments, simulated code assessments, and unscheduled mock codes to increase resident confidence and performance in real code scenarios. The 2019-2020 quality improvement project continued this mock code curriculum with the additional intervention of a reference Code Quick Card provided to each pediatric resident. Results showed an overall improvement in average time to Zoll lead placement from 6:56 to 6:01, time to start of chest compression from 1:33 to 1:13, and time to defibrillation from 12:47 to 7:51 but no improvement in time to establishing airway or time to epinephrine administration in mock codes for the 2019-2020 academic year compared to 2018-2019. Survey results showed an average improvement of all pediatric resident self-perceived confidence with codes by 16%. Written code quiz scores improved overall by an average of about 70%.

Davis, Thomas

Co-Author(s): Smith Heavner-Sullivan

Mentor(s): Dr. Phillip Moschella

Public Health Collaboration Augments HIV and Syphilis Screening in Upstate South Carolina Emergency Departments

Background: The HIV epidemic is at the forefront of public health concerns. Emergency Departments (ED) play a critical role in early detection of HIV. In 2006, the CDC recommended HIV screening to all patients 13-64 who present to health care facilities, citing that in populations where the prevalence of undiagnosed HIV infection is $\geq 0.1\%$, screening for HIV is as cost effective as screening for chronic diseases such as hypertension. Aim: This study highlights how a unique collaboration with a state health agency can overcome a significant barrier to HIV screening in the ED, while uncovering the prevalence of HIV and Syphilis in the Upstate Region of South Carolina. Methods:

This is an IRB approved study of a new collaborative South Carolina Department of Health and Environmental Control (DHEC) program providing fully subsidized "opt-out" HIV screening for uninsured adult patients aged 18-64 at two EDs in the Upstate region of South Carolina (~95K and 67K visits/year) presenting over a 2 year period (1/18-12/19). These sites cover both the only level 1 trauma center and a rural ED that serves a portion of the Appalachian mountains. "Opt-out" HIV screening is offered as part of the general consent for ED treatment. Serum HIV screening using batched samples including reflex HCV and Syphilis testing was conducted as per established CDC guidelines. All positives were reported to DHEC and scheduled for post-test counseling with a local clinic representative. Results: 6,992 patients were screened and 32 were confirmed positive for HIV (0.46%). Of those, 16 were found to have a new di-

agnosis of HIV (0.23%) and 8 patients were coinfecting with Syphilis (25%). All 32 patients were linked to care. Conclusion: A prevalence of 0.23% on new diagnosis of HIV is greater than the CDC recommendation for universal screening, thus continued screening in the ED is warranted. We discovered a high Syphilis coinfection rate (25%), a curable disease with a strong link to increased HIV transmission. Other EDs can model this collaboration to overcome cost barriers that EDs face to routine HIV screening, realizing early detection is an effective first step in mitigating the HIV epidemic.

DuBruille, Gabrielle

Mentor(s): Dr. Andrew Mardis

Optimizing Utilization of SGLT2 Inhibitors in an Outpatient LVAD Population

Purpose: SGLT2 inhibitors (SGLT2i) decrease morbidity and mortality in patients with HFREF and have potential but unstudied benefits in LVAD patients. The purpose of this study was to assess the impact of a provider education program and SGLT2i initiation protocol on SGLT2i prescribing and to determine barriers to SGLT2i utilization.

Methods: This was a single center, retrospective, cross-sectional cohort study of an outpatient LVAD patient population. The primary outcome was the proportion of patients on SGLT2i therapy seen in clinic prior to (May/June 2019) and after (May/June 2020) pharmacist-led protocol development and provider education. Candidates for SGLT2i were those with NYHA Class II-IV symptoms, MAP \geq 80 mmHg, and eGFR \geq 20 mL/min. Chi-square and t-tests were used to compare categorical and continuous data, respectively.

Results: A total of 272 LVAD outpatient encounters were evaluated; patient characteristics were similar between the pre- and post-protocol cohorts. No patients in the pre-protocol cohort received SGLT2i therapy despite 67 being appropriate candidates. In the post-protocol cohort, 25 patients (16.0%) were already receiving an SGLT2i ($p < 0.001$ vs pre-protocol) and 109 patients were candidates. Of those, 9 patients (5.8%) were initiated on an SGLT2i ($p = 0.01$ vs pre-protocol). NYHA Class I (23.4%) and MAP < 80 mmHg (21.3%) were the most common reasons patients were not SGLT2i candidates. Rationale for failing to initiate SGLT2i post-protocol was poorly documented, but primarily included other medication changes ($n = 12$) or patient instability ($n = 7$). In addition to improved rates of SGLT2i prescribing, rates of prescribing of other guideline-directed therapies also improved.

Conclusion: Pharmacist-led provider education and initiation protocols can increase SGLT2i utilization in outpatients supported by LVADs, leading to a larger patient population in which the potential benefits of these therapies on clinical outcomes can be evaluated.

Durbin, Luke

Mentor(s): Dr. Christine Schammel

Factors Influencing Discharge Location following Ischemic Stroke

There are greater than 7 million stroke survivors within the United States alone with over half afflicted with impaired mobility necessitating rehabilitation. There is greater potential for improved functionality when post-stroke acute care includes an inpatient rehabilitation facility when compared to a skilled nursing facility or home with home health; however, only approximately 10% of patients hospitalized for a stroke are admitted into inpatient facilities upon discharge. The goal of this study was to evaluate the actual discharge locations of post-ischemic stroke patients receiving a consultation for admission to a single hospital based IRF and the criteria utilized in the case manager and patient decisions were evaluated. Following IRB approval, a single institution, retrospective review of patients diagnosed with an ischemic stroke, were hospitalized and evaluated for admission into a hospital based IRF at hospital discharge

between 1/1/2016 through 9/5/2016 was performed. Overall, 100 patients were included in the study. Patients with private insurance were approved for the inpatient facility more (72%) with low approval for all others ($p=0.0832$). Private insurance patients utilized the inpatient facility (56%); public insurance patients utilized skilled nursing facilities (30%; $p=0.1349$) despite no significant difference in discharge NIHSS scores ($p=0.2333$). No significant differences were noted between insurance status and denial codes ($p=0.7141$). Of those approved for inpatient, 35% declined secondary to patient or family refusal; 80% of skilled nursing patients and 93% of those discharged home with services were denied inpatient admission ($p<0.0001$).

Ellison, Carrie

Mentor(s): Dr. Sarah Blandy, Dr. Amanda Moyer

Evaluation of guideline-directed utilization of intravenous iron in patients with heart failure with reduced ejection fraction in an inpatient setting

Background:

Intravenous (IV) iron repletion for patients with heart failure is currently recommended in guidelines due to noted benefits in improved quality of life, increased exercise tolerance, and reduction in patient-reported symptoms. While these recommendations were mostly based on evidence from two randomized controlled trials in the ambulatory setting, a recent trial in hospitalized patients with acute heart failure confirmed a reduction in heart failure-related hospitalizations. The purpose of this study was to evaluate intravenous iron utilization in patients with heart failure with reduced ejection fraction (HFrEF) in the inpatient, cardiac hospital setting.

Methods:

This single-center, observational, retrospective chart review was conducted in adult patients with HFrEF who received intravenous iron during hospitalization. Patients who received blood transfusions were excluded. Charts were reviewed for demographic information, ejection fraction, iron studies, and iron repletion characteristics. The primary objective of the study included the evaluation adherence to guideline directed criteria for iron deficiency defined as ferritin <100 mcg/L or ferritin $100 - 300$ mcg/L + Tsat $<20\%$. Secondary objectives included evaluation of IV iron replacement completeness stratified by study site iron formulation and presence of discharge recommendations for completion of IV iron if needed.

Results/Conclusion: In Progress

Enabore, Aldrin

Mentor(s): Dr. Derick Wenning

Targeting Pediatric Firearm Violence in Columbia, SC

Firearm-related injuries account for the second leading cause of death among children and adolescents in the United States. Though unintentional firearm injury comprises only 2% of all U.S. firearm deaths, a disproportionate 26% of these events occurred among children and adolescents. Epidemiological studies have demonstrated epicenters of gun violence to be a result of area deprivation, of which failing schools and poor health outcomes appear to have confounding and leading roles. Our study seeks to localize the epicenters of pediatric gun violence in Columbia, South Carolina. This retrospective study compounds the pediatric (2-18 year old) GSW traumas in years 2016-2019 presenting to Prisma Richland Midlands Hospital, the only level 1 trauma center in the capital city of Columbia, South Carolina. We assort the events ($n=144$) by zip code, and after analysis, have localized four areas of which 45% of events occurred. Using a gender based analysis, male ($n=117$) or female ($n=27$), there was not a statistically significant intrinsic difference between male and female accidental firearm related events ($p = 0.61$) or mortality rate ($p=0.43$). A statistically significant number of these events occurred in children between the ages of 16-18

($p < 0.0001$). Public health studies have urged to view these events not as accidents but rather socioeconomic phenomena amenable to prevention. These data collected can locally guide efforts of increasing firearm education by targeting schools in these regions where firearm violence, accidental or intentional, are most. Ultimately, we may be able to reduce accidental firearm events, and more importantly in a broader schema, pediatric firearm related events in this young and susceptible population.

Fellers, Ashley

Mentor(s): Dr. John Bernhart, Ms. Mary Wilson, Dr. Gabrielle Turner-McGrievy

When in-person assessment can't happen: Use of Bluetooth scales to assess weights during a global pandemic

Background: In the U.S., African Americans have disproportionately higher rates of obesity compared to white and Hispanic populations. The Nutritious Eating with Soul (NEW Soul) study partners with local soul food chefs to deliver a behavioral nutrition intervention to African American adults with overweight or obesity in South Carolina through weekly hands-on cooking classes. As a result of COVID-19 and social distancing restrictions, all intervention delivery moved online. This study examined participant engagement of utilizing Bluetooth scales to assess body weight in place of in-person assessments.

Methods: All current NEW Soul participants ($n=148$) were invited to participate in the remote weight assessment with Bluetooth scales. Seventy-five (51%) consented and were mailed Fitindex Bluetooth scales. The research team sent personalized emails explaining scale set-up instructions, an assigned login for the Fitindex app to sync their scale to their mobile device, and contact information of research staff for assistance. We monitored the completion of the weigh-in assessment via the Fitindex app over 1 month. Participants were sent reminders over email, text, and call, every three to seven days up to 5 reminders.

Results: Of the 75 participants, 2 (3%) dropped the study. Of the 73 remaining participants, 70 (96%) recorded an initial weight. An average of 2.57 contacts were required for a participant to complete their initial weigh-in. The most effective method of reaching participants was via text. Many participants (23, 33%) required technological assistance to complete their weigh-in and 35 (50%) sent a screenshot or photo of their weight rather than connecting the scale to the app.

Conclusions: Bluetooth scales were an effective way of assessing body weight when in-person assessments are not possible; however, only 51% of enrolled participants opted to receive a scale. Participants who received a scale responded positively and utilized the scale to monitor their weight. Most participants were able to connect to the scale using the app; however, accepting pictures of the weight was a crucial alternative method of collecting data. Moving forward, studies assessing body weight and body weight changes via telehealth interventions should consider utilizing Bluetooth scales as a method of assessment.

Fielding, Seth

Mentor(s): Dr. Joseph Myslinski

Flash pulmonary edema resulting in hypoxia refractory to positive pressure ventilation

Abstract Text: Pre-Hospital Course: An 80 year old male presented by ambulance to the emergency department (ED) following a low-mechanism MVC, without obvious signs of damage. The patient initially had no complaints and did not want to be transported to the hospital. While waiting 20 minutes for the fire department to help open his car door, the patient became short of breath. When he became cyanotic the paramedics placed him on continuous positive airway pressure (CPAP) with 100% oxygen, but the best oxygen saturation obtained was 84%. Initial blood pressure was 200 systolic. The patient then went into ventricular tachycardia and was electrically cardioverted. ED Course: Patient presented extremely

short of breath and cyanotic. He was immediately placed on CPAP and bedside ultrasound revealed significant pulmonary edema, but no other injuries. Shortly thereafter he became apneic and lost his pulse. CPR was initiated and he was intubated. ACLS was performed for 7 minutes, during which he received 2 rounds of defibrillation, epinephrine, amiodarone, magnesium, bicarbonate, and calcium. Patient then attained return of circulation with initial post-arrest BP of 130/70. An EKG showed left bundle branch block without evidence of myocardial infarction. Despite multiple ventilation strategies and high levels of PEEP, oxygen saturations remained below 82%. CT scans revealed consolidated pulmonary edema but no other significant findings. He was transferred to the MICU with stable blood pressure but persistent hypoxia. Hospital Course: In the MICU, the patient was placed in a prone position, but his oxygen saturations remained 78-80%. He also developed hypotension requiring vasopressors. His oxygen saturations gradually improved 8 hours later and he was then extubated and weaned off vasopressors. Patient had multiple runs of ventricular tachycardia requiring placement of an implantable cardioversion device. Cardiac catheterization revealed no obstructive lesions and troponins were negative for myocardial infarction. Echocardiogram revealed chronic but undiagnosed cardiomyopathy. He was discharged six days later neurologically normal, with normal oxygen saturations. Conclusion: Despite persistent hypoxia for greater than 8 hours due to severe pulmonary edema, supportive care allowed his lung function to improve and he was able to be discharged home completely normal.

Fielding, Seth

Mentor(s): Dr. Joseph Myslinski

Hemoconcentration and Clinical Presentation Helps Identify Patients Likely to Have Angiotensin Converting Enzyme Inhibitor Induced Visceral Angioedema (AIVA)

Background: Angiotensin converting enzyme inhibitors (ACEI) are known to cause AIVA. However, this side effect is considered rare and difficult to diagnose because there are no definitive tests.

Objective: To determine if high hemoglobin (Hgb) and clinical presentation could identify potential AIVA patients.

Methods: A retrospective chart review used abnormally high Hgb as the primary marker. Other markers evaluated were: gastrointestinal (GI) symptoms; discharge diagnosis (DD); and ED visits within the previous 12 months.

Results: ED visits in 2016 totaled 77,719. 544 non-trauma patients had a high Hgb, with 160/544 being on an ACEI. 181/544 patients had GI symptoms and 51/181 of these were on ACEI. 28/51 of +ACEI/+GI patients and 44/133 of -ACEI/+GI patients had a non-specific GI DD. 43/181 patients with GI symptoms (14 on ACEI; 25 not on ACEI) also had ED visits within the prior 12 months for GI symptoms. The 14 +ACEI/+GI/+prior patients had 36 total prior visits, with 27/36 (75%) having a non-specific GI DD. The 25 -ACEI/+GI/+prior patients had 51 prior visits, with only 10/51 (20%) having non-specific GI DD. The 43 +GI/+prior patient charts were reviewed for subsequent ED visits for GI symptoms. The 29 patients not on ACEI had 56 subsequent visits, with 15/56 (27%) having a non-specific GI DD. The 14 patients on ACEI had 31 subsequent visits with 27/31 (87%) having a non-specific GI DD.

Conclusion: High Hgb identifies increased likelihood of non-specific GI DD in ACEI patients and may be a valid marker to potential AIVA.

Fulton, Haley

Co-Author(s): Kyleigh Connolly

Mentor(s): Dr. Lauren Fowler

Working night shift has negative health effects; what we can learn from markers of oxidative stress and fatigue

Many jobs in healthcare require shift-work due to the 24/7 occurrence of various health crises. One of the jobs that requires this is the role of emergency medical technicians (EMTs). EMT shifts are often divided

into 12-hour shifts. It has been shown that those who work night shifts have deleterious health outcomes due to disruption of the body's circadian clock. Plausible reasons for the negative health effects that night shifts have on the human body could be due to increased fatigue, which can have effects on many physiological systems. Fatigue has been associated with increased oxidant stress and decreased antioxidant capacity. This creates an imbalance in the body's ability to maintain ideal oxidation levels in healthy tissues. This study is designed to assess the effects of working day vs night shifts on fatigue and oxidative stress. 16 EMTs and paramedics were tested prior to and following their 12-hour day or night shift. Testing consisted of saliva collection to measure total antioxidant capacity (TAC), and pupillometry was used to assess pupillary response for physiological fatigue. Amplitude of pupil constriction has been shown to be a valid measure of fatigue, with smaller amplitude of constriction in those with higher fatigue. A multivariate analysis of variance (MANOVA) demonstrated that time of day had an effect on both TAC and pupillary amplitude. TAC and amplitude were both greater in the morning ($p < .05$), indicating participants were more fatigued and less capable of fighting oxidative stress in the evening. This study showed that both TAC and pupillary amplitude were significantly lower when starting a night shift than when starting a day shift. Twelve-hour shifts increase fatigue and decrease TAC, but the effects are worse when working night shifts. These results could contribute to the negative health effects seen in EMTs working shiftwork, with night shift having particularly deleterious health effects.

Funkhouser, Avery

Co-Author(s): Alexander Strigenz, Bailey Blair, Basil Chaballout, Jane Goodwin

Mentor(s): Dr. Julie Martin, Dr. Connie Arthur, Dr. Ronnie Funk, Dr. Jeffery Edenfield, Dr. Anna Blenda

Oncogene Mutations and Their Correlation with Serum Levels of Galectins -1, -3, and -9 in Breast Cancer Patients

Galectins are members of the b-galactoside-binding protein family, which bind carbohydrates across a range of biochemical pathways. Fifteen human galectins have been discovered, with galectins -1, -3, and -9 implicated in cancer progression, metastasis, and angiogenesis, and also in modulating innate and adaptive immune responses. Forty patient samples of stage I-IV breast cancer were obtained from the Biorepository of the Prisma Health Cancer Institute. Serum levels of the above-mentioned galectins were measured by ELISA. Additionally, analysis of DNA sequences of 50 oncogenes from the same patients was conducted. Correlations between the galectin serum levels and mutation presence were elucidated by statistical analysis. Three genes, PIK3CA, TP53, and KDR, were found to have a significantly high frequency of mutation in the sample population with at least 65% of the patients having a mutation in at least one of those genes. Serum levels of galectin-3 and -9 are significantly higher in the presence of a p.Met542Leu point mutation in the KIT gene compared to other oncogenic mutations. Galectin levels are also higher in patients with mutations (18 total) in the PIK3CA gene compared to galectin levels of cancer patients without mutations in the same gene. Additional findings include PIK3CA mutations and galectin-1 levels each positively correlating with patients' BMI. Decreased galectin levels correlated with non-coding FLT3 gene mutation. Finally, KIT gene mutations were associated with brain metastases, invasive ductal histology, and higher number of other mutations present in patients. The galectin profiles and mutations data were reported to the Prisma Health cancer patient database to enhance future research. Further studies will include analysis of the same oncogene mutations in liver and colon cancer patients to determine if similar patterns can be found in other cancers.

Garner, Sydney

Mentor(s): Dr. Kathryn Fong

Peripheral Arterial Disease: A Focus on Critical Limb Ischemia and the Variation in Treatment and Outcomes

Lower extremity peripheral arterial disease (PAD) also known as peripheral vascular disease (PVD) is estimated to affect more than 200 million people worldwide. In America, it affects over 8 million people. These numbers are likely lower than the true prevalence as PAD is often underdiagnosed in primary care settings. PAD is a chronic disease caused by atherosclerotic build up and occlusion of lower extremity arteries that can eventually lead to loss of limb.

In the US, prevalence of PAD varies across age groups and increases dramatically with age. As the elderly population in America continues to expand, PAD is likely to become an even larger problem for physicians. Prevalence also varies across ethnicities and is higher in Hispanic and American Indian populations than the Non-Hispanic White population. However, African-American patients are the most disproportionately affected by PAD.

Incidence of amputation also varies across regions of the United States. Goodney, et al. found that rates of major lower extremity amputations in Corpus Christi, Texas (24 per 10,000 Medicare patients) are six times higher than rates of major lower extremity amputations in Grand Junction, Colorado (4 per 10,000 Medicare patients). They also found that there are 12 regions in the US where amputations rates are high, and the level of vascular care is low. These regions were primarily in the South and included Florence and Columbia, South Carolina. Some of these variations in amputation rate can be attributed to patient differences such as gender, age, and race. However, these characteristics do not fully account for the differing amputation rates. Therefore, it is important to look at other possible explanations. Some of these potential explanations (e.g. access to care and socioeconomic standing) will be discussed below. If patients are suffering worse outcomes due to factors that do not contribute to disease severity then it is incredibly important for physicians to acknowledge that these factors exist, that they play a role in patient care, and attempt to address them.

Gettleman, Brandon

Mentor(s): Dr. Earl McFadden

Recurrent Inflammation with Anterior Subluxation of the Sternoclavicular Joint.

A 66-year-old female presented to the clinic with recurrent pain at the right sternoclavicular joint. Four years earlier, the patient had a successful resection of the medial clavicle. Upon physical exam, the patient repeatedly subluxed at the right sternoclavicular joint and it was tender to the touch.

Chronic inflammation and anterior subluxation of the sternoclavicular joint are rare diagnoses with insufficient treatments options. The limitations in treatment options are attributable to its intimate relationship with the mediastinum and forces applied on the joint. Techniques such as K-wire/pin fixations pose a large risk of damaging the mediastinal vessels. In this context, Bontempo et al state that the figure-of-eight semitendinosus reconstruction had superior biochemical properties to other techniques. The success yielded by repairing the dislocation with a tendinous allograft has been inconsistent due to development of laxity in the tendons. One study elucidated that this problem may not be related to the technique chosen by physicians but a lack of consistency in graft selection, leading to variable outcomes.

The goal of this case report is to support the literature's selection of a figure-of-eight reconstruction technique as the gold standard surgical approach while creating an innovative solution. Dr. Earl B McFadden Jr is confident that the use of an Arthrex swivel lock suture anchor with augmentation by Arthrex FiberTape #2 can provide strength and stability that has not been consistently displayed in previous sternoclavicular joint reconstruction procedures.

Following a successful operation, post-op appointments occurred at four days, ten days, four weeks, and twelve weeks. To this point the patient has full range of motion and no instability. There has been no tenderness, swelling, erythema, or hypersensitivity at the incision site. A one-year follow-up will be obtained to ensure the clavicle is still in the properly reduced position and the patient is pain free.

Giakas, Alec

Co-Author(s): Ashley Fellers, Siyuan Guo, Katherine Holder

Mentor(s): Dr. Matt Orr, Dr. Kevin Bennett

Major Stressors for Medical Students amidst COVID-19 Pandemic

Objective: To elucidate the major stressors described by medical students amidst the COVID-19 pandemic.

Methods: This study utilized a non-probability convenience sampling method to survey a cross-section of first through fourth year medical students to assess their major concerns, changes in lifestyle habits, and degree of burnout experienced during the COVID-19 pandemic. Participants were given the opportunity to describe their stressors and concerns through open-ended written questions.

Results: 405 medical students from schools in 20 states completed the survey. Of those participants, 65.19% reported being female and 33.33% were male. The most frequently referenced stressors, as expressed in open-ended comments, included: the inability to see family members due to travel restrictions or concerns of transmitting COVID-19; loss of clinical experience and clinical skills training; lack of away (“audition”) rotations for students applying to competitive residency programs; residency interviews being conducted virtually and associated concerns over ranking programs without having previously visited them; loss of research opportunities; adjusting to virtual lecture and lab; rescheduling of Board exams, especially the USMLE Step 1; and social isolation and resulting mental health struggles. Other identified stressors included: the shortage of PPE in hospitals; difficulty obtaining letters of recommendation due to decreased interaction with physicians; decreased time to study for shelf exams due to shortened rotations; and lack of appropriate study space due to the closure of schools and libraries. Several participants cited financial hardships due to spousal job loss; decreases in productivity as a result of studying at home while simultaneously homeschooling children; and increases in intimate partner violence. First year students noted significant stress regarding both the inability to meet their new classmates and the lack of class cohesion due to the absence of group collaboration and social activities. Other students expressed frustration with school faculty and administration, noting a lack of responsiveness to student questions and concerns with matters unrelated to COVID-19.

Conclusions: Medical students have experienced a variety of stressors throughout the COVID-19 pandemic. The results of this study can be used by medical schools to develop policies aimed at ameliorating this significant stress and reducing burnout in medical students.

Godwin, Joshua

Co-Author(s): Meghan Brown

Mentor(s): Dr. Stephanie Gibson

Comparison of Outcomes of Infants at Risk for NAS Utilizing the Eat, Sleep, Console Model versus the Modified Finnegan Scoring System: A Quality Improvement Project

Department of Pediatrics, USC-Prisma Health Richland Midlands, Columbia, South Carolina

Background: Infants exposed to various medicines such as opiates, SSRIs, or other substances while in
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utero are at increased risk of exhibiting withdrawal symptoms after birth. This constellation of symptoms is commonly referred to as Neonatal Abstinence Syndrome (NAS). Although rarely leading to death, it can lead to serious outcomes and significant health care system costs.

Aims: To decrease use of Morphine and hospital admission lengths in newborns at risk for NAS.

Methods: Data was obtained through retrospective chart review of all infants identified to have a ICD diagnosis code of NAS. Baseline data was obtained on infants who underwent management by the Finnegan scoring model. Post-intervention data was obtained on infants who were managed with the Eat Sleep Console model. We also evaluated the effect of higher caloric formulas on primary outcomes.

Results: Our data showed a 3.3 day decrease in length of hospital stay in infants managed by the ESC protocol when compared to the traditional Finnegan scoring system. Similarly, we saw a 3.8 day decrease in corrected length of stay using the ESC model. Infants managed by the ESC model showed a 9% decrease in Morphine use compared to the Finnegan scoring system. Eighty-four percent of all Morphine doses given to the infants observed under both models is attributed to the infants scored using the Finnegan system.

Conclusion: The Eat-Sleep-Console model correlates to a significant decrease in both Morphine use and length of hospital admission in infants at risk for NAS when compared to the Finnegan scoring system.

Goldbach, Tyler

Mentor(s): Dr. Heather Brown

E-cigarette or Vaping Product Use-Associated Lung Injury (EVALI) masquerading as COVID-19: A case of Availability Bias

E-cigarette or Vaping Product Use-Associated Lung Injury (EVALI) is a condition that was first recognized by the Centers for Disease Control in August of 2019 after thousands of cases of acute lung injury were linked to inhalation of aerosolized nicotine and THC products using E-cigarettes. EVALI is a diagnosis of exclusion but one which should be considered in the appropriate setting to prevent delay in care.

We present the case of a 17-year-old male who presented to our Emergency Department during the early days of the COVID19 pandemic with respiratory complaints. Patient presented to the ED with one week of fevers (Tmax of 104 F), nonproductive cough, dyspnea, vomiting, and diarrhea. He was referred to the ED from the pediatrician's office due to hypoxemia and was found to be significantly tachycardic and tachypneic with a pulse oxygen saturation of 93% on room air. He admitted to smoking marijuana but initially denied vaping. Due to a strong suspicion for COVID19 or other respiratory infection, a broad-based workup was initiated. Labs revealed leukocytosis of 18.6 with leukopenia. CRP and Procalcitonin were significantly elevated at 382 and 2.8, respectively. Troponin was unremarkable at 0.01. Interestingly, chest x-ray revealed severe venous congestion. Echocardiogram was performed which demonstrated that this was noncardiogenic as he has normal systolic function. COVID19 PCR ultimately came back as negative. He was initially admitted to the pediatric service and had formal consultation by cardiology, pulmonology, and infectious disease. He did require upgrade to Pediatric ICU and later in his hospital course, after a battery of testing, he admitted to vaping. After all other serological tests, cultures, and bronchoscopy were

found to be negative, he was diagnosed with EVALI and ultimately discharged after clinical improvement with steroids.

This case illustrates how availability bias surrounding COVID19 can lead to diagnostic error if not careful. Clinicians during the pandemic are surrounded by news media and patient concerns regarding the virus. A broad differential is still warranted. This patient presented with many signs and symptoms of COVID19 yet a detailed and accurate history ultimately led to the correct diagnosis.

Gregorie, Carolyn

Co-Author(s): Lauren Kubas

Mentor(s): Dr. Melanie Blackburn

A Quality Improvement Project Aimed at Identifying the Etiologies of Unplanned Extubations in the Pediatric Intensive Care Unit.

Introduction/Objective:

Unplanned extubation (UE) is any dislodgement of an endotracheal tube from the trachea that is not intentional. These events can vary in severity from requiring no reintubation to cardiovascular collapse that requires CPR. It is known that various factors can contribute to UEs. We reviewed charts and Apparent Cause Analysis (ACA) forms in the Pediatric Intensive Care Unit (PICU) to assess the patient conditions and environmental factors that were associated with UEs in an attempt to identify opportunities to reduce UE rates.

Methods:

Over a 17-month period, clinical information was collected retrospectively on all patients who had unplanned extubations while admitted to the PICU. This clinical information included demographic information, restraint usage, medication usage, and other factors. From the information collected, areas of opportunities were identified in order to educate staff on the possible etiologies of the unplanned extubations.

Results:

From a total of 18 UEs, 77.8% occurred with hands on activities with the patient such as retaping, position change, and hygiene care, 55.6% occurred on night shift, 42.9% of ACA surveys revealed that staff felt sedation was inadequate, 24.2% of patients were given PRN sedation within the hour prior to UE, and 61.1% of UEs occurred in patients who were being weaned or awaiting extubation.

Conclusion:

After careful review of ACA surveys and patient charts, we conclude that unplanned extubations in the Prisma Health Richland PICU are most associated with inadequate attention to the airway with hands on activities requiring position change and inadequate sedation. In an effort to reduce the incidence of unplanned extubation in the PICU by 50% by January 2022, we suggest that staff be educated on the use of a second caregiver as an airway guardian during activities that require position change and about the use of PRN sedation prior to these activities.

Gregory, Taylor

Mentor(s): Dr. Erin Creech, Dr. Elizabeth Wright

Comparing the Incidence of Hematoma Expansion after Desmopressin Administration in Patients with Spontaneous Intracerebral Hemorrhage on Antiplatelet Medications

Background/Purpose: Spontaneous intracerebral hemorrhage (sICH) is associated with high morbidity and mortality. Expansion of the initial hematoma is a marker of poor prognosis but may be preventable. The use of antithrombotic medications can adversely affect outcomes, specifically hematoma expansion. This study aimed to determine the efficacy of desmopressin (DDAVP) in reducing the incidence of hematoma expansion in patients taking antiplatelet medications after a sICH.

Methodology: This was a single center, retrospective cohort study that included adult patients admitted to the Neuroscience, Medical, or Surgical Trauma Intensive Care Units for sICH with documented DDAVP administration between January 2016 and January 2020. Patients were stratified by those on antiplatelet therapy at baseline versus those who were not. Patient demographics, laboratory values, DDAVP dosage, timing of interventions and imaging were all collected. The primary endpoint was to compare the incidence of hematoma expansion. Secondary endpoints included ICU and hospital length of stay, in-hospital mortality, and functional outcome. This study was approved by the Institutional Review Board.

Results: In progress

Conclusions: In progress

Hall, Rachel

Mentor(s): Dr. Jenny Knight, Dr. Christine Schammel

Multiple Myeloma with Neutrophilia: 2 case reports and literature review.

Multiple myeloma, a neoplastic proliferation of plasma cells, is a common diagnosis among hematologic malignancies. Leukocytosis, specifically neutrophilia, is also frequently seen secondary to many pathologic states; however, having both multiple myeloma and neutrophilia simultaneously is rare and could arise by two distinct pathways: either by a separate, but concurrent, clonal neoplasm of neutrophils or by a paraneoplastic-type process secondary to plasma cell production of G-CSF. Distinguishing the two determines treatment and prognosis. We report two cases in which persistent neutrophilia was related to an underlying multiple myeloma. One case had inconsistent response of the neutrophilia and varying response of his multiple myeloma to multiple pharmacotherapies, and the other case had steadily elevated leukocytosis without worsening symptoms in the setting of observation alone. After thorough evaluation of the literature and detailed comparison with our two new presented cases, a diagnostic algorithm was created to differentiate neutrophilia secondary to MM from other differential diagnoses in order to correctly determine treatment options and prognostic implications.

Harrell, Chad

Mentor(s): Dr. Emerson Smith

Neighbors Helping Neighbors: Non-clinical Prevention of Illness, Disease, Injury, and Premature Death

In the field of medicine there is an increased focus on primary prevention to improve health outcomes in the United States and worldwide. This is a study of social cohesion, a primary preventative variable, at the neighborhood level, and its relationship to longevity of residents. A literature review suggests a range of studies related to social cohesion, longevity, and neighborhoods, seeking to measure social cohesion. A qualitative survey analysis was performed, interviewing residents of two neighborhoods: Shandon (n

=16) an affluent, predominantly white neighborhood (79%) with a life expectancy of 79.4 and Waverly (n =6) a predominantly black neighborhood (80%) with a life expectancy of 71 years. An open-ended questionnaire based on previous studies of social cohesion in the literature was used to gauge self-perceived neighborhood social cohesion among residents in each neighborhood. Preliminary results indicate that there is no clear difference in social cohesion between the two neighborhoods; however, it was also determined that certain residents may be excluded from the benefits of the larger Waverly community. Interviews in Waverly were all with older residents who had years of experience with the neighborhood. Limitations of this study include a small number of people interviewed, lack of age variation among subjects, and the subjectivity of the researcher. A quantitative study based on a random sample of residents is needed.

Harvey, Wynn

Co-Author(s): Ashley Wright

Mentor(s): Dr. Morgan Rhodes

Can direct patient outreach increase screening for hepatocellular carcinoma in patients treated by the primary care physician for chronic hepatitis C and cirrhosis?

Abstract

Background: Hepatocellular carcinoma (HCC) is a serious complication of cirrhosis with high morbidity and mortality, including in patients with hepatitis C (HCV). The risk of developing HCC persists even after successful treatment of HCV. American Society for the Study of Liver Disease (AASLD) guidelines recommend HCC screening with biannual abdominal ultrasound and alpha-fetoprotein (AFP) for high risk patients with cirrhosis and/or hepatitis B. Currently, in the Prisma Health-USC Family Medicine Center (FMC), 70% of the 40 total HCV patients have been screened at least once in the last 3 years by ultrasound for HCC. Of those patients, none have been screened by ultrasound in the last 8 months with no AFP labs ordered. Results of a study at the VA suggested that targeted outreach can improve HCC surveillance in cirrhotic patients.

Objective: The objective of this project was to determine if direct patient outreach involving routine “opt-out” screening leads to an increase in the screening rate of HCC in high risk populations to 50% compared to baseline after 6 months at the Prisma Health-USC Family Medicine Center.

Methods: This was a prospective quality improvement project that analyzed screening rates of HCC pre and post implementation of an “opt-out” patient outreach in HCV treated cirrhotic patients at FMC. The intervention included calling and/or sending letters to patients due for HCC screen. If the patient agreed, the provider placed an order for an ultrasound and AFP and notified the patient’s primary care provider (PCP). If no follow up with PCP was scheduled within 1 month, the FMC schedulers called patients to set up appointments.. Results were analyzed by descriptive statistics to compare pre and post-intervention rate of HCV patients with up-to-date HCC screening.

Results: Pending

Key Words: Hepatocellular carcinoma screening, hepatitis C, ultrasound, cirrhosis

Hathaway, Campbell

Mentor(s): Dr. Steven Fiester, Dr. Christine Schammel

Aspergillus otomycosis leading to tympanic membrane rupture in a young immunocompetent woman

This case report outlines a case of left Aspergillus otomycosis with associated left tympanic membrane perforation that required tympanoplasty in an immunocompetent 28-year-old woman. Aspergillus otomycosis is uncommon in young immunocompetent patients without obvious risk factors. This case report highlights the importance of considering Aspergillus otomycosis in the differential diagnosis of all patients presenting with otalgia and otorrhea that does not improve with antibiotic therapy to avoid the potential devastating complications from an untreated infection.

Heavner-Sullivan, Smith

Mentor(s): Dr. Phillip Moschella, Dr. Conner Graham, Mrs. Jessica Knapp, Dr. Alain Litwin

Emergency Department Screening Discovers High Prevalence of Current HCV Infection in Urban/Rural South Carolina

Background. In the United States, the estimated average prevalence of HCV infection is 1.3%. Universal HCV testing is currently recommended by the CDC, for all adults born from 1945-65. Unfortunately, there has been a rise in HCV incidence (~3x) from 2010-2016, attributed to the increased rates of IV-drug abuse (IVDA). In 2017, the CDC reported only 13 new cases of acute HCV for all of South Carolina (SC). The Emergency Department (ED) has been studied as a unique venue for screening of vulnerable populations for HCV. **Aims:** To describe initial HCV screening in the ED and explore linkage to care rates. **Methods.** This is an IRB approved analysis of aggregated results from 4 months of ED based HCV screening beginning in 2 of our 7 EDs. We implemented screening in 2 EDs which represent the varying populations within our overall health system. ED1 is the health system's level 1 trauma center (~95K visits/year) and ED2 is a rural, satellite ED (~67K visits/year) serving a mountainous SC community. ED based screening was randomly performed on an "Opt-out" basis for adult ED patients aged 18-65. Summative statistics of both HCV antibody and quantitative RNA by PCR testing per each ED and overall linkage to care rates were calculated using Microsoft Excel 2016. **Results.** In 4 months of testing at 2 EDs, we discovered 59 new active HCV infections. 4.5x the reported number of all active HCV cases reported by the CDC for SC in 2017. **Discussion.** Given the higher than anticipated HCV prevalence rates, the overall burden of disease from HCV may be much higher than previously reported for SC. It is vitally important to continue and expand HCV screening to discover and link HCV positive patients to treatment.

Hess, Andrew

Mentor(s): Dr. Kamla Sanasi-Bhola, Dr. William Giles, Dr. Jonathan King, Dr. Aaron Hilton

Hyperbaric Oxygen Therapy as Adjunct Treatment for Invasive Mucormycosis Fungal Sinusitis

Background

Invasive fungal sinusitis caused by mucormycetes is a rare life-threatening infection predominately occurring in patients who are immunocompromised or have uncontrolled diabetes mellitus (DM). Early and aggressive interventions (antifungals, debridement, and glucose control) are required given high mortality/morbidity rates. This case series highlights the utility of hyperbaric oxygen (HBO) therapy as adjunctive management.

Cases

Patient A, a 59-year-old Hispanic female with uncontrolled DM (HBA1c 10.3%), presented with orbital cellulitis and pansinusitis. Mucormycosis (*Rhizopus* spp) was diagnosed and she received Amphotericin in combination with Caspofungin, then Isavuconazole after AKI, subsequently resumed amphotericin given resistance. Left eye was removed on day 4 after two failed retrobulbar amphotericin injections. The

patient underwent extensive sinus debridement (10 times over 3 months), HBO was not tolerated due to COVID19 and claustrophobia after 2 minutes. Despite aggressive efforts the patient died on day 94.

Patient B, a 48-year-old African-American male with uncontrolled DM (HbA1c 11.9%), chronic sinusitis/polyps, presented with right-sided facial pressure, bilateral facial swelling, and acute right sided vision loss. He was found to have invasive sinusitis with mucor spp. (seen on pathology only) and central retinal artery occlusion. He received amphotericin followed by Posaconazole and had three nasal debridement operations (days 12, 19, and 33). He underwent 15 rounds of HBO therapy ending on day 28. Patient discharged after a 5-week hospitalization with oral antifungals, vision remains poor to date.

Patient C, a 32-year-old African-American male with uncontrolled DM (HBA1c 13.9%) and ESRD on dialysis, presented in DKA and with bilateral auditory drainage. Initially managed as mastoiditis with Streptococcus pneumoniae bacteremia, he was subsequently diagnosed with mucormycosis (Rhizopus spp) on day 4. Complicated by invasion of the frontal lobe requiring bifrontal craniotomy and partial lobectomy (day 7), he received additional sinus debridement (days 4, 7, and 17), Amphotericin followed by Fluconazole, and only two rounds of HBO. HBO stopped due to pain. Patient continues to have severe deficits, but infection is improving on amphotericin.

Conclusion

Early suspicion, diagnosis, and intervention are key for good clinical outcomes. HBO therapy in addition to aggressive debridement and antifungals may reduce mortality in patients with invasive mucormycosis.

Hill, Kathleen

Mentor(s): Dr. Ann Blair Kennedy, Dr. Nabil Natafqi, Mrs. Anna Nourse, Ms. Haley Kirby

Virtual Patient (VIP) Engagement Studio: Mid-Project Evaluation and Preliminary Assessment of Using Technology to Engage Patients in Research

Background: Patient engagement in research involves patients and caregivers as experts and collaborators who impactfully contribute to research. Traditionally, patient engagement activities are facilitated in-person; yet the COVID-19 pandemic disallows for in-person meetings. This project aims to build capacity for and implement a diabetes-focused Virtual Patient (VIP) Engagement Studio, to facilitate engagement efforts along the diabetes continuum of comparative effectiveness research and patient-centered outcomes research (CER/PCOR).

Objective: The purpose of this project is to evaluate the process of virtual patient engagement efforts.

Methods: A survey was created using Qualtrics that consisted of a mix of open-ended and multiple-choice questions about the VIPs experiences. The survey was sent to all 25 VIPs with 20 of them completing the survey.

Results: The results of the survey indicated that VIPs felt that technology used to chat between meetings was quite or extremely easy to use (59.1%) as was the technology for video conferencing (81.8%). The topmost reasons cited for helping with engagement were the video conferences, flexibility of attending from other locations, and ability to change between meeting times. 90% of the VIPS were quite or extremely satisfied with the engagement initiative and 95% indicated they felt at least some sense of belonging in the group. Opportunities for improvements were also indicated, including more opportunities to get to know one another and spending more time in one-on-one breakout sessions with other VIP members.

Conclusions: The results of the survey indicate a multi-faceted approach of virtual interaction can be effective to remotely engage patients in research efforts. In the future, it may be beneficial to allow participants more opportunities to get to know one another to facilitate a greater sense of belonging and satisfaction in the VIP experience.

Horovitz, David

Co-Author(s): Laura Askins, Grace Regnier

Mentor(s): Dr. Joseph McQuail

Age-Associated Memory Impairments Correlate with Decline of Excitatory and Inhibitory Synapses in Hippocampal Area CA3

Aging is characterized by declining memory and escalating risk for Alzheimer's disease. Anomalous patterns of hippocampal activity manifest in prodromal AD, wherein a shift in the excitatory-inhibitory (E/I) dynamic signals the transition from normal brain aging to neurological disease. E/I imbalance is most evident within the dentate gyrus (DG)-CA3 network and is proposed to underlie age-related deficits in spatial learning that are ascribed to the dorsal, but not the ventral, hippocampus. Previous studies have identified that no significant neuronal loss occurs in non-pathological age-related cognitive decline, excluding neuron death as a plausible mechanism of E/I imbalance. Consequently, ongoing research has shifted to examine the integrity of hippocampal synapses and to determine their relationship to age-related memory loss. Collectively, these observations drive the hypothesis that a neuroanatomically precise characterization of changes to excitatory and inhibitory hippocampal synapses could elucidate the circuit-basis of memory changes that confer age-associated risk for AD. To address this important matter, we quantified changes to VGluT1, a marker of glutamatergic synapses, and VGAT, a marker of GABAergic synapses, in hippocampal sections from young 6-months old F344xBrown Norway F1 rats relative to strain-matched 24-months old rats that were rated as spatial-learning unimpaired or impaired based on performance in the Morris water maze. We identified significantly lower levels of VGluT1 in both dorsal and ventral divisions of area CA3 between young and impaired aged rats. Using a complementary approach that leverages the full range of individual differences in spatial learning, correlational analyses applied across the entire spectrum of aged performance revealed significant relationships between spatial learning decrements and lower level of VGAT in the dorsal CA3. These new findings are consistent with our hypothesis that E/I disruption centered on dorsal CA3 is of special relevance to age-related memory loss and ongoing work in our lab will further localize changes to defined synaptic layers in the CA3 that receive input from the DG and entorhinal cortex. Precisely characterizing synaptic changes in the aging CA3 can support the development of interventions that can normalize E/I balance and protect memory in susceptible individuals.

Huggett, Ashley

Mentor(s): Dr. Caroline Derrick, Dr. Sharon Weissman, Dr. Divya Ahuja, Dr. Majdi Al-Hasan

Addressing Gaps and Disparities in HIV testing in the Emergency Department

Background: The Emergency Department (ED) is a critical site for persons living with HIV (PWH) to access care. Previous data from SC reported that two-thirds of individuals newly diagnosed with HIV have visited a health care facility a mean 7 times prior to their diagnosis. Over 80% of these visits were to the ED, thus representing missed opportunities. Failure to test results from a multitude of barriers, including avoidance of testing due to a perceived lack of follow up. To address this gap, we established a rapid HIV engagement team (RHET) that assumes responsibility for post-HIV testing linkage and reporting. Our goal was to evaluate the effectiveness of this intervention.

Table 1: Baseline Characteristics

Methods: This retrospective cohort study compared HIV testing rates and patterns in Prisma Health EDs from May 2018 through October 2018 (pre-RHET) to 5/2019 through 10/2019 (post-RHET). Included persons were ≥ 18 years of age and had ICD-10 codes for a sexually transmitted infection (STI), trichomonas, herpes simplex, and gonorrhea (GC) or Chlamydia (CT) NAAT, and/or presented with an initial complaint of a STI. Multivariable logistic regression analysis was utilized to examine impact of RHET implementation on HIV testing in ED.

Results: A total of 4104 individuals were identified, 2154 pre-RHET and 1950 post-RHET. Table 1 displays baseline characteristics for the two groups. Overall, 87% had GC testing; 9% had positive results; 95% had CT testing, 12.6% had positive results. Only 6% were tested for HIV pre-RHET implementation. HIV testing improved to 12% post-PHET implementation ($p < 0.001$). In the multivariate regression analysis predictors for HIV testing were presenting post-RHET (OR 2.27; 95% CI 1.81 to 2.85), male gender (OR 2.98; 95% CI 2.39 to 3.73), white race (OR 2.27; 95% CI 1.81 to 2.85), and presenting to ED for STI (OR 3.58; 95% CI 2.03 6.33).

Conclusion: HIV testing rates increased post-RHET yet, despite indications for HIV testing, only a small proportion received HIV testing. Further interventions are needed to improve HIV testing in EDs, particularly in women and blacks. The overall HIV testing rate remained low, representing ongoing missed opportunities for early HIV diagnosis.

Hungerpiller, Colin

Co-Author(s): Asia Johnson, Lily Zheng, Morgan Easterling

Mentor(s): Dr. Brandon Bookstaver, Dr. Chengwen Teng, Dr. Christopher Bland

From start to finish: examining factors associated with higher likelihood of publication among abstracts presented at infectious diseases scientific meetings

Introduction

Presentation of research outcomes at scientific meetings is often viewed by many as an intermediate step to the goal of timely publication in a peer-reviewed journal.

Research Question

What are the proportion of abstracts published from international infectious diseases meetings and the factors associated with higher likelihood of publication?

Methods

A retrospective, observational analysis of publicly available abstracts presented at ID Week from 2017 and 2018 was performed. A random sample of abstracts was used for data extraction and analysis. The primary endpoint was to determine the proportion of abstracts subsequently published as full papers. The study follow-up period was an average of 27 months post-presentation. Factors associated with successful publication were determined using a multivariate regression model. Categorical variables were compared using Fischer's exact or chi-square tests. Continuous variables were compared using Wilcoxon Rank Sum test. Univariate and multivariate regression analysis were performed.

Results

Among 886 abstracts reviewed, 240 (27%) were subsequently published an average of 13.2 months (± 6.5) after presentation. A PharmD was an author on 28% of abstracts and the presenting author on 14%. Primary presenters were international in 56 (23%) of the published abstracts. Affiliation with an academic institution comprised 121 (50.4%) of published abstracts. Published abstracts more often included PhD authors (70% vs. 59%, $p=0.0024$), were prospective (44% vs. 29%, $p=0.0003$), and included more study subjects (432 vs. 254, $p=0.025$) compared to non-published abstracts. In regression analysis, platform presentations (OR: 2.11, CI: 1.56-2.84), abstracts from 2017 (OR: 2.22, CI: 1.64-3.01), and abstracts with larger authorship (OR: CI, 8 (5-10.5) vs 6 (4-9), $p < 0.0001$) were more likely to be published.

Conclusion

Abstracts from the IDWeek annual meetings were published at a slightly lower proportion than anticipated based on published data. Published abstracts were frequently interprofessional, prospective, and

presented as platform presentations with high numbers of authors.

Conflicts of interest: none

Hunnicut, William

Mentor(s): Dr. Phillip Moschella

Age Adjusted D-Dimer is an Independent Mortality and Admission Risk Factor for Emergency Department Patients

Background. Several studies have shown that utilization of age-adjusted d-dimer values for this common blood test, can lead to decreased utilization of imaging for the diagnosis of Pulmonary Embolism (PE) in the Emergency Department. An elevated d-dimer can be seen across several pathologies all with significant associated morbidity/mortality. This study seeks to evaluate if an elevated d-dimer value is associated with an increased risk of mortality and/or admission independent of the presence of a PE. This study highlights the potential clinical significance of an elevated d-dimer above the age-adjusted cutoff for predicting overall mortality risk. **Methods.** A sub-analysis of a larger IRB approved retrospective study looking at all Emergency Department CT pulmonary angiogram studies and associated d-dimer values within a large South Carolina health system covering 7 EDs (~250,000 patients/year) from 2/1/2016 to 7/1/2019. Variables including age, race, gender, ESI, chief complaint as well as disposition from the ED and overall mortality were recorded. Differences in these variables were analyzed based on a d-dimer level at/above or below the age adjusted cut-off levels. **Results.** A total of 7496 patients were included in this analysis, 5811 patients were at/above the age-adjusted cut-off group and 1685 patients were below the age-adjusted cut off. The average age of the overall populations at/above and below the d-dimer cut-off were 54.2 years and 56.1 years, respectively. Patients at/above the cut-off had a 20.58% (n=1196) vs 10.5% (n=178) (p<0.001) proportion of admission. The proportion of death in the ED was 0.07% (n=4) in the at/above group vs 0% (n=0) (p<0.001) in the below group. The overall proportion of death while in hospital between these two groups was 0.62% (n=36) vs 0.12% (n=2) (P<0.05), respectively. All analyses was performed on R Stats Software (2019). **Discussion.** Irrespective of CTPA results, there was a significant increased proportion of patients: admitted, and those who died in the ED and while in the hospital when comparing those patients whose D-dimer was at/above vs below the age-adjusted cut off values. Further analysis including propensity matching across multiple variables would be beneficial for guidance for overall mortality risk.

Hunter, Zachary

Mentor(s): Dr. Steve Shelton, Dr. William Richardson

Acute Neurologic Dysfunction from Presumed Air Gas Embolism Requiring HBO Therapy

We herein report a case of acute neurologic dysfunction with high suspicion for air gas embolism of unknown etiology and utilization of hyperbaric medicine (HBO) in a 22-year-old male. The patient's presentation consisted of total sensation deficits from the cervical spine distally, generalized distal weakness with 2/5 strength in bilateral upper extremities and left lower extremity only, intact strength in the right lower extremity, and diffuse hyporeflexia, however mentation was appropriate with a GCS 15. Patient also presented with hypothermia, hemodynamic compromise, and hypoxia requiring bipap without complaints of shortness of breath. There were no signs of severe trauma on physical exam or CT imaging, neurologic exam did not localize a specific lesion in the CNS and CT imaging did not suggest ischemia or hemorrhage. CT imaging of the facial bones did reveal free air in the soft tissues of the face and neck. The underlying etiology of the free air was unknown as the patient had no recent historical features consistent with being at risk for development of an air gas embolism, however much of the patient's history 24 hours prior to arrival are unknown. Despite correction of the patient's hypothermia and aggressive resuscitation, the patient's neurologic deficits remained unchanged. Ultimately, the patient was treated

with HBO prior to transfer to the ICU in an attempt to improve their neurologic outcome. Features of this case are discussed together with its implications, including the patient's cross findings on neurologic exam, free air as mentioned above, and no evidence of neurologic insult on CT or MRI after HBO. HBO was utilized given the time sensitive nature of his deficits and lack of sufficient evidence of an alternative diagnosis that would directly lead to his deficits. The patient's prolonged hospital course and neurologic recovery are discussed, as well as the work-up for alternative diagnosis.

Ingram, Jenna

Co-Author(s): Jordan Jones, Anna Norris

Mentor(s): Dr. P. Brandon Bookstaver, Dr. Caroline Derrick, Dr. Kamla Sanasi-Bhola, Dr. Chengwen Teng, Ms. Kimberly Gifford

Predictors for non-therapeutic vancomycin concentrations post-discharge in patients receiving outpatient parenteral antibiotic therapy

Patients receiving outpatient parenteral antimicrobial therapy (OPAT) with vancomycin often have non-therapeutic drug concentrations at initial follow-up. Predictors for non-therapeutic vancomycin concentrations post-discharge in patients receiving OPAT were assessed, alongside the clinical and financial impact of necessary modifications. This was a single-center, retrospective, cohort study among patients ≥ 18 years of age discharged from a Prisma Health Midlands hospital between January 2017 and September 2020 on IV vancomycin for ≥ 1 week of therapy. Patients on renal replacement therapy or those lost to follow-up were excluded. Non-therapeutic vancomycin concentrations were defined as an AUC:MIC outside of target range (400-600 mg/h*L). Multivariable regression analysis was used to determine factors associated with initial non-therapeutic vancomycin concentrations. Clinical and financial implications were described. Results and conclusions in progress.

Johnson, Emmaline

Mentor(s): Dr. Alvin Day, Dr. David Resuehr

A low-cost, reusable ultrasound training phantom of giant cell arteritis

Giant cell arteritis (GCA) is the most common systemic vasculitis and can lead to permanent vision loss if treatment is delayed. Temporal artery biopsy (TAB) has been the gold standard for diagnosis; however, temporal artery ultrasonography (US) has been recommended as the initial diagnostic modality by the European League Against Rheumatism due to its high sensitivity and specificity. Additionally, US yields quick results, is less expensive, and less invasive than TAB. The primary US finding in GCA is a thickened, hypoechoic wall surrounding the arterial lumen, termed a halo sign which resolves within days of treatment. Those who seek training in GCA US are limited to standardized patients. Simulation training has been shown to increase trainee competency, but commercial phantoms are often cost prohibitive. Further, no commercial GCA phantom is available. Homemade phantoms are a feasible alternative. We created a low-cost, reusable US phantom that simulated halo signs and arterial flow. Halo signs were simulated by creating beads of ballistics gel along latex tubing, and embedded in a mixture of ballistics gel and mica powder. Arterial flow was created with a peristaltic pump wired to a time delay circuit. The approximate cost of materials was \$120. Halo signs and arterial flow were successfully created and easily visualized with US. The phantom can be replicated by others to aid in training. Additionally, the arterial flow can be applied to other types of phantoms. The limitations of our study include the appearance of the tubing and lack of anatomic realism. More accurate vessels have been created through other methods, but these options may be cost prohibitive with limited availability and reusability. Anatomically, the phantom did not contain any surface landmarks and did not follow the branching course of a normal temporal artery. Future work will be needed to create an anatomical mimic and experiment with various alternatives to the latex tubing.

Joseph, Cara

Mentor(s): Dr. Alex Milgrom, Dr. Trevor Morris

Streptococcus Anginosus Bacteremia Resulting in Formation of Hepatic Abscesses Secondary to COVID-19 Infection

Streptococcus anginosus is a bacteria found as normal flora in the human respiratory and gastrointestinal tract. The bacterium rarely causes infections in healthy individuals but can wreak destruction in immunodeficient individuals. Members of the S. anginosus group are known for their pathogenicity and tendency for abscess formation, especially in the liver and brain. The organism is also able to cross tissue planes in the lung, including the interlobar fissure, diaphragm, and chest wall. This case reports a 70-year-old male who presented to the emergency room with a three-day history of chills, malaise, and fevers just one month after being hospitalized for a severe COVID-19 infection. A CT chest showed an incidental finding of a thickened gallbladder however the patient had normal AST/ALT, normal alkaline phosphatase, normal bilirubin, no leukocytosis, no abdominal pain, and negative murphy's sign. HIDA scan reported an impression of cholecystitis with possible involvement of adjacent liver. Due to lack of a clinical indication, surgery elected not to operate. Blood cultures then came back positive for Strep anginosus. Given the bacteria's propensity for abscess formation, a CT abdomen was obtained that demonstrated cholecystitis with multiple adjacent small hepatic abscesses. This report discusses the potential COVID-19 has to precipitate bacteremia with a typically innocuous organism such as Streptococcus anginosus. This case also highlights the importance of pursuing further evaluation for abscess formation even if no abscess is clinically apparent in patients who test positive for Streptococcus anginosus. After a thorough review of the literature, there is a paucity of reports associating COVID-19 with an increased risk for Streptococcus anginosus bacteremia. This case can be used to shed some light on the clinical presentation of a Streptococcus anginosus bacteremia secondary to a COVID-19 infection.

Joseph, Cara

Co-Author(s): Jason Siebert

Mentor(s): Dr. Parth Sheth, Dr. Christopher Zust

Neurological Manifestations of Bartonella in an Immunocompetent Patient

Bartonella henselae is a proteobacterium that is the causative agent of cat-scratch disease, an infectious disease usually characterized by self-limited regional lymphadenopathy. In immunocompromised patients, however, the manifestations of CSD can include visceral organ, neurologic, and ocular involvement. This report presents a 21-year-old female who came to the ED for evaluation of a myriad of symptoms including: inguinal lymphadenopathy, syncopal episodes, nausea, vomiting, dizziness, intermittent headaches, diffuse generalized body tremors that worsened with movement, and a 15 pound weight loss. Four weeks after developing lymphadenopathy, she began experiencing visual and auditory hallucinations. Initial broad-based workup proved unremarkable aside from a mild nonspecific leukocytosis of 13,000. Eventually the patient's blood culture then came back positive for bartonella henselae. A thorough literature review revealed few other reports of neurobartellosis as well as uncertainty regarding the mechanism(s) by which bartonella can lead to neurological manifestation. This paper details the rare and atypical presentation of a neurological manifestation of Bartellosis in an immunocompetent patient. We believe this case conveys the utility of asking questions about exposures to domestic animals and wildlife, the importance of maintaining a broad differential, and encourages further research as to the mechanism of neurobartellosis.

Juarez, Selina

Mentor(s): Dr. Emilia Krol

TEVAR graft with in-situ fenestration: one size does not fit all.

Acute aortic syndrome is a pathology of the aortic wall that includes aortic dissection, intramural hematoma, and penetrating atherosclerotic ulcer. Aortic intramural hematoma (IMH) is the formation of thrombus in the media layer of aortic wall, secondary to the rupture of the vasa vasorum. It is estimated that the resultant weakening in the aortic wall can progress to acute aortic dissection, aneurysmal dilation or rupture in 28% to 56% of patients with IMH. Obtaining an adequate landing zone for thoracic endovascular aortic repair can be limited by the location of IMH or dissection flap and its relationship to the orifice of branching arteries particularly the left subclavian artery. There is no commercially available endograft that allows for arch vessel preservation. In this case report we describe the first successful case in the state of South Carolina, where laser in situ fenestration technique was utilized for immediate revascularization of the left subclavian artery at the time of TEVAR. Our patient is a 73-year-old female with significant comorbidities including ulcerative colitis, hypertension, severe chronic obstruction pulmonary disease (COPD), 40-year smoking history and known splenic artery aneurysm for which she was undergoing surveillance at our institution. She presented to the emergency department with acute onset upper abdominal pain that radiated to her back and was found to have an intramural hematoma on Computed Tomography Angiography (CTA) dissection protocol. Due to her significant comorbidities she was initially managed conservatively, however on serial CTA scans her IMH was worsening, with ulcer-like projections into the IMH. She was not a candidate for open carotid to subclavian artery bypass due to her medical conditions. Patient underwent TEVAR repair with in-situ fenestration of left subclavian orifice.

She was followed for a year in the office and with radiologic studies. She was found to have good aortic remodeling of the area that was covered by the stentgraft.

Kemp, Cassidy - Co-Author(s): Bailey Alkhatib

Mentor(s): Mrs. Lara Peck

Foregoing Falls: Identifying Potential Areas of Improvement Regarding Patient and Staff Fall Education at Prisma Health Richland on the Surgical Trauma and Orthopedic Floors

The purpose of this quality improvement project is to identify opportunities for enhancement of patient education regarding fall prevention following a stay at Prisma Health Richland. Two separate google forms were created to anonymously document feedback from both patients and hospital personnel. All patient information was obtained verbally and notated by the investigators. Data recorded from employees was acquired likewise via an in person interview or via self-submission to the form electronically. The patient interview form included the following: an evaluation of the fall education received, their understanding of the information provided, an assessment of their comfort level in asking questions, and a description of how the patient believes they learn best. The staff form asked complimentary questions to gauge the types and method of patient education provided, the comfort level of conveying this information, certainty level of patient comprehension, and barriers to providing patient education. Data collection is ongoing. The survey results will be analyzed and disseminated within the final poster.

Kennedy, Benjamin

Mentor(s): Dr. Traci Testerman

Detection of Helicobacter Species in Veterans Through Polymerase Chain Reactions

Background: The growing understanding of *Helicobacter pylori* as a pathogen has raised questions about potential pathogenicity of other *Helicobacter* species. Several non-*pylori* *Helicobacters* have been associated with enterohepatic diseases. Despite the known pathogenesis of these species, there is a lack of

literature in their epidemiology. There is no current diagnostic test for determining if Helicobacters other than *H. pylori* are present in the gut. Therefore, an efficient detection method for Helicobacters needed to be created. The use of colonoscopy waste samples could generate a large collection of data but required confirmation of a threshold met for DNA concentration. Detection through PCR was the method of choice for its cost-efficiency and high specificity.

Methods: Samples were collected from patients who have undergone a colonoscopy procedure for unknown pathology. Samples taken from each patient were cultured with Helicobacter friendly medium. Separately, any DNA present was extracted and isolated from the patient samples. The concentration of DNA was determined from each sample before performing PCR. Three sets of primers were used for each patient. The first primer was bacteria specific, then Helicobacter genus specific, and finally Helicobacter pylori specific. The PCR products were run on a 2% agarose gel and analyzed under UV light.

Results: All patients tested positive for presence of bacteria as expected. Of the 60 patients tested, 4 tested positive for Helicobacter specific bacteria. The 4 patient samples were then sent off for sequencing. All 4 patients were determined to have *H. pylori*.

Conclusion: The collection method contained a sufficient concentration to detect Helicobacter if they were present in the patient. A set of primers needs to be created that can exclude *H. pylori* while detecting the other Helicobacters.

Kennedy, Benjamin

Co-Author(s): Patrick Deal

Mentor(s): Dr. Benjamin Jackson

The Surgical Learning Curve for Modified Lapidus Procedure for Hallux Valgus Deformity

Background: Hallux valgus is one of the most common orthopedic deformities of the foot, affecting as much as 23% of the population age 18 to 65. In addition to its high prevalence, it has a complex multifactorial pathogenesis. Surgical correction options have variable rates of success and new techniques are being developed. The modified Lapidus procedure attempts to correct in three planes of deformity which may create a steeper learning curve for those newly adopting the technique.

Methods: A retrospective review was performed on patients who underwent hallux valgus reconstruction with a modified Lapidus procedure between March 2018 and July 2020. Exclusion criteria included: revision surgery, 6 or more concurrent procedures, or a flexor digitorum longus tendon transfer for adult acquired flatfoot correction.

Results: There were a total of 81 modified Lapidus procedures for hallux valgus within the study time frame and 68 were included in the study. Over a period of 2 years there was a significant decrease in overall surgery duration from 78.93 minutes at month 0 to 61.80 minutes at 24 months ($P = .036$). The rate of non-union was 4.41% (3/68) and the rate of recurrence was 5.88% (4/68). There was not a significant difference in rate of non-union as the surgeon increased in experience ($P = .817$).

Conclusion: Although there is a significant learning curve for the modified Lapidus procedure it is largely overcome by the 23rd case. Additionally, experience with the technique does not appear to affect the patient outcomes of non-union or recurrence.

Kent, Patrick

Co-Author(s): Mary Hunter Hychee

Mentor(s): Dr. Christine Schammel, Dr. Mark Call, Dr. Steven Fiester, Dr. A Michael Devane, Dr. Jenny Knight

Tropheryma whipplei manifesting in the CNS: case report and comprehensive literature review

Tropheryma whipplei is a gram-positive bacteria found in waste waters that can be transmitted to humans through feces and saliva. Rare infections manifest as Whipple Disease (WD), with 18-30 new cases reported worldwide per year. As the bacteria typically targets the small intestine, gastrointestinal symp-

toms such as abdominal pain, diarrhea and weight loss are the typical presentation; other manifestations occur as swelling in the joints. Treatment involves a two-week course of antibiotics followed by long-term doxycycline and hydroxychloroquine maintenance therapy with verification of resolved infection. Short-term prognosis is typically good, but relapses, which have been reported as the most severe complication of infection, can occur even up to a few years after the initial infection, with a 2-33% recurrence after five years.

Relapses typically manifest with CNS symptoms including dementia, gait issues, memory and concentration problems and a variety of behavior/personality disorders and are noted in 20–40% of cases during the course of WD. Treatment for CNS infection involves antibiotics that penetrate the blood brain barrier, such as ceftriaxone, doxycycline, trimethoprim, or sulfamethoxazole. Treatment can result in resolution of some CNS symptoms if the infection is caught early; however, prognosis is typically poor with mean survival of four years.

Here we present a case of primary CNS *T. whipplei*, highlighting radiologic and histologic characteristics. Additionally, we present a comprehensive review of both the GI and CNS manifestation of this rare infection as reported in the literature with the goal of developing a diagnostic algorithm for early diagnosis and treatment to optimize patient outcomes.

King, Cody

Mentor(s): Dr. James Nottingham, Dr. Julian Kim

Racial Differences of Oncotype DX Recurrence Risk in Estrogen Positive Breast Cancer Patients from Columbia, SC

Breast cancer is one of the most prevalent and financially burdensome cancers in the United States. A genomic analysis called Oncotype DX can be performed for ER+ breast cancer patients to determine the risk of recurrence and degree of benefit from adjuvant chemotherapy treatment. While racial disparities have been found to exist in breast cancer patients, the conclusions regarding the relationship between Oncotype DX and race is still unclear. This retrospective study analyzed the Oncotype DX recurrence risk of ER+ female breast cancer patients in Columbia, SC to identify any disparities that may exist between African American and Caucasian patients. The sample included 559 female breast cancer patients that received Oncotype DX from 2016-2020 and was retrieved from the South Carolina Oncology Associates database. Univariate and multivariate analyses were performed looking at the association of race with recurrence risk, grade, and lymph node status. African American patients trended towards a high recurrence risk ($p = 0.0539$) and had significantly high tumor grades ($p = 0.000571^{***}$) when compared to Caucasian patients. Race was not significant for recurrence risk; however, a high tumor grade was independently significant for high recurrence risk ($p = 0.00069^{***}$). While there was a trend toward disparity in recurrence risk between the two groups, future studies with a greater geographic distribution would help determine if these differences are observed in a larger and more diverse sample.

Kostelic, Stephen

Mentor(s): Dr. William Richardson

Case Report: Sodium Azide Overdose

Introduction

Sodium azide is a hazardous white solid commonly used as a propellant in airbags as well as preparation of various chemicals in agriculture, microorganism fumigation, sponge rubber, detonators, and in explosive manufacturing. Mechanisms of human health effects is unknown but felt to be related to inhibition of cytochrome oxidase and cellular respiration as well as enhancing excitatory transmission in the CNS after conversion to nitric oxide. There is currently no specific antidote for intoxication.

Case Report

21-year-old male presents to ER in Columbia, SC after he reportedly told his mother he swallowed 2.7 g of sodium azide powder approximately 1-2 hours prior to approval. The patient quickly deteriorated, became unresponsive, went with refractory seizures, hypotension and metabolic acidosis. Despite very aggressive resuscitation and intervention, the patient died within hours of arrival to the ED.

Discussion

Based on a systemic review of literature ranging from 1927 to 2002 on human exposure most sodium azide industrial exposures are by inhalation with most laboratory exposure and suicide attempts are by ingestion. Fatal doses reported with exposures as small as 700 mg (10mg/kg). Non fatal exposures ranged from 0.3 to 150 mg. (0.004- 2 mg/kg). Of a total of 185 cases studied, overall fatality rate was 9.7%, with most coming from oral exposure. Nonoccupational deaths included suicides and poisonings. Other common symptoms reported include headache, tachycardia, tachypnea, vomiting, diarrhea. Severe health effects such as coma, respiratory failure, seizure, metabolic acidosis, pulmonary edema were observed only following doses of 10 mg/kg. Multiple common antidote treatments were tried including amyl nitrate, sodium nitrite, sodium thiosulfate as well as activated charcoal, gastric lavage, and peritoneal dialysis without success.

This case demonstrates typical findings of large oral ingestions of sodium nitrate with patient death despite aggressive supportive care. However, as the mechanism of action of its human health effects is poorly understood, future studying could benefit those with larger ingestions.

Krachman, Haley

Mentor(s): Dr. Christine Schammel

Atypical Lobular Hyperplasia and Lobular Carcinoma In-Situ: To Upgrade or Not to Upgrade?

Patients diagnosed with invasive breast cancers on biopsy typically have a consistent treatment plan over the course of their disease; however, there are discrepancies regarding the significance and appropriate treatment of pre-invasive lesion identified on biopsy, including atypical lobular hyperplasia (ALH) and lobular carcinoma in situ (LCIS). Following IRB approval, all females diagnosed/treated with breast cancer at a single institution between 2016-2019 were retrospectively evaluated. All patients that underwent a breast core biopsy that revealed ALH/LCIS only and had a subsequent resection for their disease were included in the study. Resection histology was noted and patients were classified as 'upgraded' if the resection specimen contained ADH/DCIS/IDC or ILC. Patients were classified as 'not upgraded' if resection histology was ALH/LCIS only. Overall, 27 patients met the study criteria, 12 (41%) of which exhibited upgraded histology upon resection (9 ADH only, 1 DCIS, 1 IDC/ADH, 1 ILC/ADH); 15 were not upgraded (52%). All upgraded histology was ER+/PR+; the IDC and ILC were Her-2 negative. Treatment for upgraded patients was mastectomy (33%), radiation therapy (17%), and anti-hormonal (50%). While two of those patients were not upgraded opted for mastectomy, 50% had anti-hormonal. None of the patients had a recurrence (follow-up 2 years). While some literature has recommended imaging as appropriate follow up for ALH/LCIS only biopsies, our data suggests that while the morbidity of resection and anti-hormonal can not be ignored, the morbidity of an under diagnosed lesion also must be considered warranting conservative therapy.

La Valley, Elizabeth

Mentor(s): Dr. Souvik Sen

Dental caries a risk factor for incident ICH and specific ischemic stroke subtype

Introduction: Streptococcus mutans is a known cause of dental caries that contains a collagen-binding protein, Cnm, and shows inhibition of platelet aggregation and matrix metalloproteinase-9 activation. This strain has been linked to aggravation of experimental intracerebral hemorrhage (ICH) and may be a risk factor for intracerebral hemorrhage.

Methods: Presence of dental caries was assessed in subjects from the Dental Atherosclerosis in Communities Study (DARIC) without prior stroke or intracerebral hemorrhage. This cohort was followed for a period of incident intracerebral hemorrhage, subsequently verified by chart abstraction. Cox regression with time-dependent covariate was used to compute crude and adjusted hazards ratio stratified as <15 years and ≥15 years from the initial dental assessment.

Results: Among 6506 subjects, dental caries were recorded in 1227 (19%) subjects. 47 (1%) had ICH over a period of 30 years. Those with dental caries versus those without dental caries had a greater proportion of younger (mean age 61.8±5.6 vs. 62.5±5.6, p<0.001), male (24% vs. 16%, p<0.001), African-American (53% vs 12%, p<0.001) and hypertensive (24% vs. 16%, p<0.001) patients. The association between dental caries and ICH in the first 15 years was not higher (crude HR 1.0, 95% CI 0.4-2.3) and remained so after adjusting for age, gender, race, and hypertension (adj. HR 1.1, 95% CI 0.5-2.9). The association between caries and ICH in the second 15 years was higher (crude HR 3.7, 95% CI 1.1-12.0) and strengthened after adjustment (adjusted OR 4.5, 95% CI 1.3-15.5). This is depicted in the Kaplan-Meier curve below.

Conclusion: We report a significant association between dental caries and ICH. Future studies are needed to determine if early treatment of dental caries can reduce the risk of ICH.

Lancaster, Harrison

Mentor(s): Dr. Amanda Schnee

THE USE OF DALBAVANCIN FOR PRIMARY BLOODSTREAM INFECTIONS AND INFECTIOUS ENDOCARDITIS; A RETROSPECTIVE REVIEW. Harrison Lancaster, Connor Evins, Amanda Schnee. U of SC School of Medicine Greenville, Greenville, South Carolina.

Background: Dalbavancin is a semisynthetic antibiotic used as an alternative to vancomycin for skin infections as well as osteomyelitis. It is particularly useful due to its safety profile as well as long half-life, which allows for weekly outpatient infusions. This decreases the need for patients to have long term IV access and reduces hospital stays. This study analyzes the effectiveness of Dalbavancin for bacteremia and infective endocarditis

Methods: Upon IRB approval, the authors performed a retrospective chart analysis on patients who fit our inclusion criteria between 2014 and 2020. Their hospitalizations were analyzed for demographics, medical history, indication, and follow up. The results were then analyzed using descriptive statistics.

Results: Our cohort had 23 patients treated with Dalbavancin for endocarditis or bloodstream infections. There were no reported side effects from the medication, no readmissions for worsened infection, and no deaths from the infection. 11 patients were treated due to refusal of medical care, and 15 patients had follow-up visits within 90 days.

Conclusions: Overall, patients responded well. The lack of readmission to the hospital is promising as it indicates a possible outpatient treatment. This would help decrease cost and comorbidities of long-term hospital stays. These positive results are limited by small sample size and treatment of other antibiotics prior to receiving Dalbavancin. Further research is required to accurately estimate the efficacy of Dalba-

vancin on bloodstream infections and endocarditis, but these results are promising especially for patients who are not candidates for long term hospitalization or IV access.

Lancaster, Matthew

Co-Author(s): Julie Flugel

Mentor(s): Dr. Jenna Swindler

Post-Surgical Opioid Prescription: An Area for Improvement

This study is a retrospective chart analysis of October 2020 that serves to analyze the opioid prescribing habits of general and orthopedic surgeons and compare them to the current recommendations for opioid prescription after surgery. The goal of this is to determine new ways to reduce opioid prescription after surgery and specific areas to target within the surgical fields. Study completion is currently ongoing.

Laney, Robert

Mentor(s): Dr. Susan Lessner

Development of Machine Learning Approach to Identify Endoleaks Following Aortic Aneurysm Repair

N/A

Lawton, Jessica

Mentor(s): Dr. Samantha Cox, Mr. Noah Dargy

The effect of depression on patients undergoing peripheral vascular intervention.

Background

Peripheral arterial disease (PAD) and comorbid depression are indicative of an increased risk of amputation and death in comparison to patients with only PAD. Prevalence of depression is increased in patients with PAD and is independently associated with a longer length of hospital stay. The aim of this study is to assess the effect of depression on PAD by comparing mortality, retreatment rate, and rate of 1-week hospital stays after peripheral vascular intervention (PVI) in patients with depression.

Methods

The diagnosis of depression was recorded for patients that received PVI in an urban community hospital in the Southeastern United States from January 2014 to May 2019 by a retrospective chart review. Patients with a recorded history of depression compared to the general populations of those undergoing PVI by gathering mortality, postoperative retreatment, and length of stay via a 1-year follow-up. Patients were excluded from the study if postoperative vascular lab studies were not completed or a 1-year follow-up was not obtained. Odd ratios for number of stays over 1-week, endovascular retreatment, and mortality were calculated by a logistical regression to elucidate whether depression is independently associated with these outcomes.

Results

A total of 267 patients were included. 71 patients were noted to have depression. 35.2% of those with depression had a length of stay greater than 1-week in duration compared to 22.2% of those without depression. The odds of having a length of stay greater than 1-week among those with depression are 2.28 times higher than those without the diagnosis. Mortality and endovascular retreatment rates at 1-year follow-ups showed no statistical difference between those with depression and those without depression.

Conclusions

Patients with depression undergoing PVI have a disproportionately high utilization of hospital days

and healthcare expenditures due to the increased odds of having a longer than 1-week hospital stay. Further research investigating the impact of depression on surgical outcomes should be performed.

Lee, DJ

Co-Author(s): Kyleigh Connolly

Mentor(s): Dr. Christine Schammel

Treatment and Outcomes of T1/T2 NSCLC at a Regional Hospital

In the United States, lung cancer remains one of the leading causes of cancer death among men and women, and approximately 85% of all diagnoses are non-small cell lung cancer (NSCLC). For early-stage NSCLC, treatment modalities include radiotherapy and surgical resection. Trends and outcomes of NSCLC treatment vary based on differences in treatment modality as well as patient sex, race, tumor histology and grade, tumor size. Multiple studies have produced differing conclusions on which treatment modality yields better outcomes in terms of survival and control, and so surgical resection currently remains the most widely accepted standard of cure for early-stage, operable NSCLC. Our study investigates patient outcomes following treatment of T1/T2 NSCLC with radiotherapy or surgical resection in approximately 500 patients at a regional hospital between 2007 to 2015. We anticipate analysis of this cohort of patients will potentially produce significant treatment outcomes, including 1-, 3-, and 5-year survival metrics as well as local, regional, and distant control rates. Our results will be compared to regional and national data to promote optimization of therapy and treatment modalities for the patients whom we serve.

Lee, John

Mentor(s): Dr. Woodrow Coker

Cardiac Amyloidosis and Smoldering Multiple Myeloma in Middle-Aged Female

Patient is a 48-year-old Caucasian female with past medical history of IgA lambda smoldering multiple myeloma (SMM), cardiac amyloidosis, HFrEF, recurrent pleural effusions, and chronic hypotension who was admitted to the hospital for acute DVTs, submassive pulmonary embolism, and acute right and left atrial thrombi noted on CT angiogram of the chest.

Patient initially presented in early 2019 with decompensated heart failure and broad work-up led to the diagnosis of cardiac amyloidosis after bone marrow and fat pad biopsies revealed AL-subtype amyloidosis. Patient was started on a chemotherapy and was referred to Duke for consideration of heart transplant. Further diagnosis via SPEP/UPEP revealed IgA lambda SMM in late 2019. Patient was closely followed by the advanced heart failure team for continuous diuretic infusions and the pulmonary team for chronic right-sided pleural effusions.

Patient was admitted to our inpatient service with hypercoagulability with evidence of DVTs and submassive PE. This led us to initiate a heparin drip for therapeutically anticoagulation, but management was difficult due to the chronic hypotension and overall illness while receiving chemotherapy. This led to severe hyponatremia while inpatient and she began to decline rapidly, at which time she elected to pursue comfort care. Unfortunately, patient died in the hospital due to worsening PE and overall condition.

The learning objective focuses on the diagnosis of cardiac amyloidosis and IgA lambda SMM. An echocardiogram is the initial diagnostic step for cardiac amyloidosis, plus corresponding history, which includes age > 40 years and unexplained heart failure. Further diagnostic steps include SPEP, bone marrow, and fat pad biopsies to confirm diagnosis and quantify plasma cell concentrations for other underlying conditions. MGUS is defined as serum monoclonal (M) protein of < 3 g/dL, bone marrow with < 10% monoclonal plasma cells, and absence of systemic symptoms. SMM is defined as M protein > 3 g/dL, 10-60% plasma cells, and absence of systemic symptoms. Multiple myeloma is defined as M protein > 3 g/dL, > 10%

plasma cells, and the presence of systemic symptoms, which include hypercalcemia, renal dysfunction, anemia, and lytic bone lesions. Consult hematology/oncology early, manage carefully, patient's comfort comes first.

Lucas, Claiborne

Co-Author(s): Sara Perregaux

Mentor(s): Dr. Christine Schammel

Orofacial clefts: an evaluation of diagnosis, treatment and compliance at a regional medical center.

Orofacial cleft occurs in approximately one of every 6000 births, often requiring surgical repair within 12-18 months followed by years of therapy to improve breathing, hearing, speech, and language maturation, maximizing function for the child. Well-developed programs to manage the care of children with this disorder exist, however, a detailed study of the rate of occurrence for orofacial clefts, treatment and outcomes in South Carolina has not been established. The purpose of this study was to determine local incidence and treatment outcomes with the goal of developing a patient-centered educational program to facilitate comprehensive care of this condition in our region. A retrospective review of all patients diagnosed and/or treated with orofacial cleft at a single institution between 3/1/2016-6/1/2019 was performed using the American Cleft Palate-Craniofacial Association Classification (1--mild; 2--moderate; 3--severe). Specifically, age at diagnosis, severity of cleft, compliance with treatment, utilization of supportive resources and local surgical repair were evaluated. A total of 123 patients with an average gestational age of 266.96 days (range 186-298) were assessed. Of those, 72.41% of pre-natal diagnosis patients had cleft subtype 3, 50% of those identified at birth were subtype 2 (35%=3), and 81.82% post-birth diagnoses were subtype 2. When evaluating intrapartum diagnosis vs. compliance, 96.15% of patients diagnosed pre-birth, 81.82% diagnosed at birth, and 43.75% diagnosed post-birth correlating with support resources. Local surgical repair of cleft was highest for pre-natal diagnoses (44.44%), followed by diagnoses at birth (42.44%) but representing only 13.33% of those diagnosed post-birth. When considering treatment (surgical repair) and severity, 57.89% of those with subtype class 1 underwent local repair, 80.43% with subtype 2 did not require repair, and 63.83% of those with subtype 3 underwent local cleft repair. When evaluating for use of support resources, those who did have local repair, only 55.88% were followed by the Fetal Care Case Management Team, while 92.31% of those not repaired locally were also not followed. Overall, compliance and optimal patient outcomes in our cohort for all orofacial cleft were dependent on local supportive care.

Lynn, Heather

Co-Author(s): Elizabeth Beaty

Mentor(s): Dr. Melanie Blackburn

Readmissions in Pediatrics: Results of a Resident-Aimed Quality Improvement Project to Reduce Readmission Rates at a Medium-Sized Academic Pediatric Hospital

Introduction: Readmissions are an expensive concern that all hospitals must address. Research has shown that there are some attributes that can be linked to an increased risk of readmission. At Prisma Health Children's Hospital steps have been taken to improve readmission rates such as initiating a Readmission Quality Improvement Team. The purpose of this project was to reduce the rate of inpatient 30-day readmission by 10% by March 2020 through the implementation of standard discharge instructions for specific diagnoses.

Methods: Pre-intervention data was collected from July 2018 to March 2019 and post-intervention data was collected from July 2019 to March 2020 using data that had been compiled by the Readmission Quality Improvement Team. Discharge Smart Phrases were created for the most common admission/discharge

diagnoses and distributed to the residents for use. The Fisher exact test was utilized to compare pre- and post-intervention data.

Results: From July 2018 to March 2019, there were 5,604 discharges and of those, 49 (0.87%) were readmitted. From July 2019 to March 2020, there were 5,774 discharges and of those, 236 (4.09%) were readmitted.

Discussion: Upon evaluation of the data, no statistically significant difference was found between the readmission rate prior to the implementation of Discharge Smart Phrases compared to after. During the course of this project, the method used to collect readmission data by the hospital was changed which could have been a confounding factor interfering with data analysis.

Conclusion: Though this project did not result in the decrease of readmission rates by the use of Discharge Smart Phrases, it did collect demographic data that may be used to determine how to target future interventions.

Manning, Jasmine

Mentor(s): Dr. Andrew Gainey, Dr. Robert Daniels, Dr. Anna Kathryn Burch

Evaluating the impact of a procalcitonin testing and treatment algorithm on antibiotic use within pediatric patients

Procalcitonin (PCT) is an endogenous peptide precursor of the hormone calcitonin. Healthy individuals can have extremely low levels of PCT <0.02 ng/mL, however, the serum concentration can increase in response to systemic inflammation and bacterial infections. PCT levels can quickly increase within 3 to 6 hours, peak at 6 to 13 hours, and has a half-life of around 22 to 36 hours. A PCT level >0.5 ng/mL is a strong predictor of bacterial infections.

Studies have demonstrated that PCT testing promotes earlier discontinuation of antibiotic therapy in adults; however, similar data is lacking for pediatric patients. Appropriate initiation of antibiotics can reduce morbidity and mortality associated with bacterial infections. However, inappropriate use or extended antibiotic exposure, has been associated with the emergence of multi-drug resistant organisms and antibiotic-associated adverse events, such as *C. difficile* infections. Thus, antibiotic de-escalation or discontinuation is an important goal of antimicrobial stewardship programs. Our study seeks to evaluate whether a PCT testing and treatment algorithm can promote early and safe antibiotic discontinuation within our pediatric population.

This is a retrospective; single center observational study. The study will assess the mean duration of antibiotic therapy between a cohort adherent vs a cohort non-adherent to the institution specific algorithm. Data will be collected from July 1, 2019 to June 20, 2020. Patients will be identified using the Theradoc Clinical Surveillance system for patients identified with a procalcitonin level obtained during the admission.

Patients included in the study will include all patients admitted for an infectious work-up and initiated on antibiotics. The study will exclude any patients that meet the risk factor for false elevations in procalcitonin (ie. end-stage renal disease, trauma, etc.). Data collection points will include the following: adherence to PCT algorithm, number of days of antibiotics, procalcitonin level(s), c-reactive protein, days of antibiotics outside of standard care, 30-day mortality, re-initiation of antibiotics for a bacterial infection within 30-days, length of intensive care unit admission, overall length of hospitalization, and rates of antibiotic-associated complications. Data will be reported using descriptive statistics, chi-square or Fisher's exact tests for categorical variables, and Kaplan-Meier curves.

Marchek, Alex

Mentor(s): Dr. Christine Schammel, Dr. John Cull, Dr. Mike Devane

Angiograms and CECT for pelvic trauma

Introduction

Pelvic fractures represent approximately three percent of skeletal injuries, with a mortality ranging from five to 45 percent, depending on the type of fracture. Pelvic fracture related bleeding is not an uncommon occurrence, with an incidence of 1.3/100,000 per year, with arterial bleeding accounting for the majority of mortality in those with pelvic fractures. As such, imaging is essential to determine not only the presence but source of the bleed since treatment options rely on imaging and subsequent pelvic angioembolization has a high success rate. Imaging modalities include focused assessment with sonography for trauma (FAST), computed tomography angiography (CTA) and contrast enhanced computed tomography (CECT); much controversy exists on not only the optimal imaging in these cases, but also the order in which they are performed.

Objective

The purpose of this study is to evaluate the imaging for hemorrhage in patients admitted through the ED for pelvic trauma at a single institution and to formulate an algorithm to assist physicians in determining the optimal order of imaging in hemorrhage identification.

Material and Methods

Following IRB approval, all adult patients admitted through the emergency department (ED) between 3/1/2016 and 3/1/2021 for pelvic/abdominal trauma at a single institution were retrospectively evaluated. Typical demographic and clinicopathologic data were collected to include, but not be limited to, age, race, gender, physiology in the ED (blood pressure, acid-base lactate, pH, base deficit), type of trauma, trauma score (AIS for pelvis and ISS), fracture types, blood transfusions, procedures, imaging and outcomes.

Results and Discussion

We expect that our results and comprehensive evaluation of the literature will show that, following FAST identification of bleeding, CECT is a sufficient imaging modality for hemodynamically stable patients to identify both arterial and venous bleeds; CTAs should be reserved for hemodynamically unstable patients that are unable to undergo CECT.

Marigliano, John

Mentor(s): Dr. Mark Small, Dr. Michael Sierra

Pilot Usability Study of the Hamilton Depression Scale in the Resident Outpatient Psychiatry Clinics

The Hamilton Depression Rating Scale (HDRS) has been employed as the gold standard in clinical research for decades as a tool for assessing the level of depression, and tracking changes in this metric has been used to assess the efficacy of medication trials monitoring treatment response. Despite the wide use of the HDRS in clinical research, it is not often utilized in clinical practice. In contrast, the Patient Health Questionnaire (PHQ-9) was originally designed to screen for depression in primary care settings, and has been widely incorporated into most electronic medical records leading to widespread adoption. While multiple studies have demonstrated the validity of the PHQ-9 to effectively identify patients who may meet criteria for a major depressive episode, attempts to correlate this metric to the HDRS have been met with mixed results. As such, the use of the HDRS by a trained psychiatrist remains the standard for assessing and monitoring response to treatment for patients being treated for depression.

In this pilot usability study an EPIC dot phrase was created and shared with all of the current psychiatry residents. A video lecture was created to educate these residents on the use of the HRDS and additional print resources were shared to aide training residents to use this metric in their clinical practice. To

assess the usability in the Prisma Health Upstate outpatient resident psychiatry clinic, residents will be surveyed at 3 and 6 month intervals to assess ease of use, clinical relevance and willingness to incorporate the HDRS into their practice of psychiatry.

Matthews, Marina

Mentor(s): Dr. Morgan Rhodes, Dr. Adam Pizzuti

Pharmacist evaluation and intervention on time to treatment and vaccination rates in hepatitis C

Background:

From 2013-2016, an estimated 2.4 million people in the United States were living with chronic hepatitis C. In 2017, the Prisma Health Family Medicine Center started to treat hepatitis C patients. A pharmacist assists attending and resident physicians with insurance coverage, lab and medication recommendations, and follow-up. Pharmacists can also recommend prevention measures such as hepatitis A and B vaccinations. This project sought to evaluate time from diagnosis to treatment and to improve hepatitis A and B vaccination rates.

Methods:

This was a retrospective chart review to evaluate the time from hepatitis C diagnosis to treatment, defined as date of positive HCV antibody to prescription issuance date. This quality improvement project also aimed to increase vaccination rates for hepatitis A and B in patients with HCV. Charts were reviewed for appropriate vaccinations or immunity to hepatitis A and B. Patients who were non-immune, were contacted to set up an appointment to receive recommended vaccines. Secondary data points for the study included insurance coverage, cirrhosis status, medication adherence, and co-morbidities.

Results

A total of 42 patients were reviewed. The average time from diagnosis to prescription issuance was 107 days (4-323 days). From the data collected, insurance coverage and prior authorizations was the most common cause of delay, in 37/42 (88%) of patients. Patient factors such as missed appointments, and inability to contact were the next largest reason for delay at 16/42 (38%). Out of the 42 patients, 27 (64.3%) did not have documented hepatitis A and/or hepatitis B vaccinations or immunity. Out of these patients, we have contacted 16 (59%) patients. Of these, 12 (75%) patients have received the first round of appropriate vaccinations with a goal to have all vaccine series completed by July 2021.

Conclusions

There are various barriers to overcome to provide optimum care to patients. The clinic has used this data to make the process of initiating therapy more efficient by identifying and attempting to reduce the potential barriers. The implementation of the vaccinations initiative aligns the clinic with CDC/ACIP guidelines for hepatitis C care. Together these initiatives will continue to improve patient care and outcomes.

Mayan, Danel

Mentor(s): Dr. James Nottingham

Racial Disparity in the Surgical Treatment Options for Breast Cancer

Among the available surgical treatment options for breast cancer, mastectomies and breast conservation surgeries such as lumpectomies stand at the forefront. Racial disparities in choosing which operation to undergo has remained controversial. This observational retrospective review study aimed to define any racial disparity among Caucasian and African American patients from 2000 to 2019 treated for ER-PR-HER2- or ER+PR+HER2- breast cancer at Prisma Health- Richland, Baptist, Baptist Parkridge and Upstate (GHS). A total of 6,009 patients were included in our sample size and a treatment disparity was not observed. For ER-PR-HER2- and ER+PR+HER2- breast cancer, both African American and Caucasian patients

were preferentially treated surgically with lumpectomies.

Mayan, Danel

Co-Author(s): Sophie Carr

Mentor(s): Dr. Phillip Prest, Ms. Julie Murray, Dr. Ashley Jones, Ms. Megan Iseman

Improvement in Unplanned Return Rates to the STICU

Prisma Health has experienced an above average rate of unplanned returns to the STICU within the past few years. The bounce backs that occurred during 2020 were grouped into major categories to determine primary reasons for readmission. It was determined that the bulk of causes for bounce backs involved respiratory complications that may have been prevented with a longer primary stay in the STICU. It was proposed that improvement in provider communication and documentation could play a significant role in reducing premature patient discharges. A survey was sent to the STICU providers to determine their attitudes toward the department's overall communication and documentation, as well as their familiarity with Epic dot phrases to determine whether the introduction of this feature will allow for more efficient documentation.

McClure, Kinsey

Mentor(s): Dr. Tisha Felder, Dr. Deeonna Farr

Evaluating Available Data Related to Racial Health Disparities in Breast Cancer Prevention

Background: Breast cancer risk prediction models are valuable tools to identify appropriate individuals for preventive strategies based on key risk factors. However, current risk prediction models perform poorly in non-white women, which inadvertently exacerbates racial disparities in breast cancer. To develop and validate better breast cancer risk prediction models, we need a better understanding of risk factors and disease pathways, as well as large datasets that include representative samples of women of color.

Purpose: To identify and describe existing datasets that can be used to validate breast cancer risk in women of color who experience disparate risk of and death from breast cancer in the U.S.

Methods: We conducted a scoping review to find datasets by using knowledge of secondary data sources from previous health disparities research. We evaluated each dataset for variables commonly required for breast cancer risk assessment: sociodemographics (e.g., race/ethnicity), lifestyle habits (e.g., physical activity), and reproductive health variables (e.g., age at menarche).

Preliminary Results: After reviewing 41 datasets, we identified 37 existing datasets that measured race as a variable. Of these datasets, the majority (n=30) included $\geq 50\%$ of the variables necessary for assessing breast cancer risk, and 7 datasets contained 100% of the 11 variables necessary for assessing breast cancer risk. The sample sizes for these datasets ranged from 1,675 to 2.7 million. Five of the datasets that included race as a variable applied weight estimates to allow racial groups to be representative of the U.S. population.

Conclusions and Next Steps: Our scoping review identified few existing datasets that include a high enough percentage of non-white women to create a more accurate breast cancer risk prediction model. The majority of datasets with a large percentage of non-white women were comprised of 100% of one underrepresented race to increase knowledge of risk in one particular group. With this in mind, suggestions for future research are to pool information from these datasets and conduct ad hoc studies where necessary to have enough racially diverse data that includes all necessary variables.

Melton, Chandler

Mentor(s): Dr. Po-Nien Lu, Dr. Barbara Dupont, Dr. Julie Jones, Dr. Richard Steet, Dr. Michael Lyons, Dr. Heather Flanagan-Steet

Functional Analysis of a Novel SPTAN1 Mutation

SPTAN1, present at 9q34.11 in humans, encodes the alpha II-spectrin protein. Expression of alpha II-spectrin is essential to maintain myelination at Nodes of Ranvier in multiple axons. As such, variants that compromise SPTAN1 function have been associated with early infantile epileptic encephalopathy-5. Recent reports increased the spectrum of clinical features to also include mild developmental delay and late onset seizures. Here, we describe one of the first cases of an autosomal recessive SPTAN1 disorder, associated with ataxia and mild cognitive deficit. Genetic analyses identified a de novo SPTAN1 variant homozygosed through a mechanism of uniparental disomy of chromosome 9. Functional studies of this variant demonstrate the p.Gln1448Pro compromises protein expression and localization. This was shown by ectopically expressing an EGFP-fused form of SPTAN1 in both wild type and sptan1-null zebrafish. Western blot analyses show the variant containing SPTAN1 expression is reduced compared to wild type protein. Further, confocal analyses show that unlike wild type sptan1, the p.Gln1448Pro variant did not properly localize in lateral line axons. Using an automated behavioral tracking system, we demonstrated sptan1-null embryos progressively lose mobility. Importantly, treatment with D-aspartate increased distance swam by these animals. Previous work on another demyelinating disorder, multiple sclerosis, suggest this relates to the ability of D-aspartate to increase oligodendrocyte survival and expression of myelin basic protein. These findings support the possibility that D-aspartate may be an effective treatment for alpha II-spectrin deficiency.

Montoya, Katherine

Mentor(s): Dr. Frank Spinale, Dr. Catherine Gutshall, Dr. Britt Wilson, Dr. Kevin LeBlanc, Mr. Kevin Thomas

Pressure-Volume Loop Simulation: A Platform for Enhancing Teamwork and Didactic Performance for Inter-professional Learners

Simulation-based learning has proven an effective training tool in many high-risk industries such as aviation, military operation, and medicine. The value of simulation in medical education focuses on three main folds: improving technical skill, increasing inter-professional learning, and enhancing mastery of didactic material. The preponderance of literature in simulation focuses on the former-most of these three pillars, while this study focuses on the latter two. Three cohorts of 5-6 students participated in a simulation that tested their knowledge of pressure-volume loops in cardiac physiology. In each group, at least two of the following medical professions were represented: students from the University of South Carolina School of Medicine's MD, CRNA, or PA programs. The simulation was designed to encourage teamwork as students worked together to make clinical decisions for their patient as well as answer questions regarding the physiology that underpinned their patient's presentation. Participants were given identical pre- and post-tests to evaluate the efficacy of the simulation and its capacity to enhance didactic learning. Moreover, students completed a survey which evaluated their qualitative experience in inter-professional learning as well as opinions regarding the prospect of simulation in their respective curricula. Where $n=16$, the average pre-test score was 61%, while the average post-test score was 67% ($p=.02$). The average improvement from pre- to post-tests was 6%. Notably, the mode participant response reflected strong agreement that the simulation provided a helpful opportunity to gain insight and respect for the professions represented by counterpart cohort participants. Moreover, participants overwhelmingly favored the integration of simulation similar in style and content to this simulation in their respective academic programs. In conclusion, simulation was found to be an effective didactic learning modality in this cohort of inter-professional student participants.

Montoya, Katherine

Mentor(s): Dr. S. Wendell Holmes, Dr. Logan Huff

Patient-Reported Outcomes Following Meniscal Root Reconstruction with Gracilis Autograft, a Novel Technique

Background:

Meniscal tears are the most common injury to the knee and thus present a substantial burden to patients by way of pain and accelerated arthritic change. Meniscal root repair is the current standard of care for treating posterior meniscal root tears. The procedure has shown superior functional outcomes compared to complete meniscectomy but lacks biologic basis for healing at the menisco-tibial interface. To address this deficit, meniscal root reconstruction using gracilis autograft (MMRRGA), a novel technique, has been described in the literature. Clinical outcomes of MMRRGA, however, have not yet been investigated. The purpose of this study was to observe patient-reported outcomes (PROs) in a series of patients treated by a single surgeon with MMRRGA.

Methods:

Five PRO instruments were used to evaluate post-operative functional status and pain: Lysholm Knee Score, WOMAC Knee Score, SF-12 (PCS and MCS), and VAS. Data were collected both pre-operatively and at post-operative intervals, then analyzed retrospectively using a cubic spline regression model. Patients were monitored for complications. The study was approved by the University of South Carolina IRB.

Results:

Twenty-nine patients were included in the study between 2017 and 2020 – twenty-two females and seven males. The average patient age was 45 years (range: 16-63), and the average follow-up time was 14.7 months (range: 1-30 months). Lysholm, WOMAC, SF-12 PCS, and VAS were improved in the post-operative time period captured by these data to level that reached statistical significance ($p < .001$). SF-12 MCS improvement, however, was not statistically significant ($p = .162$). There were no intra-operative or long-term postoperative complications observed in this patient series.

Conclusion:

MMRRGA is a safe, effective procedure that improves subjective functional capacity, pain, and physical well-being as reported in Lysholm, WOMAC, SF-12 PCS, and VAS data instruments.

Level of Evidence: IV

Morris, Corbin - Co-Author(s): Mackenzie Adams, Ann Harouny, Shivali Desai, Alyssa Guo, Madison Little

Mentor(s): Dr. Steven Trocha, Dr. Stella Self, Dr. Christine Schammel

31-GEP testing and as an adjunctive risk assessment in following up of melanoma patients.

Assessing the longitudinal recurrence of risk in melanoma has traditionally been defined by histological features such as Breslow's thickness and regional nodal metastasis through sentinel node evaluation. These methods, however, have the possibility of missing patients with higher risk for recurrence than anticipated by these approaches. Recently evolving molecular evaluations of genetic markers (gene expression profiling GEP) has demonstrated a promising adjunctive testing to better stratify risk of recurrence in melanoma patients. The goal of this study was to evaluate all melanomas diagnosed in our institution over the last 3 years and compare traditional risk assessment with a 31 GEP test (Castle Melanoma DDX) that stratifies recurrence risk into Class 1A/B and Class 2A/B. All patients that have melanomas diagnosed and treated at a single regional medical center 3/2016-6/2020 were included in the study. Typical demographic and clinicopathologic data were collected to include histologic indicators of prognosis to

include Breslow depth. Patient will be contacted to consent to have 31-GEP testing completed, generating a prognostic profile independent of traditionally utilized criteria. These genetic results will focus on the probability of recurrence and prognosis and allow enrollment of higher risk patients in a more intensive follow up program in a parallel clinic to their regular dermatologic follow up. This clinic, entitled Lifetime Clinic (LTC), will have physical exam (PE), imaging and an increased frequency of follow-up visits compared to patients classified as low risk patients following up only with dermatology.

Morton, Zoey

Mentor(s): Dr. Christine Schammel, Dr. Jesse Jorgensen, Dr. Steven Trocha
Cardiac Amyloidosis and Transcatheter Aortic Valve Replacement

Aortic stenosis (AS) is one of the most common valvular pathologies and a major cause of morbidity and mortality worldwide. The prevalence of AS in the United States in people >75 years is approximately 12.4%. Cardiac amyloidosis (CA) is caused by the deposition of insoluble abnormally folded proteins, mainly light chain or transthyretin, causing restrictive cardiomyopathy. The prevalence of transthyretin CA is estimated to be 196.2 per million adult patients. CA associated with AS leads to reduced quality of life, heart failure, and death. The prevalence of CA within all AS patients is approximately 8%, with a higher prevalence of 16% in an older cohort (> 74 years) of AS patients. Patients with AS combined with CA had significantly higher (56%) 1-year all-cause mortality than patients with only AS (20%). Until recently there were no specific therapies for cardiac amyloidosis, but advances in immunotherapy, chemotherapy, and treatments designed to stabilize transthyretin or stop its synthesis have shown positive results for CA patients. Advances in diagnosis that no longer require a biopsy and the emergence of effective treatments make CA diagnosis more valuable in patient care.

Transcatheter aortic valve replacement (TAVR) is used to treat severe AS. This procedure has become more common with the number of TAVR procedures increasing 338% between 2012 and 2016. Aortic valve replacement is a current treatment strategy used for CA patients to address their AS. TAVR is frequently used as the replacement technique, but outcomes for CA patients following the TAVR procedure have not been well documented.

The goal of this study is to prospectively evaluate the presence of CA in patients undergoing TAVR at a single regional medical center. The study aims to determine how CA affects outcomes following TAVR to develop this as a predictor to facilitate early detection treatment and promote optimal patient outcomes.

Natrajan, Mohan

Co-Author(s): Michael Oehler

Mentor(s): Dr. Morgan Rhodes, Dr. Divya Ahuja

How has the Covid Pandemic affected Hepatitis C screening and linkage to care at the USC FMC?

More than 2 million people in the United States are chronically infected with hepatitis C virus (HCV), and 18,000 die annually from an HCV infection. Approximately half of patients are unaware they have the disease. In 2016, an estimated 64,495 people in South Carolina were living with chronic HCV, and 6,195 new cases were reported to SCDHEC that year.

The 2013 USPSTF guidelines recommended one time HCV screening for adults born between 1945 and 1965 (i.e. "Baby Boomers"). Baby Boomers comprise 26.2% of the South Carolina state population. According to the CDC, people born from 1945-1965 are five times more likely to have hepatitis C. In 2020, the USPSTF guidelines were updated to include one time screening of all adults age 18 to 79. The rationale for this change was that advances in treatment of HCV have shortened treatment course, improved cure rates, and decreased risk of long-term adverse effects. Additionally, rates of HCV in persons age 20 to

39 are higher than they were in 2013.

During the 2019-2020 academic year prior to the guideline update, a third-year Family Medicine resident investigated whether opt-out HCV screening procedures could increase HCV screening rates and linkage to treatment of HCV positives persons. Results of this study indicated that an opt-out protocol increased HCV screening rates from 3.6% to 4.2% of eligible adults according to 2020 guidelines. Of the 8 people identified with positive HCV viral loads, 100% underwent HCV evaluation within three months.

Towards the end of the 2019-2020 academic year, the Covid pandemic disrupted typical clinic workflow with the increased usage of telehealth and reduced patient volumes in clinic. Many patients have not been comfortable coming to the clinic, and labs must be drawn asynchronously with telehealth visits. The goal of this retrospective study is to examine how changes to clinic workflow affected HCV screening rates by comparing rates from March 2019 to 2020 to March 2020 to 2021. The primary endpoints that will be compared are the rate of screening tests and length of time between positive screen and linkage to care. The number of tests ordered during these time periods will also be compared.

Nwadukwe, Ifeanyi

Mentor(s): Dr. Khadija Jones

HIV and Hep C screening rates in according to USPSTF recommendations at an Urban Federally Qualified Health Center in SC 2019

HIV and Hep C screening rates in according to USPSTF recommendations at an Urban Federally Qualified Health Center in SC 2019

Authors: Nwadukwe Ifeanyi, Khadija Jones.

Track: Research, Evidence, and policy (Preventive medicine + Public Health).

Background:

HIV1/ AIDS Hep C continues to pose significant health consequences of public health importance.

In SC, AIDS has have been reported since 1981, confirmed cases of HIV infection have been reportable since February 1986. The incidence rate in SC for 2016 is 16.12/100,000 population.

In 2017 SC reported 3341 cases of chronic Hep C infection to CDC.

We examined the rate of patient screening for HIV and HCV, in accordance with USPSTF guidelines, in an urban FQHC.

Methods:

Cross-sectional data were obtained from the EHR on screening for HIV and HCV in patients seen at one FQHC site, for any type of visit. Patients included were age, male, and female. Data was obtained for the time periods January 1, 2018- December 31, 2018, and the same time for 2019.

Results:

For HIV, in 2018, 199 out of 486 patients (41%) of patients meeting criteria, were screened, compared to 753 out of 1253 patients (60%) in 2019 (19% increase). For HCV, 2019, 630 out of 1513 patients, were screened for HCV (42), but in 2018 353 patients were screened out of 1396 (25%),

Conclusions: Screening rates for both HIV and HCV, in accordance with USPSTF guidelines, at the FQHC increased between 2018 and 2019. Nevertheless, there was a wide range of screening rates, ranging from 25% (HCV 2018), to 42% in 2019 and 41% to 60% for HIV.

Public Health Implications:

There have been tremendous resources expended in providing awareness, risk and treatment of HIV and HCV, but the incidence of both diseases continues to rise and impact our communities. Variable screening rates of high-risk patients, in accordance with USPSTF guidelines, may contribute to the problem. Providers and patients should be educated on USPSTF guidelines for HIV and HCV screening, to increase screen-

ing rates. EMR systems should be programmed to alert of appropriate screening.

O'Brien, Clay

Mentor(s): Dr. Dietrich Jehle, Dr. Casey Wilson

Car Ratings Take a Back Seat to Vehicle Type: Outcomes of SUV vs. Passenger Car Crashes

Car safety ratings are routinely utilized in making automobile purchase decisions. These one to five star ratings are based on crash test data comparing vehicles of similar type, size and weight. We hypothesized that car safety ratings are less important than vehicle type and weight in predicting outcomes of head-on crashes between SUVs and standard passenger vehicles. We conducted a retrospective study on the drivers in severe head-on motor vehicle crashes entered into the FARS (Fatality Analysis Reporting System) database between 1995 and 2010. This database includes all motor vehicle crashes in the United States that resulted in a death within 30 days. Only two car, head-on crashes were included in the initial analysis. Outcomes of all SUV vs. passenger car and passenger car vs. passenger car head-on crashes were then compared by safety rating. Crashes were excluded from analysis if either vehicle was older than model year 1995, specific vehicle type information was incomplete, drivers were unbelted, or vehicle crash ratings were not available for both vehicles. These paired crash results were entered into a logistic regression model with driver death as the outcome of interest.

There were 83,251 vehicles of any type involved in head-on crashes in the database. In head-on crashes where the passenger car front driver crash rating was superior to the SUV's front driver crash rating, the odds of death were 4.52 times higher for the driver of the passenger car (95% CI: 3.06-6.66). Ignoring crash ratings, the odds of death were 7.64 times higher for the car driver than the SUV driver in all head-on crashes (95% CI: 5.59-10.44). In passenger car vs. passenger car head-on crashes, a lower car safety rating was associated with 1.28 times higher odds of death (95% CI: 1.05-1.57). In passenger car vs. passenger car head-on crashes, each one point lower car safety rating was associated with a 1.22 times higher odds of death (95% CI: 1.03-1.44). Our results suggest that vehicle type (passenger vehicle vs. SUV) is a much more important predictor of death than crash safety ratings in SUV vs. passenger vehicle head-on crashes.

Olson, Aram

Co-Author(s): Ben Kennedy

Mentor(s): Dr. Benjamin Jackson

A Prospective Comparative Analysis on the Outcomes and Complications of Ultrasound Guided Corticosteroid Injection on Tendinopathy of the Foot and Ankle

Background: Corticosteroid injections (CSIs) are a commonly used method to treat tendinopathy. Though the average orthopedic surgeon performs 20.6 injections per month, the data supporting its use is lacking. A CSI is done by utilizing an ultrasound-guided route to insert the needle into the tendon sheath, as opposed to the tendon itself. Unfortunately, significant evidence exists which shows an increased risk in post-injection tendon rupture via the structural weakening of the tendon itself. Given the average volume of CSIs administered by orthopedic surgeons on a monthly basis, the relative increase in risk for tendon rupture warrants further investigation into the causality and thus needs to be further researched.

Methods: The study design is a prospective analysis that examines rates of CSI complications. To be included in the study, patients had to have undergone a CSI of a foot or ankle tendon. Excluded from this study are patients who are considered part of the vulnerable population or those who refuse to be part of the study. Data will be collected via a phone call where patients report the following: binary relief (yes or no), degree of improvement (1-10 scale), number of injections, and medical complications following the CSI. The intervals of the follow-up phone calls are one week and 6 months post-injection. Comorbidity data will be analyzed along with the patient reported data to determine the relationships of these factors.

Results: At this time, 49 patients have been enrolled in the study. Of those enrolled, 19 have answered the phone. 17 out of 19 patients reported that the CSI provided relief. The average degree of improvement

was 6.35 out of 10. The average number of injections was 1.41. The most commonly reported complication after the CSI was a temporary flare of pain within 24 hours post injection (88.2%). No patients experienced tendon rupture since the CSI.

Conclusions: At this time, preliminary data suggest there is no increased risk of tendon rupture following ultrasound-guided CSI. More data needs to be gathered from prospective patients to obtain significant relationships between the comorbidities and risk of rupture.

Owen, Shauna

Co-Author(s): Edwin Holt

Mentor(s): Dr. Paul Miller

Laparoscopic Management of a Spontaneous Cornual Heterotopic Pregnancy: Case Report and Review

Heterotopic pregnancy is a rare phenomenon that typically occurs as a result of assisted reproductive technologies at a rate of 1 in 3,900 pregnancies. The incidence of spontaneous heterotopy is even less (1 in 30,000). Moreover, it is exceedingly rare for the ectopic pregnancy component to be cornual. We report a unique case of spontaneous cornual heterotopic pregnancy in a 37-year-old multiparous woman. Her cornual ectopic and intrauterine pregnancies were recognized at 11 weeks gestation. She was managed surgically without complications and ultimately delivered a viable female infant via planned cesarean section at 36 weeks. The occurrence of a cornual heterotopic pregnancy is rare, and our case report details successful diagnosis and surgical management, resulting in delivery of a viable infant.

Owens, Landon

Mentor(s): Dr. Derick Wenning

Systemic Histoplasmosis with Fibrosing Mediastinitis in a Toddler

Histoplasmosis is the most common systemic mycosis in the USA, caused by the fungus *Histoplasma capsulatum*, which is usually asymptomatic in non-immunocompromised hosts and is classically associated with spelunking. Symptomatic infection in children is uncommon. Fibrosing mediastinitis is a rare complication of histoplasmosis that is progressive and resistant to treatment.

A 30-month-old male was brought to the pediatric emergency department by his mother with 4 pounds weight loss and decreased activity for four weeks, with recent development of dry cough and occasional labored breathing, without fever. On exam he appeared fatigued and cachectic, with clear lungs and a normal neurological exam. A failure-to-thrive work-up was initiated including a chest x-ray, which showed a rounded density in the right upper lobe with tracheal deviation. A subsequent computed tomography for better characterization showed a mass measuring 4.4 cm in diameter without calcification which abutted the thoracic aorta, trachea, and right mainstem bronchus. This was not felt to be thymic tissue. Differential diagnosis included neuroblastoma, lymphoma, germ cell tumor, tuberculosis, histoplasmosis, or nontuberculous mycobacterium.

The patient was admitted to the hospital and was given partial parenteral nutrition and underwent surgical biopsy, which was notable for hard fibrotic tissue that was poorly vascularized. Workup included histoplasmosis complement fixation, which was strongly positive (1:512) and urinary antigen, which resulted negative. Biopsy pathology showed extensive fibrosis, suggestive of fibrotic mediastinitis, secondary to histoplasmosis infection. He was started on Itraconazole for the typical six-month course although unfortunately this complication of Histoplasmosis is not usually responsive to treatment or surgery. During his hospitalization he was transitioned to drinking children's protein

beverages and grew more energetic, although he had developed an aversion to solid foods. After stabilization he was discharged. On a follow-up CT two months later, the mass had not grown significantly and the patient had gained nearly five pounds. This case illustrates the need for mycosis to be considered in a patient with upper respiratory symptoms, especially in one with an immature immune system or immune compromise. Histoplasmosis is endemic to the United States and failure to recognize it may lead increased morbidity and mortality.

Padi, Akhila

Mentor(s): Dr. Alain Litwin, Dr. Irene Pericot-Valverde, Dr. Moonseong Heo

The Influence of Trust in Providers, Distrust in the Health Care System, and General Social Trust on Adherence to Direct-Acting Antiviral Therapy Among People Who Inject Drugs on Medications for Opioid Use Disorder

Introduction: Despite the high prevalence of hepatitis C virus (HCV) infection among people who inject drugs (PWID), less than 10% of the population receive direct-acting antivirals (DAA). Trust plays an important role in the initiation and adherence to medical care among vulnerable populations, along with increasing access to services and maintaining a quality patient-physician relationship. This study examined (a) trust in providers, distrust in the health care system, and social trust among HCV-infected PWID; and (2) examined the association between adherence to DAAs agents and trust in providers, distrust in the healthcare system, and social trust.

Methods: This secondary analysis of a randomized clinical trial explored different models of treatment for HCV among PWID on medication for opioid use disorder (MOUD). At baseline, we collected information regarding sociodemographic characteristics, both psychiatric and chronic health conditions, and three measures of trust, including distrust in the healthcare system, trust in the health care provider, and general social trust. Adherence to DAA was continuously assessed using electronic blister packs.

Results: Participants reported high levels of distrust in the health care system 2.9 (SD = 0.7), low levels of trust in health care providers 3.1 (SD = 0.4), and low general social trust 2.4 (SD = 1.1). Participants who reported with higher levels of distrust in health care system showed lower adherence to medication over the course of the study ($p > 0.024$).

Conclusions: This sample of HCV-infected PWID reported low levels of trust among three different trust categories – social trust, trust in the healthcare provider, and distrust in the healthcare system. An increased level of distrust in the healthcare system was associated with decreased adherence to DAA. With PWID making up a big portion of the population infected with HCV, shifting the levels of distrust in the healthcare system in PWID will be crucial in targeting HCV treatment adherence in this population.

Parsa, Parmida

Mentor(s): Dr. Kamla Sanasi-Bhola, Dr. Caroline Derrick, Dr. Matthew Lenhard

Utility of FibroScan® Use in Pregnancy

Background:

Rates of liver disease have been steadily increasing in women of reproductive age, and pregnancy-related liver diseases can affect up to 3% of pregnant women, even fatally. However, monitoring in pregnant patients can be challenging as physiologic changes during pregnancy affect the accuracy of evaluation. Available serum tests have not been approved for use during pregnancy and more invasive procedures such as liver biopsy may require screening upper endoscopy to assess portal pressure and risk complications. Transient elastography (FibroScan®) is a sound-based technique used to determine liver stiffness in patients with liver disease. It uses shear wave velocity to determine tissue stiffness and provides a value in kPa. Demonstrating the validity of FibroScan® use in pregnancy through this project could improve the screening process of liver disease in pregnancy and lead to greater management of related complications.

Methods:

Adult pregnant patients age 18 or older were recruited (n=46). Race, age, comorbidities, drug use, and available liver function test values were gathered as baseline data. Transient elastography was performed three times for each patient: at the 2nd trimester, 3rd trimester, and at 6 weeks post-partum. Any adverse pregnancy events were also recorded.

Results:

The mean age of participants was 30 years old, with average AST values of 16 U/L and average ALT values of 12 U/L. Liver stiffness scores averaged 5.44 kPa at the 2nd trimester, 5.13 kPa at the 3rd trimester, and 4.92 kPa at 6 weeks post-partum. There were 7 reported adverse fetal/pregnancy events: polyhydramnios, pre-eclampsia, vacuum-assisted vaginal delivery, shoulder dystocia, complete placenta previa, bilateral fecal ventriculomegaly, and nuchal cord, but none of these were deemed related to FibroScan® use.

Conclusion:

Transient elastography could potentially be used as a means of predicting pre-eclampsia and management of liver disease during pregnancy as highlighted by prior studies done in Europe.

Future directions: data collection will continue now that the pandemic has slowed, and statistical analysis will be done.

Parsa, Parmida

Mentor(s): Dr. Kamla Sanasi-Bhola

Penile Mass: An Atypical Presentation of HSV-2

Purpose: Columbia, South Carolina is ranked number 15 in the country for HIV prevalence according to 2018 CDC data. Co-infections such as syphilis, chlamydia, gonorrhea, and herpes are generally common in this population, sometimes with atypical presentations. It is important for providers to be able to recognize atypical presentations in immunocompromised hosts.

Case: We discuss a 60-year-old male with HIV for 11 years (on elvitegravir, cobicistat, emtricitabine, and tenofovir alafenamide) who presented with a 3-week history of an enlarging, non-tender, and odorous ulcerated lesion inferior to the corona on the ventral surface of the penis (Figure 1). Initial differentials included syphilis, HSV, chlamydia (including LGV) and donovanosis. On day 1, he received benzathine penicillin IM and azithromycin PO. Initial workup revealed an undetectable HIV viral load with a CD4 count of 280. Tests for gonorrhea, chlamydia, and HSV-1 were negative. Treponemal antibody test was also negative. A swab of the ulcer detected HSV-2 on day 8 for which a 10-day BID valacyclovir regimen was given. The ulcer progressed into a mass (Figure 2). Biopsy done on day 10 revealed treponemes with no malignant cells, prompting 3 additional doses of IM penicillin. By day 21, the penile mass continued to increase in size, and partial amputation was done on day 56. Pathology revealed positive stains for HSV with excessive inflammation and no evidence of malignancy.

Outcome: Given concern for acyclovir-resistant HSV, IV cidofovir was given once a week for 2 weeks with a regimen of oral probenecid and saline hydration to prevent nephrotoxicity. At treatment completion, the lesion had healed, but consequently returned as 3 ulcers on the rims of the incision and required additional cidofovir in months 10 and 12 along with local injection with cidofovir. He had maintained function of his organ.

Conclusions: This case confirms the need for providers to be aware of atypical presentations of STIs in the immunocompromised host. Providers should maintain a broad differential and work with interdisciplinary teams to ensure good clinical outcomes.

Patel, Tarak

Co-Author(s): Zachary Vincent

Mentor(s): Dr. Troy Privette

Atraumatic Tongue Type Calcaneal Fracture in a 13-Year-Old Male

Calcaneal fractures are a rare form of fracture pediatric patients making up 0.005-0.41% of all pediatric fractures(1). Most commonly, this fracture type is seen in young adults involved in significant trauma-classically with fall from height(2). Symptoms at presentation involve ankle and heel pain, inability to weight bear and occasionally skin tenting on the posterior ankle. We herein report a rare presentation of tongue type calcaneal fracture atraumatic mechanism of injury. He presented with complaints of significant pain and inability to weight bear after feeling a “pop” while jumping from ground height during soccer practice. Physical exam was remarkable for non-blanching skin over the posterior ankle concerning for progression to skin necrosis. Ankle X-ray revealed significantly displaced tongue-type calcaneal fracture. The patient underwent emergent internal reduction, external fixation for correction. Management of calcaneal fractures ranges from non-operative to operative with the majority of fracture types in pediatrics able to be managed conservatively(3). However tongue type calcaneal fractures, as well as significantly displaced intra-articular fractures require urgent surgery given their high risk for disunion and local soft tissue and skin necrosis due to the pressure the calcaneus exerts on overlying soft tissue. This case is notable due to the rarity of the fracture type in pediatric patients as well as the unique injury mechanism.

Patterson, Paige

Mentor(s): Dr. Hollie Edwards

The use of simulations to improve resident learning in hospital based scenarios: A quality improvement project

Introduction: Despite studies that show that learning and knowledge retention is improved with simulation based learning, medical education continues to center around an apprentice based learning model.

Aim: This quality improvement project aimed to improve resident education and increase knowledge and learning through the institution of a simulation based learning curriculum that focuses on commonly encountered urgent but non-emergent inpatient clinical scenarios using high fidelity mannequins. The goal was for post simulation test scores to increase by 5% for each learning topic with a resident rating on the simulations of 8.0 or higher.

Methods: Time was set aside for the residents to participate in the simulations during each of their inpatient blocks. Residents took a pre-simulation test evaluating their knowledge of the topic, completed the simulation with the high fidelity mannequin followed by a short teaching session, then answered the same questions in a post-simulation test that additionally surveyed how they would rank the simulation in terms of helpfulness to their education on a scale from 1-10. Pre and post-simulation test scores were averaged and compared for improvement for each simulation topic.

Results: For each of the four learning topics that were addressed with the inpatient simulation curriculum, there were increases in average post simulation test scores. The bronchiolitis simulation had an increase of 4%, status asthmaticus improved by 10%, status epilepticus scores increased by 29%, and septic shock scores showed an increase of 8%. Additionally, the simulations were rated an 8.7, 9.1, 9.1, and 9.3 respectively by residents in terms of helpfulness to their education.

Conclusions: Average test scores improved after each of the four simulations implemented with the new inpatient simulation curriculum and were rated highly valuable to the inpatient learning experience by 400

the participating residents.

Petersen, Kirklen

Mentor(s): Dr. Saptarshi Biswas

Pandemic Paradox: Trauma Trends During the COVID-19 Pandemic Despite the Safe Haven of Home. Experiences From a Rural Trauma Center

Background

As the early peak phase in the coronavirus outbreak has intensified, stay at home mandates were enacted requiring individuals to remain home to prevent community transmission of the disease. Further mandates escalated isolated environments including school closures, social distancing, travel restrictions, closure of public gathering spaces, and business closures. As citizens were forced to stay home during the pandemic, the crisis created unique trends in trauma referrals, which consisted of atypical trends in injuries related to trauma.

Methods

A retrospective review of all trauma registry patients presenting to a rural American College of Surgeons (ACS) verified Level I trauma center with associated trauma activation before and during the Coronavirus 2019 (COVID-19) pandemic, integral dates January 1, 2020, to May 1, 2020. A comparison was made regarding trauma trends based on the previous year (January 1, 2019, to May 1, 2019). The data collected included patient characteristics, grouping by trauma activation, injury type, injury severity score (ISS), alcohol screen, drug screen, and mode of injury.

Results

A statistically significant increase was found largely among males ($p = 0.02$) with positive alcohol screens ($p < 0.001$). The statistically significant mode of injury among this trauma population included falling, jumping, pushed ($p = 0.02$); self-harm-jump ($p = 0.01$); assault ($p = 0.03$); and assault with sharp object ($p = 0.036$).

Conclusions

Although overall trauma volume was reduced preceding and during the COVID-19 stay at home mandates, a significant increase in specific trauma trends was observed, including falls, jumps, and pushed; self-harm-jumps; assaults; and assaults with sharp objects. Largely, the trauma trends were among men with higher levels of alcohol than previously reported.

Pham, Mai-Trinh

Co-Author(s): Luke Spangler

Mentor(s): Dr. Andrew Vaughan, Dr. Morgan Rhodes, Dr. Paul Bornemann

Artificial intelligence Technology in Point of Care Ultrasound Training

Background: Point of care ultrasound (POCUS) has been shown to decrease the use of expensive diagnostic studies and improve quality outcome measures. This project will add to current literature by showing that there can be increased access to training and decreasing training time to achieve competency in ultrasound. This pilot study aimed to train primary care trainees in POCUS by using a portable ultrasound with auto-labeling and real-time corrective feedback artificial intelligence (AI) technology. This project compared clinical competency in point of care cardiac ultrasound using traditional ultrasound training to traditional training supplemented with 4 hours of AI technology.

Methods: This was a pilot study in the Prisma Health Family Medicine Center (FMC), an outpatient family medicine teaching clinic in Columbia, South Carolina. The AI technology was made available through an unrestricted grant from Echonus. Participation was optional for medical students and residents com-

pleting rotations at FMC. Students and residents were randomized to standard ultrasound training or standard ultrasound training with 4 hours of AI as a supplement. Outcomes were scores on the objective structured clinical examination (OSCE) and time to obtain and measure ultrasound views (apical 4 chamber view of the heart, parasternal long axis view of the heart, components of left ventricular systolic function). Analysis included direct comparison of the scores between the two groups, as well as mean and standard deviation of time to obtain cardiac parasternal long axis and apical four chamber ultrasound views. Number of cardiac ultrasounds performed during the rotation and self-perceived experience with ultrasound was also reported.

Pierce, Ashley

Mentor(s): Dr. Morgan Rhodes, Dr. Mark Humphrey

Can a QI initiative focusing on providing providers with an individual pediatric panel improve adherence of well-child visits?

Well-child visits are a critical opportunity for screening, vaccinations and counseling. In comparison to problem focused visits, well-child visits routinely include assessment of emotional and social development (1). Behaviors established during childhood or adolescence, such as eating habits and physical activity, often extend into adulthood (2). Well-child visits also provide opportunity for evaluation of growth curves and appropriate documentation of vital signs. Specifically, among school-aged and adolescent children, a higher percentage of well-care visits had recommended height, weight, and blood pressure measurements recorded, compared with visits for problem-focused care (1). In 2020, Prisma Health – USC Family medicine pediatric visits accounted for approximately 5.25% of total visits. The purpose of this QI initiative is to provide medical providers with an individual pediatric panel in an attempt to improve adherence for Well-child Visits. The project will take place at Prisma Health USC – Family Medicine Center, which cares for patients of all ages. This project will specifically look at patients aged 2-18 years old who have established care with FMC and been seen within the last 3 years. The QI project is an intervention to target providers. This project will involve chart review, which will be utilized to separate patients based off their listed primary care provider. The EMR (One Chart) allows for appropriate chart review to identify patient panels. Providers will be provided with access to their individual patient panels, along with an excel sheet with their pediatric panel's information. This will allow for a more thorough way to track patients who are delayed on well child visits. The provider will be able to identify those who are delayed and send a standardized reminder letter. This project aims to improve adherence to the standard of care of annual well-child visits. Completion of yearly well-child visits will lead to increased continuity and improve standard of care by providing opportunities for physicians to provide anticipatory guidance, promote good health habits and screen for medical and/or psychosocial concerns.

Pilotti, Ashlie

Mentor(s): Dr. Sara Donevant

Understand the Signs and Symptoms of COVID-19: A Systematic Review

COVID-19 first appeared in Wuhan, China in December 2019, and continues to infect millions globally. Initially, common COVID-19 signs/symptoms included fever, cough, and shortness of breath. As the virus spread, patients began reporting more diverse experiences, such as loss of taste/smell and gastrointestinal issues. Understanding the COVID-19 signs/symptoms is essential in early identification and limiting its spread. The purpose of the systematic review was to identify an inclusive list of COVID-19 signs/symptoms across all age groups in all settings and assess potential gaps in reporting the signs/symptoms. The Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) Protocols and Research Synthesis and Meta-Analysis: A Step-by-Step Approach were used to guide the review. Search criteria included quantitative, primary articles published in English available in Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, EBSCO Academic Database, and Google Scholar from Jan-402

uary 1st, 2020 to June 24th, 2020 and excluded articles reporting on <50 patients to reduce potential bias associated with small numbers of patients. We used the search terms: COVID, COVID-19, and coronavirus. Articles were reviewed for information including type and location of study, total number of patients reported in the article, signs/symptoms timeframe, and signs/symptoms experienced by patients.

After screening, we included 98 articles in the review. We identified 77 unique signs/symptoms, combination of signs/symptoms, and vital signs from 1,369,547 patients. However, only 2 signs/symptoms (fever and cough) were reported in 89/98 of the articles. Overall only 5% of the potential signs/symptoms were reported in more than one article. The most-reported COVID-19 signs/symptoms were cough, fever, myalgia/fatigue, headache, shortness of breath, sore throat, and diarrhea.

The lack of reporting all the potential COVID-19 signs/symptoms results in a biased understanding of the virus that may improperly guide COVID-19 screening and testing. In turn, this biased understanding potentially acts as a barrier to diagnosis and treatment. Overall, this systematic review only included 6.5% of the world's cases, leaving a significant gap in fully understanding COVID-19 signs/symptoms. As the virus mutates, a better understanding of all the COVID-19 signs/symptoms can assist in mitigation and containment.

Pizzuti, Morgan

Mentor(s): Dr. Julie Justo

Validation of Local *Pseudomonas aeruginosa* Risk Factors in Patients with Community-Onset Bacterial Pneumonia

Presentation Objective

- At the conclusion of my presentation, the participant will be able to describe validation methods for local *Pseudomonas aeruginosa* risk factors in patients with community-onset bacterial pneumonia.

Purpose

- The international management guidelines for community-acquired pneumonia encourage development and validation of institutional treatment guidelines based on local risk factors. Previous research from our health system identified local risk factors for *Pseudomonas aeruginosa* in adult, hospitalized patients with community-onset bacterial pneumonia. The study demonstrated that individuals with bronchiectasis, interstitial lung disease, prior airway colonization with *P. aeruginosa* within the last 12 months, and recent exposure to beta-lactam antibiotics within the last 3-30 days had a greater risk of *P. aeruginosa* pneumonia. Our institution developed local pneumonia treatment guidelines focusing on use of empiric antibiotics for patients with risk factors for *P. aeruginosa*. The aim of this study was to validate the local *P. aeruginosa* risk factors in patients with community-onset bacterial pneumonia.

Methods

- This was a retrospective, observational cohort study. Patients were screened from reports of respiratory specimens and admissions with MS-DRG codes associated with pneumonia between January 1, 2017 to March 31, 2020. Enrolled subjects were adult patients aged ≥ 18 years, admitted to Prisma Health Richland, Baptist, or Baptist Parkridge hospital campuses with: a diagnosis of pneumonia, receipt of inpatient antibiotic therapy within 48 hours after pneumonia symptom onset, and receipt of >48 hours of antibiotic therapy. Patient comorbidities, culture results, antibiotic therapy, and acute severity of illness were collected. Statistical analyses include sensitivity, specificity, positive and negative predictive value, overall accuracy and over and under treatment proportion.

Results: In Progress

Conclusions: In Progress

Poupore, Nicolas

Mentor(s): Dr. Thomas Nathaniel, Dr. Renee Chosed, Dr. Sergio Arce, Dr. Robert Rainer
Metabolomics Profiles of African American and White Acute Ischemic Stroke Patients

Introduction: In the US, African Americans (AA) have higher neurovascular disease (NVD) morbidity and mortality than whites. Recent evidence suggests that the NVD development may be related to circulating metabolite alterations, which might contribute to racial disparities in acute ischemic stroke (AIS) risk.

Hypothesis: We tested the hypothesis that the metabolomic profile of AAs differ from that of whites.

Methods: Metabolomic profiling in plasma samples of 31 AIS patients was performed. 9 were AA AIS patients and 7 were AA control patients. 7 were white AIS patients and 8 were white controls. 1062 known metabolites were measured. A principal component analysis (PCA) was analyzed between AA AIS and control patients. A Student T test was used to then compare scaled metabolite values between these two groups. Receiver operating characteristic (ROC) curve was performed for select metabolites. A similar process for whites was performed. Then, a PCA was computed between AA and white AIS patients. The metabolites that were significant in both AA and white analyses were compared using a one-way ANOVA and post hoc Tukey method with a combined control group.

Results: 13 metabolites that significantly differed between AA AIS and control patients were identified. 6 were in the amino acid family and 5 were in the lipid family. 86 metabolites were significantly different between white AIS and control patients with 36 being amino acids and 26 being lipids. The PCA analysis did not reveal separation between the AA and white AIS patients. The three duplicate metabolites were 1-ribosyl-imidazoleacetate, Alpha-hydroxyisocaproate, and N-acetylhistidine and were all significantly different on one-way ANOVA. The post hoc Tukey test showed significant differences for all metabolites between AIS and control groups except for Alpha-hydroxyisocaproate when comparing AA AIS and controls.

Conclusions: When comparing the three biochemicals that were present in both groups, Alpha-hydroxyisocaproate was significantly different in the white AIS group and not AA AIS group compared to controls. This amino acid involved in leucine, isoleucine, and valine metabolism could provided guidance into the varied pathophysiology of why AA AIS patients have worse mortality and morbidity than whites.

Poupore, Nicolas

Co-Author(s): Nicole Boswell, Bryana Baginski

Mentor(s): Dr. Katherine Pellizzeri

The Utility of Serial Hemoglobin Monitoring in Non-Operative Management of Blunt Splenic Injury

Background

Serial hemoglobin (Hgb) measurements are frequently used to monitor ongoing hemorrhage in blunt splenic trauma (BST) patients. There is limited evidence that trending serial Hgb levels affect clinical decision making in non-operative management (NOM) of BST. The Eastern Association for the Surgery of Trauma (EAST) states that there is not enough evidence to recommend a particular frequency of measuring Hgb values for NOM. This study was performed to compare the usefulness of serial Hgb values to daily Hgb values in NOM of BST patients.

Methods

We conducted a retrospective chart review of patients with a splenic injury who were brought to Greenville Memorial Hospital between 2013 and 2019. Demographics, comorbidities, lab values, clinical decisions, and outcomes were gathered through a trauma database.

Results

A total of 562 patients arrived in the trauma bay with a BST. 214 underwent operative management (OM), 341 underwent NOM, and 7 died in the trauma bay. In the NOM group, 297 were successful, 37 failed NOM, and 7 died of reasons unrelated to their splenic injuries. Of those that failed NOM, 8 were felt to have a significant decrease in Hgb levels that triggered a change to OM. 5 of the 8 patients (62.5%) were

hypotensive first, 2 of the 8 patients (25%) were no longer receiving serial Hgb checks, and 1 of the 8 patients (12.5%) had a repeat CT and was embolized. Patients receiving q24h Hgb levels were not significantly different from q2-12h patients in injury severity, length of stay, largest drop in Hgb, and incidence of failing NOM.

Conclusions

Overall, these results show that trending serial Hgb levels did not seem to independently influence clinical decision making in NOM of BST. There were no identifiable patient-related risk factors in the serial Hgb group to indicate a target population that would benefit from serial Hgbs. Patients who received q24h Hgb had similar injuries and outcomes than patients who received serial Hgbs at shorter frequencies. These results suggest that daily and serial Hgbs are comparable in NOM of BST.

Puckett, Hannah

Mentor(s): Dr. Matthew Lenhard, Dr. James Cook, Dr. Kamla Sanasi-Bhola, Ms. Ivory Harding, Dr. Katelyn Fisher

Assessing Risk of Post-Cesarean Endometritis and Implementing Vaginal Iodine Preparation in the High-Risk Pregnant Population: Quality Improvement and Risk Reduction Pilot Study

Introduction: There are >2,400 deliveries per year at our tertiary referral center (Prisma Health Midlands – PHM), which covers 16 counties in the Midlands region of South Carolina. Approximately 30% of our deliveries are cesarean, and we encounter infections daily, though our rate of endometritis is unknown. Post-partum endometritis is an ascending infection that affects approximately 1-3% of all types of deliveries, and cesarean deliveries carry a 10-20-fold higher rate of infections compared to vaginal deliveries. A recent meta-analysis showed a 67% decrease in the rate of endometritis amongst high-risk patients (actively laboring and/or amniotomy before proceeding with cesarean) who received vaginal cleansing for > 30 seconds prior to delivery. Our study aims to determine the current rate of endometritis and demographic information of subjects in our cohort at PHM who were readmitted or treated post-operatively over a 12-month period and compare the rate of post-op endometritis at our institution to other institutions or to published data.

Methods: Retrospective chart review of Labor and Delivery subjects at PHM from 05/01/2018 to 04/30/2019. Consecutive patient charts were evaluated and identified as meeting the inclusion and exclusion criteria. Identified charts were then assessed for 19 epidemiological variables.

Results: The rate of endometritis among our cohort was 5.76%. There were higher rates of endometritis among the deliveries of later gestational ages. On average, post-cesarean patients with a diagnosis of endometritis were younger, spent more hours in labor, and experienced an increased number of cervical checks. Fevers > 100.4°F had a high specificity (99.2%) but a lower sensitivity (68.8%) in diagnosing endometritis.

Conclusions: The rate of endometritis among our cohort was lower than the rate among the unplanned CS cohort (11%) of the reference study but higher than the rate among unplanned CS with intact membranes cohort (5%). Phase 2 of our study involves initiating protocol of vaginal iodine pre-operatively in high-risk patients and determining if this intervention matches accepted rates of risk reduction.

Reihart, Layne

Mentor(s): Dr. Jenna Cox, Dr. Alyson Wilder

Evaluation of a transition from an ACT to an aPTT-based ECMO anticoagulation algorithm

Background: The extracorporeal membrane oxygenation (ECMO) anticoagulation strategy for heparin infusions at Prisma Health Richland was recently updated from an ACT-based strategy to an aPTT-based strategy. The purpose of this evaluation was to evaluate the efficacy and safety of the aPTT-based strategy.

Methods: This was a retrospective evaluation of adult patients who required ECMO and received heparin

infusions for anticoagulation at Prisma Health Richland. Patients requiring ECMO after the updated anticoagulation algorithm was implemented (“post” group) were matched 1:2 with patients requiring ECMO prior to the anticoagulation algorithm changes (“pre” group). Matching criteria included age (± 10 years), ECMO type (veno-arterial vs veno-venous), and concurrent Impella use. Outcomes included thrombotic complications (deep vein thrombosis, pulmonary embolism, ischemic stroke, limb ischemia, circuit thrombosis requiring exchange) and bleeding complications. Major and minor bleeding definitions were in accordance with the Extracorporeal Life Support Organization.

Results: There were 16 patients in the “pre” group and 8 patients in the “post” group. Thrombotic complications occurred in 3 patients (18.8%) in the “pre” group and 2 patients (25%) in the “post” group. Major bleeding occurred in 8 patients (50%) in the “pre” group and 5 patients (62.5%) in the “post” group. Minor bleeding and transfusion requirements were similar between the groups. The rate of adherence to the algorithm in the “post” group was 37.5%. Patients without adherence to the algorithm compared to those with adherence had higher rates of major bleeding (80% vs 33.3%), CNS source of bleeding (40% vs 0%), and mortality (80% vs 33.3%).

Conclusions: Overall rates of thrombotic and bleeding complications were similar between the “pre” and “post” groups. In the “post” group, adherence to the algorithm was associated with lower rates of major bleeding and mortality. Continued evaluation of the algorithm will be required to confirm these findings.

Renick, Dalton

Co-Author(s): April Hobbs

Mentor(s): Dr. Melanie Blackburn

Stay Alert: Improving Response to SIRS/Sepsis in Pediatric Patients via Implementation of a Sepsis Alert Protocol

Sepsis is the leading cause of death in pediatrics. Delay in treatment contributes to the high morbidity and mortality rates seen in sepsis patients within the pediatric population. Although there are multiple studies of implementing sepsis alerts within various emergency departments across the nation, there are very few addressing the implementation of similar alerts within the inpatient setting; especially within pediatrics. Aim : Implement a Sepsis Alert protocol within the EMR at Prisma Health Children’s Hospital 4th floor. The goal of this sepsis alert is to decrease the time that it takes to realize that a patient is septic and increase the efficiency and effectiveness of treating that patient. Design: A before and after retrospective cohort study Setting: Prisma Health Children’s Hospital 4th Floor - Med Surg (Child/Adolescents) Intervention: Sepsis alert protocol was implemented based on Goldstein criteria for pediatric sepsis. This protocol included 3 parts: an automatic sepsis pop-up alert within the medical record based on Goldstein sepsis criteria, a screening tool completed by nursing in effort to identify and initiate treatment if indicated, and a sepsis powerplan that is to be used when sepsis is identified to help orchestrate appropriate fluid resuscitation and antibiotic selection. Measurements: Total number of alerts, percentage of responses, time to response, huddle documentation Results: Data collected prior to the implementation of the SIRS/Sepsis alerts showed that there was a 38% response rate to patients who met SIRS/Sepsis criteria. After the alert system was implemented, there the response rate increased to 51.7%. The average response time prior to implementing the alert was 24.9 minutes. The average response time after implementation of the alert actually was slightly increased to 26.7 minutes. Conclusions: Overall, there was no significant change in time to response/resuscitation for patients who met SIRS/Sepsis criteria despite implementation of the protocol. Post-data was only collected for only three months after the protocol was implemented. There is an obvious learning curve for the start of a new electronic tool and therefore, further data collection should be obtained to further assess its usefulness in the pediatric inpatient setting.

Renick, Elaine

Mentor(s): Dr. Morgan Rhodes, Dr. Mark Humphrey

Colorectal Cancer Screening: Increasing Utilization of Fecal Immunochemical Occult Blood Testing

Colorectal cancer (CRC) is the 2nd leading cause of cancer-related deaths in the United States and the 3rd most common cancer in men and women. Despite these statistics, primary care offices often struggle to meet quality goals for CRC screening. Several noninvasive colorectal screening measures are available for patients. The FIT test is an FDA- approved noninvasive colon cancer screening test that has a 74% detection rate for all colorectal cancers by identifying human hemoglobin in stool. It is intended to screen adults age 50 and older at average risk for colorectal cancer, without requiring any prep, diet restriction or withholding of medications prior to test collection. The goal of this project was to increase CRC screening within a family medicine residency teaching clinic by promoting patient and staff education on screening options, primarily the Fecal Immunochemical Occult Blood Test.

For this quality improvement project, an educational brochure was developed that describes what FIT testing is, who qualifies to use it, how to complete the screening, and how results are shared. This brochure was distributed throughout the clinic waiting room and provided to interested patients during clinic visits. Additionally, a standing order was created allowing ancillary staff to order FIT tests for qualified patients based on a universal screening questionnaire. Data analysis for this project will include comparing the pre- and post implementation (number of FIT tests ordered per number of qualifying patients) to calculate relative risk. Additionally, the overall colorectal cancer screening rate for the Prisma Health Family Medicine Center will be compared pre and post-intervention.

Rice, Garrison

Co-Author(s): Miles Scott, Jarvis Johnson, Justin Cole, Trevor Morris, Kylie Whittle

Mentor(s): Dr. Morgan Rhodes, Dr. Mark Humphrey, Dr. Nicolas Limogiannis, Dr. Jenny Gonzalez, Dr. Lynet Nyaribo, Dr. Reona Broadwater

Longitudinal Approach to Improving Colorectal Cancer Screening

Colorectal cancer screening is an effective measure to detect colon cancer in its earlier and more treatable stages. It is estimated that 4.4% of men and 4.1% of women will develop colorectal cancer in their lifetime. The current recommendation is to screen all individuals age 55 -75 years old. Colon cancer has a significantly higher survivability when caught early, compared to colon cancer caught at later stages after the cancer has spread. Colon cancer screening rates have been designated as a quality metric which is used to assess the quality of patient care. As of May 2020, the screening rate of eligible patients at the Prisma Health Family Medicine Center (FMC) was 48.97%. The health system goal was to reach 75%. The goal of this quality improvement project was to improve the rate of colorectal cancer screening at FMC. Since colon cancer screening can have a significant effect of the lives of patients and that it is a measure used to determine the quality of care at a clinic, it is target that can have a large effect and could benefit from an improvement study.

This was a longitudinal quality improvement project led by the PGY1 Family Medicine residents starting in August 2020. Each of the 10 first year resident physicians conducted a month long Plan-Do-Study-Act (PDSA) cycle focused on improving the colorectal cancer screening rate. The project was measured by determining the percentage of patients in the age range each month after each PDSA cycle. Interventions included: placing reminders in the charts of patient due for screening, developing a questionnaire which allows the patient to see the various options for screening, checking patient panels to address gaps in care, and adapting established practices to include screening for colorectal cancer. As of December 2020, the rate of appropriate colorectal cancer screening improved to 55.4%.

Rossi, Lyda

Co-Author(s): Malashia Drummond

Mentor(s): Dr. Christopher Goodman, Dr. Emily Ridley, Dr. Linda Jaffa

Improving Naloxone-based Harm Reduction Within an Internal Medicine Ambulatory Care Center

Naloxone is a safe and effective medication for the reversal of opioid overdose. The FDA recommends prescribing naloxone for emergency home use to patients at increased risk of opioid overdose. Patients at increased risk include those prescribed opioid pain medications at 50 or greater morphine milligram equivalents (MME) per day or in combination with benzodiazepines, patients with a past or current diagnosis of opioid use disorder (OUD), or those with a history of opioid overdose. Our project seeks to gain understanding of the current state of naloxone-based harm reduction within Prisma Health's Internal Medicine Ambulatory Care Center through survey of both patients and physicians. We will apply those findings to elucidate the key drivers involved in the prescribing and appropriate use of at-home naloxone. Additionally, we will suggest multiple change measures with potential to improve harm reduction within the Internal Medicine Clinic.

Rossitch, Elizabeth

Mentor(s): Dr. Joe Myslinski

Revised Fundoscopic Exam Results in Quicker Evaluation of the Optic Disc in the Emergency Department

The fundoscopic exam can provide important clinical information, but is rarely performed in the emergency department because of the delays and poor success rates associated with the procedure. The traditional fundoscopic examination taught in medical school requires pharmacologic dilation of the pupils and an almost completely dark room, which leads to time delays in the emergency department. Our study describes a modified fundoscopic exam for the emergency department, where no medications are needed, the only equipment necessary is the direct ophthalmoscope, and it can be performed in the hallway. This revised fundoscopic exam (RFE) was easy to learn, was more rapid to perform than the traditional fundoscopic exam and demonstrated a high rate of success. Specifically, the mean time to visualize the optic disc was 64.86 seconds using the traditional fundoscopic exam and 21.40 seconds for the revised fundoscopic exam, yielding an average time difference of 43.46 seconds (Wilcoxon $p < 0.001$). We believe the simplicity and speed of the RFE will increase the utilization of the fundoscopic exam by emergency physicians, which is imperative in a medical specialty where the physician must evaluate patients accurately and in a timely fashion to optimize patient outcomes. The revised fundoscopic exam is ideal for assessing for acute end-organ damage or other life threatening conditions when a patient presents with headache, severe hypertension, visual complaints, or focal neurologic deficits.

Ruggiero, Christopher

Co-Author(s): Parmida Parsa, Jordan Pennington, Michaela Myers, Sidney Strauss, Michael Deaney

Mentor(s): Dr. Kamla Sanasi-Bhola

Impact of Student-Led Health Professional Training on Caring for the LGBTQ+ Community

Intro

Health professional students are often not comfortable caring for the diverse community encompassed by the acronym "LGBTQ+". Formalized training on LGBTQ+ healthcare is an important intervention to improve patient care as we embark towards the national goal of Ending the Epidemics. National and international medical bodies recommend culturally competent care. We propose that implementation of this student-led training will improve student confidence in providing culturally competent, equitable care to LGBTQ+ patients.

Methods

Student advocates from UofSC School of Medicine (SOM)- Columbia and College of Pharmacy (COP) constructed a pilot curriculum for health professional students with mentorship from faculty during 2020-2021. This training consisted of a 2-hour lecture (terminologies, healthcare disparities, and medical / surgical care) followed by a 1-hour interdisciplinary panel (providers and patients). Advertised across select campuses- SOM, COP, College of Nursing, College of Informatics and Communications, and Department of Psychology were invited. Participants' perceptions and confidence pertaining to caring for the LGBTQ+ community were evaluated via RedCap® pre- and post-training questionnaires. Pronoun pins were distributed to participants, signaling awareness of and advocacy for LGBTQ+ patients.

Results

Participants who responded represented the COP (n=54) and SOM (n=5). The majority (78%) identified as heterosexual, 88% as cis-gendered, 85% as white, and 92% were <25 years old. Pre- and post-training, the average score for perception of preparedness for the clinical environment was 29% and 85% respectively. Pre-training, the average scores for perceived understanding of LGBTQ+ screening guidelines, routine healthcare needs, and available resources were 24%, 28%, and 37% respectively. Post-training, the average scores for these were approximately 75%. Roughly 90% would recommend that their program incorporate similar content.

Conclusions

Preliminary findings of this pilot indicate that focused, formalized didactics improves student confidence pertaining to caring for the LGBTQ+ community; thus such a curriculum has the potential to better prepare future providers. The paucity of representation on surveys indicates the need to facilitate further interdisciplinary efforts and training for health professional students in caring for the LGBTQ+ population. The curriculum will be tweaked based on evaluations and we will have sessions annually with more advertisement across campuses.

Rush, Sydney

Mentor(s): Mr. Noah Dargy, Dr. Samantha Cox, DO, FACS

Effect of Decreasing Glomerular Filtration Rate in Patients Undergoing Peripheral Vascular Intervention

Patients with peripheral vascular disease (PVD) are disproportionately impacted by end stage renal disease (ESRD). Critical limb-threatening ischemia is increased in prevalence in patients with ESRD compared to the general population. Despite this, no quantification of renal function with clinical outcomes in patients undergoing revascularization has been performed.

The preoperative glomerular filtration rates (GFR) of patients undergoing peripheral vascular intervention (PVI) were obtained by retrospective chart review in an urban community hospital in the Southeastern United States from January 2014 to May 2019. Patients were excluded from the study if postoperative vascular lab studies were not completed, or if one year follow-up was not obtained. A Cox regression was then utilized to calculate the hazard ratios for mortality and retreatment rates in respect to preoperative GFR.

A total of 267 patients underwent PVI. The average GFR was 64.4 mL/min/1.73m² with a standard deviation of 34.0 mL/min/1.73m². Of this population, 38 patients or 18.1% experienced death within one year. Additionally, 42 patients or 20.0% needed endovascular retreatment. A hazard ratio for mortality and retreatment rates were calculated with values of 0.968 and 0.987 respectively indicating a 3.2% reduced risk of mortality and a 1.3% reduction in retreatment per unit of GFR.

Decreasing GFR in patients undergoing PVI is associated with increased retreatment rates and mortality. Higher retreatment rates increase the hospital system's burden, while higher mortality decreases the quality of care being provided. In addition to exploration of medical management, additional research examining potential biochemical pathways should be pursued.

Saleeb, Rony

Co-Author(s): Milaan Shah

Mentor(s): Dr. Alvin Day

Blau syndrome associated with a heterozygous NOD2 mutation.

Blau syndrome is a rare, genetic, systemic inflammatory disease that generally presents in early childhood with granulomatous dermatitis, inflammatory arthritis, and uveitis. Blau syndrome is believed to follow an autosomal dominant inheritance pattern and is typically caused by homozygous gain of function mutations of the NOD2/CARD15 gene. NOD2/CARD15 normally activates nuclear factor-kappa B and other genes controlling innate immune and inflammatory responses. We present a case suggesting the possibility of an alternative mechanism of disease inheritance: a heterozygous mutation of NOD2.

A 40-year-old male with Blau syndrome followed in the rheumatology clinic requested comprehensive genetic testing. He initially presented in early childhood with widespread dermatitis. His symptoms improved with sunlight exposure, but he later developed uveitis. He was evaluated at a major academic medical center and found to have no evidence of sarcoidosis or other systemic rheumatic disease. His symptoms further progressed to low back, bilateral hip, knee, and ankle inflammatory arthritis. His sister eventually developed similar symptoms. With the triad of dermatitis, uveitis, and inflammatory arthritis, the seronegative workup, and a familial component, Blau syndrome was diagnosed. After various changes in medications, his symptoms were eventually well controlled with infliximab and methotrexate. Genetic testing revealed a heterozygous mutation in the NOD2 gene [variant c.1144G>A (p.Asp382Asn)], and his sister's genetic test showed the same variant.

This case demonstrates an atypical gene mutation carried by a patient with Blau syndrome. After a thorough literature search, only a limited number of other cases demonstrated novel heterozygous mutation variants associated with Blau syndrome. While the association of NOD2/CARD15 mutations and Blau syndrome has been established, the mechanism underlying the disease process and the full spectrum of mutations that can precipitate the condition remain incompletely understood. Thus, further investigation is warranted.

Saleeb, Rony

Co-Author(s): Milaan Shah

Mentor(s): Dr. Andrew Sides

Type 1 Renal Tubular Acidosis in a Twin Pregnancy

Distal Renal Tubular Acidosis (RTA), also known as Type 1 RTA, is a chronic metabolic acidosis precipitated by impaired acidification of the distal renal tubule due to defects in the transportation of H⁺. Distal RTA can be a manifestation of Sjögren's syndrome, Lupus, diabetes mellitus, or sickle cell disease, but in certain instances, the cause may be unknown.

This case describes a 38 year-old African American G3P2002 at 32 weeks with a twin pregnancy who presented with two weeks of persistent shortness of breath, nausea, and vomiting. Initial lab work revealed that she had a pH of 7.31, pCO₂ of 18, an anion gap and non-anion gap metabolic acidosis, respiratory alkalosis, and hypokalemia. After initial resuscitation, the anion gap metabolic acidosis resolved- which was likely from starvation ketoacidosis due to her prolonged nausea and lack of appetite- but her non-anion gap metabolic acidosis and urine anion gap persisted. Review of her previous lab works indicate that her bicarbonate has been consistently low with values ranging from 14-18. Based off of her presentation and previous lab values, she was diagnosed with a distal RTA. A comprehensive workup for an underlying

ing condition causing the RTA, including an autoimmune panel, metabolic and toxicology screenings, and imaging for structural renal defects, has not yet identified a cause. Furthermore, the patient has no PMH or FH of any autoimmune conditions or acidemia. With no other cause currently evident, we theorize that her distal RTA may be attributable to an elevated progesterone level, as she has a multiple pregnancy. This case demonstrates a case of renal pathology that is rarely seen in pregnant women. Furthermore, the development of distal tubule dysfunction is generally a manifestation of another medical condition, but initial workup has failed to identify a potential precipitant. After a thorough review of the literature, we have found no other cases that demonstrate Type 1 RTA in a pregnant woman.

Schammel, Noah

Mentor(s): Dr. Stephen Reinartz, Dr. Christine Schammel

The Value of the Third Ventricular Width: under-reporting of brain atrophy

Abstract

Background

As the population ages, it is estimated that 65.7 million will be living with dementia by 2030. Early detection and initiation of actionable protocols are key to combat the effects of this disease. The third ventricular width has been noted to correlate with normal advancing age as well as current and future cognitive decline; however, the status of ventricular width is seldom noted in radiology reports to alert clinicians to intervene.

Purpose

The goal of this study was to illustrate the utility of third ventricle measurements, update reference values and encourage identification/reporting of at risk patients.

Methods

Brain CT/MRIs with optimal ventricular measurements for age at a single institution (3/1/2016-6/1/2019) were evaluated. Ventricular measurement and clinicopathologic data were collected blinded to each other. Data were combined and analyzed.

Results

Overall, 149 optimal brain CT scans/MRIs were evaluated. Age range was 22-99 (mean 74 years); the mean third ventricular width was 5.2mm. Stratification by decade revealed the optimal ventricular width ranges for each decade: <50 1.8-2.8mm, 50-59 2.7-4mm, 60-69 2.4-4.2mm, 70-79 4.2-5.5mm, 80-89 5.7-7.1 and >90 6.3-9.1mm. The differences between the 7th, 8th and 9th decades were significantly different when compared to each other ($p<0.001$). Optimal ranges were compared to the literature. The data collected were within previously reported ranges, but modifies 'normal' or 'average' to 'optimal' for each decade >50.

Conclusion

Conclusion

We propose a simple approach to identifying and reporting brain atrophy in a consistent manner, and have suggested redefining ranges from 'normal' to 'optimal' for decade of age.

Radiologists are encouraged to report this measurement in 'impressions', allowing clinicians to begin early intervention for patients outside of the optimal range to hopefully minimize/alleviate cognitive decline.

Schammel, Noah

Mentor(s): Dr. Lee Madeline, Dr. Christine Schammel

Obstructive Sleep Apnea and White Matter Hyperintensities: correlation or causation?

Obstructive sleep apnea (apnea) is thought to cause small vessel ischemic episodes in the brain from hypoxic events, postulated as white matter hyperintensities (hyperintensities) identified on MRI which have been implicated in cognitive dysfunction and decline. This study sought to evaluate these correlations. A

retrospective evaluation of adults who underwent polysomnography and a brain MRI between 4/1/2016 and 4/30/2017 (n=72) was completed. MRI evaluation of hyperintensities using Fazekas scores were collected blind of clinical data. Collated clinical/MRI data were stratified and then analyzed using chi-square, fishers t-tests, ANOVA and linear regression. Stratification by apnea category revealed no differences in demographics, clinicopathologic or comorbidities; none of the hyperintensity measures were significantly different. Similarly, stratification by BMI and hypertension did not expose indicators of apnea differences. Mean Fazekas (2.09; p=0.0032) and deep hyperintensities (1.22; p=0.008) were different with hypertension stratification. Stratification by Fazekas, periventricular hyperintensities and deep hyperintensities revealed increasing incidence and classification with age (p=0.0001), while hypertension and hyperlipidemia were significantly different between Fazekas (p=0.0032 and p=0.0005, respectively) and deep hyperintensity groups (p=0.0008 and p=0.0005, respectively). Hyperlipidemia was significant between periventricular hyperintensities classifications (p=0.0076). No association between total hyperintensities, periventricular hyperintensities, or deep hyperintensities and apneas were identified. Hypertension and hyperlipidemia are significantly associated with both Fazekas and deep hyperintensities, with periventricular hyperintensities significantly associated with hyperlipidemia only, suggesting small vessel atherosclerosis may play a role in the development of hyperintensities. Unanticipated, our results may provide insight into future study design for evaluating these clandestine but ubiquitous white matter findings.

Sealy, Emily

Mentor(s): Dr. Christine Schammel, Dr. Michael Devane

Embolization of Corona Mortis in the Setting of Pelvic Trauma: A Case Series

The corona mortis is an anatomic variant that involves anastomosis between the internal and external iliac systems, which lies posteriorly over the superior pubic ramus. Given its location, the corona mortis is at risk for injury in pelvic trauma and a variety of pelvic surgeries, including acetabular fracture repair, inguinal hernia repair, radical cystectomy, Burch colposuspension, and mid-urethral sling placement. Here, we present two cases of hemorrhage from the corona mortis in the setting of pelvic trauma that were successfully treated using catheter-guided embolization.

Shah, Milaan

Mentor(s): Dr. Vimal Amin

A case of an unusually large foreign body in the esophagus with a prolonged clinical course.

The ingestion of foreign bodies is common, and the esophagus is the most common site of impaction. Foreign objects that become lodged in the esophagus can lead to dysphagia, odynophagia, and perforation. They must be addressed immediately and with caution in order to prevent negative long term outcomes. In this particular case, a patient unknowingly and accidentally ingested a Corona beer cap that became lodged in the esophagus for 6 weeks with minimal symptoms.

A 48-year-old male presented with dysphagia after an evening of excessive alcohol consumption. The patient reported that he had been "shotgunning" beers when the pain began and initially believed that he had swallowed an ice cube. His symptoms persisted for 6 weeks, so the patient appeared for consultation where an upper endoscopy was done. Endoscopy revealed that the patient had ingested a corona premier beer cap, which had become embedded into the proximal esophagus, distal to the upper esophageal sphincter. At a tertiary care center, endoscopic submucosal dissection was performed with ENT surgery availability in the event of complications. After successful removal, a subsequent CT esophagram showed a microperforation, but it healed spontaneously following antibiotics and NPO. The patient was followed for another 6 months with no complications and, overall, suffered minimal long-term structural damage. In conclusion, this case outlines the steps we took to successful treat an uncommon and difficult foreign body impaction. The removal of this foreign body was complicated by location, duration of impaction, depth of impaction, and the subsequent presence of a microperforation. This case highlights the potential

benefit of using minimally invasive endoscopic removal as the initial approach to foreign body removal, and it also emphasizes the importance of having ENT surgery available as backup when approaching high risk esophageal obstructions with the potential for perforation.

Shah, Milaan

Mentor(s): Ms. Mary Boulware, Dr. Vani Gopalareddy

Liver failure in neonates with G6PD Deficiency

Case#1- 6 wk old male presented with jaundice, pigmented stools. TB 6.6, DB 4.1. AST 532 ALT 244 ALP 593 GGTP 25. INR was 1.7; normalized with Vit K. Extensive work-up for cholestasis was negative. Liver biopsy showed idiopathic neonatal giant cell hepatitis; no fibrosis. Whole Exome sequencing revealed X-linked G6PD deficiency. Started Actigall. At 6 months age TB peaked at 28, DB 18.6. AST 1016 and ALT 230. INR 2.8, ammonia over 120, retic count >120. Received OLT.

Case#2- Newborn female was jaundiced at birth; TB 14.1 DB 8.5 at 9 hours of life. ALT 108 and AST 262. GGT normal. Initial Hgb was 13.5. Retic count elevated at 19%. Direct coombs negative. Stool pigmented. Extensive cholestasis workup negative. Actigall started. Liver Biopsy showed non-specific giant cell hepatitis with erythropoiesis. Hemolytic anemia panel positive for G6PD deficiency. At 6 weeks age TB peaked at 37 and DB 15.5. INR was 1.9 Hgb: 9.9, albumin 2.9 and developed refractory ascites needing OLT.

Discussion: It has been established that severe cases of G6PD deficiency can cause damage to kidneys, but its impact on liver function is poorly understood. Our neonates presented with cholestatic jaundice that wouldn't resolve with Ursodiol. It was discovered that both babies had chronic- low grade hemolysis and compromised liver function in the setting of G6PD deficiency. Neonates with G6PD deficiency have been found to have elevated levels of AST, ALT, and INR within 7 days of birth without any significant precipitating hemolytic event and/or trauma. This may suggest that the compromised liver function is attributed to G6PD deficiency. However, the impact of G6PD deficiency on the liver is not well established and requires further attention. In conclusion, G6PD deficiency can be associated with liver dysfunction, serving as a possible cofactor in the setting of progressive liver failure/ chronic liver disease. While it isn't known if the G6PD deficiency contributed to the development of liver failure, our cases underscore the importance of monitoring liver function in these neonates.

Shah, Smit

Mentor(s): Dr. Souvik Sen

Evaluation of Developmental Venous Anomaly with Capillary Telangiectasia: A Case Report

Developmental Venous Anomalies (DVAs) are benign radially arranged medullary veins that are interspersed in the normal brain parenchyma, mostly within white matter that act as venous conduits into superficial, central or deep veins. They are most commonly found supratentorially with frontal lobe predominance with rare occurrences in caudal neural-axis including brain stem or spinal cord. However, their co-existence with Capillary Telangiectasia has been infrequently reported. In this case report, we discuss an interesting clinical presentation and imaging findings of a 64-year-old male who initially presented with symptoms of Transient Ischemic Attack (TIA) and was later found to have supratentorial DVA with Capillary Telangiectasia. Main goal and purpose of this case report is to give readers an overview on this very interesting clinical presentation that was masqueraded by left periventricular DVA with associated Capillary Telangiectasia.

Shin, Caroline

Mentor(s): Dr. Brian Clow

ANCA Negative Pauci-Immune Crescentic Glomerulonephritis with Necrotizing Vasculitis

Pauci-immune crescentic glomerulonephritis is one of the most common causes of rapidly progressive

glomerulonephritis with majority of these patients being ANCA positive. ANCA negativity is less common than ANCA positivity. Subsequently, there is less information on patient populations that are ANCA negative in pauci-immune crescentic glomerulonephritis.

A 36-year-old male presented with 2 days of abdominal pain and worsening nausea and vomiting. He denied diarrhea, fever, chills, chest pain, shortness of breath, and sick contacts, but he had noticed anorexia and fatigue. When he was evaluated in the emergency room, he was found to have elevated BUN and creatinine that persisted despite fluid resuscitation.

He immigrated from Brazil 2 years ago, with no recent travel out of the country.

Significant labs included BUN of 62 mg/dL and creatinine of 6.26 mg/dL. Nephrology was consulted for urgent hemodialysis.

Light microscopy of a renal biopsy with 16 glomeruli for evaluation showed 3 glomeruli that were globally sclerotic, 1 glomerulus with an area of segmental sclerosis, 9 glomeruli with crescent formation.

Extensive workup included cANCA, pANCA, MPO/PR3, GBM, ANA antibody screen, HIV, HBV, and HCV screen, all of which were negative. Treatment included high dose pulsed IV methylprednisolone that was tapered and transitioned to oral prednisone along with receiving rituximab. Despite treatment, patient continued to worsen and required transfer to ICU. His hospital course of stay was complicated by microangiopathic hemolytic anemia, acute hypoxic respiratory failure, upper GI bleed secondary to esophageal ulceration/gastritis/duodenitis, IgG monoclonal gammopathy, and thrombocytopenia. Nephrology, hematology/oncology, rheumatology, and gastroenterology were consulted and felt that his complications were likely due to associated necrotizing vasculitis. The previously recommended treatment of original regimen of steroids and rituximab was maintained, as patients with ANCA negative pauci-immune crescentic glomerulonephritis are treated similarly to those that are ANCA positive. Patient was not a candidate for outpatient dialysis due to his immigration status. He was discharged with plans to return to Brazil for dialysis needs.

Ultimately, this case exemplifies the need to identify characteristics, disease course, and treatment more specific to patients that are ANCA negative.

Siebert, Jason

Co-Author(s): Cara Joseph

Mentor(s): Dr. Christopher Zust

Atypical Myasthenia Gravis with Muscle Specific Tyrosine Kinase Receptor Antibodies: A Case Report

Myasthenia gravis is a neuromuscular disease that presents with decreased muscle strength over the course of a day. Most commonly, this disorder is due to post-synaptic acetylcholine receptor antibodies that are initially outcompeted by native acetylcholine, but predominate after acetylcholine is broken down by acetylcholinesterase. These Ach antibodies are found in 80-90% of patients with generalized myasthenic disease. However, a small number of patients will be seronegative for Ach antibodies. In 38-50% of patients with generalized myasthenia without Ach antibodies, the patients will be positive for a muscle-specific receptor tyrosine kinase (or MuSK). These patients can present with fewer ocular symptoms, isolated head drop, or can be indistinguishable from Ach seropositive myasthenia. Ach and MuSK seropositive myasthenia both share diaphragmatic paralysis as a feared life-threatening complication. In this case report, we report on a 71 year old male who presented to the emergency room with shortness of breath that was later found to have bilateral diaphragmatic paralysis without any physical exam findings

of disseminated myasthenia. As this patient was later found to have MuSK antibody myasthenia gravis that was almost entirely manifested at his diaphragm, we believe that this patient will help further the understanding of MuSK antibody myasthenia gravis and provide an atypical presentation of MuSK antibody myasthenia gravis to the scientific community.

Siebert, Jason

Mentor(s): Dr. Elizabeth Ramsey, Dr. William Greenberg, Dr. Brian Kluge, Dr. Divya Ahuja

Progressive Multifocal Leukoencephalopathy in a Newly Diagnosed Patient with HIV/AIDS: A Case Report

Progressive multifocal leukoencephalopathy (PML) is a severe demyelinating disease of the central nervous system caused by the reactivation of the JC polyomavirus. Asymptomatic primary infection generally occurs in children and remains latent in the kidneys and lymphoid organs with antibodies to the virus found in 86% of adults. However, in the context of profound immunosuppression, JC virus can reactivate causing PML. Here we report on a 27-year-old male who presented to the ED with a chief complaint of difficulty driving. One week before admission the patient experienced worsening headaches that led to one episode of non-bloody, non-bilious emesis, blurry vision, and worsening paresthesia that led to alteration in gait. Imaging findings obtained at admission were concerning for PML. He was then diagnosed with HIV and found to have a CD4 count that was less than 35. He was found to have an additional penile ulceration that was empirically treated with antiviral medications for presumed herpes infection. Further investigation was undertaken to include lumbar puncture sampling of cerebrospinal fluid and serum testing. Unfortunately, due to lab error, the CSF sample was not sent properly. Serum results showed JC virus positivity. The patient then left the hospital and presented to another facility seven days later with continued neurologic complaints. He had progression of imaging findings. This patient was previously undiagnosed with HIV and his first physical manifestations were secondary to this presumed PML. As such, it is important to keep these devastating although exceedingly rare complications on the differential when caring for any HIV patient with a new neurologic deficit.

Sivakumar, Nivedita

Co-Author(s): Blake Sloan

Mentor(s): Dr. Jack DePriest

Fluid Overload in the Intensive Care Unit: Are the Drips Going Too Hard?

Define: Intravenous (IV) fluid therapy is a cornerstone of treatment for patients admitted to the medical intensive care unit (MICU). During the early stages of shock, isotonic fluids help restore intravascular volume and perfusion to vital organs. However, many patients also receive IV fluids through other sources, including vasopressors, antibiotics, corticosteroids, etc. These medications routinely add up to several liters of fluid a day leading to significant fluid overload (FO), which has a strong association with higher mortality rates and longer hospital length-of-stay. Norepinephrine is the most common high-volume critical infusions used in the MICU.

Measure: Through a retrospective chart review, we identified patients admitted to the PRISMA Health Richland (PHR)-Midlands hospital MICU between the years of 2019-2020 receiving norepinephrine (NE) >15mcg/min. We analyzed the total amount of overall volume of fluids the patient received, the amount of time the patient was on NE, and the amount of time to switch from standard premix NE concentration.

Analyze: There is significant variation in practice for max-concentrating NE in patients receiving high doses. There is a clear opportunity to help minimize volume exposure from this critical drug. Key issues to address are lack of knowledge about the impact of fluid overload in the critically ill as well as no systematic process for triggering an order to max-concentrate NE when infusions reach high levels

Improve: We will address the knowledge issue with nursing education, working through their Unit-based Council. This will include a narrated PowerPoint that nurses can review at their convenience. We will work with pharmacy and IT to explore options for building triggers into the EMR so that when a patient reaches a threshold dose a message is sent to the patient's nurse to see if the NE should be concentrated.

Control: At 3 months we will prospectively review 20 patients requiring high-dose NE.

Smith, Loren

Co-Author(s): Hannah Moreland

Mentor(s): Dr. Timothy Averch

Quality Improvement Initiative to Optimize Outpatient Triage Workflow and Reduce Burnout

Our rapidly expanding urology practice increased to eight providers in under two-years' time with a corresponding growth in patient volume. Triage personnel reported an untenable escalation in workload with mounting burnout representing an opportunity for process improvement. The SMART (specific, measurable, achievable, realistic, timely) aim for this project was to reduce the frequency and duration of triage calls, increase the appropriateness of call content, and improve the well-being of the triage staff.

Starting September 2020 using Plan-Do-Study-Act (PDSA) quality improvement (QI) methodology, a multiprofessional team iteratively identified systems-level processes available for refinement, leading to optimized triage workflow. Quantitative and qualitative data were obtained sequentially through five phases. Data were collected through a multidisciplinary approach including triage call logs, direct observation, and one-on-one collaboration sessions. Triage personnel were surveyed periodically using an anonymous, validated, repeatable instrument.

After five PDSA cycles, triage noted a reduction in call volume by 403 calls (20.3% reduction) with a median call duration of 58 seconds (21.1% reduction), down from a baseline of 1,986 calls with median call duration 73.5 seconds. Restructuring and refinement of the clinical phone tree (PDSA 1-2) and standardized management of non-urgent calls to triage not warranting triage attention (PDSA 3) contributed to the improvement. Notably, five call categories deemed inappropriate for triage were eliminated after the application of PDSA process improvement. Further modifications based on collected survey responses aimed to create a culture of recognition. They included triage interior redesign (PDSA 4), patient paperwork reallocation outside of triage (PDSA 5), and a patient education handout covering a common triage call topic (current PDSA). The latter refinements increased job satisfaction (20%), workload manageability, and fostered greater congruence between job expectations and triage duties.

Small changes to the structure of the work and communication environment resulted in measurable improvements in both call volume and employee satisfaction. Relatively few systems factors were responsible for a majority of triage concerns. Further interventions, including implementing a monthly QI meeting, optimizing use of the patient portal, and improving staffing resource allocation are needed to actualize further employee satisfaction.

Snedecor, Kelsey

Mentor(s): Dr. Heather Staples

Long Winded: A quality improvement project to increase the usage and understanding of Asthma Action Plans in the pediatric inpatient setting

Asthma is one of the most common chronic diseases in pediatrics, affecting more than 5.5 million children and adolescents in the US in 20181. Studies have repeatedly shown that Asthma Action Plans improve

health care outcomes.^{9,15} The goal of this quality improvement project was to improve the frequency and patient understanding of asthma action plans for patients admitted to the Children's Hospital with an asthma-related illness. Residents were provided with the new AAP and were taught correct dosing and usage of medications. The new AAPs had a Flesch-Kincaid Readability score of 5.9, which is below the 6th grade reading level. The original Children's Hospital APP had a score of 7.5.¹³ Residents were provided with pre- and post-surveys assessing the percentages of asthma action plans (AAPs) provided to patients at discharge, percentage of teaching provided by the residents to the families, and barriers to providing the plans to patients. Two PDSA cycles ran from Jan-March 2020. Pre-intervention, only 22% of residents were giving out written asthma action plans (AAPs) >75% of the time. During the first cycle, this increased to 70% and 66% after cycle 2. Only 26% of residents reported taking the time to teach the plans to patients and their families >75% of the time. This increased to 60% after PDSA-1 and 66% after PDSA-2. Initially, 17% of residents believed that the patient and their families understood >75% of the information on the AAP. After the first cycle, this number increased to 60% after PDSA-1 and 66% after PDSA-2. The two most common barriers for residents were forgetfulness and time constraints. Time constraints decreased to 20% after two cycles, but forgetfulness was still common. At the end of cycle 2, 100% of residents reported that they liked the new AAP and found it more convenient. The new format of the action plan used in this study improved resident compliance and decreased the time spent filling out the plans. It also reemphasized that low literacy, updated, and customized plans help asthmatic patients and their families better understand their disease and manage medications.

Spangler, Daniel

Mentor(s): Dr. Robert Eller

Left Subclavian Pseudoaneurysm: A Case of Palsies in the Recurrent Laryngeal Nerve, Phrenic Nerve, and Brachial Plexus

A patient developed a subclavian pseudoaneurysm following placement of an intravascular catheter for cancer treatment. The patient presented with palsies in the phrenic nerve, brachial plexus, and recurrent laryngeal nerve. This is a rare presentation, similar to Ortner's syndrome, which has not been previously presented in the literature. Furthermore, this case highlights the importance of early laryngoscopy in patients with persistent voice change, especially after a neck procedure.

Stanley, Dr. Robert

Co-Author(s): Courtney Peterson

Mentor(s): Dr. William Richardson

Massive Overdose of Oral Vancomycin for C. Difficile Infection in a Patient on Hemodialysis: A Case Report

INTRODUCTION

Clostridium difficile infections [CDI] are a significant cause of morbidity in hospitalized patients and those with chronic illnesses. First line treatment for initial and first recurrence of CDI is oral vancomycin [OV]. Oral vancomycin is known to be poorly absorbed via the GI tract which makes it an excellent choice when treating CDI. Normal dosages of OV are 125mg 4 times a day. There have been, however, studies and numerous case reports that demonstrate risk factors for significant absorption of oral vancomycin from the GI tract, such as patients with renal insufficiency, conditions causing significant inflammation of the GI tract, and those taking large doses (>500mg/day).

CASE DESCRIPTION

A 56-year-old female with a past medical history of ESRD [end-stage renal disease] on hemodialysis, hypertension, HIV, and recurrent C. Difficile infection, presented to the emergency department after taking 3.75g of OV twice on consecutive days. She was prescribed 150mg of OV twice a day, but states she was confused about the instructions for her new formulary of OV. The patient did endorse some loose stool

after the large doses of OV, however, denied any other complaints. She denied any abdominal pain, hematochezia, melena, nausea, vomiting, symptoms of ototoxicity, or headache. Laboratory work up revealed unremarkable electrolytes and renal function consistent with the patient's baseline ESRD. Serum vancomycin levels revealed no detectable vancomycin. The patient was educated by our emergency department pharmacist on the proper preparation and administration of the new formulary of vancomycin.

DISCUSSION

This case demonstrates the lack of systemic absorption of an extremely large dose of OV (7.5g over two days) in a patient with multiple risk factors that have been documented in numerous studies and case reports as being associated with systemic absorption of OV: large doses, renal insufficiency, and inflammation of the GI tract. To our knowledge this is the largest unintentional amount of OV taken by a patient that demonstrated no systemic absorption and no clinical signs of toxicity. This case also highlights the importance of communication with patients, providers, pharmacists, and other allied health professionals when medication formularies are being changed.

Stoddard Astemborski, Caroline

Mentor(s): Dr. Sara Dimeo

Innovations of a Virtual Escape Room

Emergency medicine (EM) educators have employed in-person escape rooms in graduate medical education to promote active learning, teamwork, leadership, critical thinking, and communication skills. Due to physical distancing guidelines put in place by the COVID-19 pandemic, we sought to apply these same themes to a novel digital learning environment during virtual education conference focusing on toxidrome presentations including lithium toxicity, drugs of abuse, serotonin syndrome and neuroleptic malignant syndrome. Objectives of the learning innovations: engaging resident learners during didactic conference using a virtual escape room during the COVID-19 pandemic, apply knowledge of common toxidromes to clinical scenarios and collaborate with team members in a socially synchronized manner to escape the activity. EM residents were divided into breakout rooms of three residents and three medical students. They had a 30 mins time limit, with up to 3 hints to solve three puzzles. Rules were explained and each group was given a google form puzzle introducing the "Cruise Line Escape" storyline. The answer to the first puzzle was a code that was then used to "unlock" a Google Form. Afterwards, facilitators debriefed the learning objectives for 20 minutes. EM residents completed a post-session survey utilizing a 5-point Likert scale. The survey had overall positive results. Residents reports that overall they found the activity stimulating and engaging. Residents reported that they would like to see similar activity in the future. Selected comments include that the activity "required application of knowledge while allowing resident interaction". For future improvement, learners would have like more time, and small groups. Faculty noted good interaction between class levels, with upper-level residents explaining concepts to junior learners. Learners find virtual escape rooms using Google Forms to be an engaging method of didactics during the age of the COVID-19 pandemic, albeit with potentially slightly less social engagement than an in-person escape room. Facilitators should explain game rules to clearly to learners, ensure groups with no more than 3-4 learners of varying PGY levels, and give adequate time for the game and debrief (at least 90 minutes) to ensure success.

Stowasser, Victoria

Mentor(s): Dr. Wenbin Tan

Pseudotyped lentivirus bearing Spike protein of SARS-CoV-2 for infection in human kidney and endothelial cells

The novel coronavirus SARS-CoV-2 caused COVID-19, a pandemic resulting in multiple million infections and deaths. Lacking human protective immunity, the virus can proliferate unhindered, primarily in infected tissues. The first step of SARS-CoV-2 entry into host cells is binding of viral transmembrane

glycoprotein, SPIKE (S) protein, to host cell membrane receptors, angiotensin-I converting enzyme 2 (ACE2) or neuropillin-1 (Nrp1). Cholesterol has been reported necessary for early SARS virus replication. Elucidation of this viral entry mechanism is paramount in predicting patient outcomes and influencing patient care decisions with regards to pre-existing comorbidities. This research investigated the infection mechanism of SARS-CoV-2 virus in various cell lines by elucidating the role of cholesterol, LDL-c and LDL receptors, in facilitation of infection. It was hypothesized that dermal microvascular endothelial cells (hDMVEC) and kidney cells (HEK293) exposed to a Spike protein-bearing lentivirus would demonstrate greater infection rates. Furthermore, LDL-c could facilitate entry of Spike protein-bearing lentivirus into host cells. In an experimental study, a SARS-CoV-2 Spike protein-pseudotyped (CoV-Spp) lentivirus was developed to mimic the infection mechanism of SARS-CoV-2. A lentivirus using a helper vector expressing VSV-G was generated as a control. Both CoV-Spp and VSV-G lentiviruses carry the mCherry reporter gene. HEK293 and dermal hDMVECs were cultured and exposed to either the CoV-Spp or VSV-G lentivirus with or without pre-incubation of LDL-c. Cells were lysed to extract RNAs and reversely transcribed into cDNAs. Cellular uptake of pseudotyped lentivirus was determined by quantification of mCherry gene using RT-PCR. Data showed CoV-Spp rendered higher rates of infection than VSV-G lentivirus in both cell lines. Additionally, LDL-c significantly increased the infectious rates of CoV-Spp and VSV-G into hDMVECs. The hDMVECs demonstrated more consistent rises in infection rate with the addition of the LDL-c, probably due to varying abundance of LDL-c receptor between the two cell types. Data confirmed that LDL-c could enhance SARS-CoV-2 entry into endothelial cells. However, the detailed mechanism remains elusive; which will be explored in future studies. These findings confirm that hypercholesterolemia promotes SARS-CoV-2 infectivity, thus worsening patient's outcomes. These findings will benefit physicians when projecting patient health outcomes.

Strandholm, Sarah

Mentor(s): Dr. Sudha Garimella

Impact of melatonin on blood pressures in children undergoing ambulatory blood pressure monitoring (ABPM)

Background: ABPM has become the standard of care for diagnosing pediatric hypertension. The use of sleep aids like melatonin is on the rise in children, especially due to COVID-19 related stress and loss of routines. In a survey in May 2020, over 50% of parents had given melatonin to their child. Melatonin has been reported to exert anti-hypertensive effects in adults with metabolic disorders, pre-eclampsia and sleep disorders. It's effects on blood pressure have not been well described in children.

Objective: Analyze impact of melatonin in children undergoing ABPM and describe the association between Body Mass Index percentiles, use of melatonin, and abnormal systolic/diastolic BP, nocturnal hypertension and non-dipping.

Design/Methods: We conducted a retrospective chart analysis of patients ages 4-21 years who underwent an ABPM study using SpaceLabs 90217® between January 2018-June 2019 at a pediatric hypertension clinic. Children with known cardiac disease, chronic kidney disease, or on dialysis were excluded. 377 records were evaluated. 300 children were not taking hypertension medications. Sub-analysis of this group was conducted for melatonin usage. Continuous variables are reported as mean (standard deviation). Discrete variables are reported as N (%). Differences between the groups were tested using ANOVA and Kruskal-Wallis test. Discrete variables were tested using Chi-square test. All analyses were carried out using R statistical software.

Results: 6% of our cohort was on prescription melatonin. Use of melatonin was more prevalent in children with higher BMI (Fig1). In our cohort, there was no influence of BMI on dipping status (Table 1). Children taking melatonin were not any more or less likely to have abnormal dip, higher systolic or diastolic BP on average or systolic load (Table2).

Conclusion(s): Melatonin usage is more prevalent in those with higher BMI. While Melatonin may attenuate hypertension in adults, our study did not demonstrate an effect of Melatonin usage on blood pressures

in children. Use of melatonin is increasing and its effect on BP must be better described with a prospective study and at differing doses.

Suchy, Christine

Mentor(s): Dr. Christine Schammel

Breast Cancer Metastasizing to the GI Tract

Breast cancer metastasis to the gastrointestinal (GI) tract is rare. Takeuchi et al. reported metastasis of breast cancer to the gastrointestinal tract (GI) in less than 1%, or only 17 of 2,604 cases over an 18-year period. The most common sites of breast cancer metastasis are bones, lungs, the central nervous system, and the liver with few reports of GI involvement (7). Using data from current literature, the most common areas of GI involvement are the upper GI tract including the stomach and small intestine. The lower GI tract, including the colon and rectum, are less commonly affected. Infiltrating lobular carcinomas are more commonly associated with metastasis to the GI tract (5), whereas invasive ductal carcinomas are more frequently associated with spread to the liver, lungs, and brain (3). According to Kim et al., invasive lobular carcinoma accounts for 83% of all metastases from malignant breast tumors (2). Furthermore, there is a low response rate to chemotherapy in infiltrating lobular carcinoma patients with a median survival rate of 2 years (4). This implies a poor prognosis, particularly for gastric metastasis. It is important to distinguish a primary gastrointestinal cancer from metastatic breast cancer in order to administer the appropriate treatment to the patient.

Teshon, Taylor

Mentor(s): Dr. Hannah Young, Dr. Amanda Moyer

A Comparison of Sodium Zirconium Cyclosilicate and Sodium Polystyrene Sulfonate in Adult, Hospitalized Patients with Hyperkalemia

Presentation Objective:

To compare the efficacy of sodium zirconium cyclosilicate (SZC) and sodium polystyrene sulfonate (SPS) in adult, hospitalized patients with hyperkalemia.

Background/Purpose:

SPS and SZC are potassium-binding agents with different cation-binding capabilities and onsets of action. There is no data directly comparing these agents. The purpose of this study was to determine if SZC lowers serum potassium levels more effectively than SPS in the treatment of acute hyperkalemia.

Methods:

A retrospective study was conducted among adult, hospitalized patients with acute hyperkalemia at Prisma Health Richland. Adult patients with hyperkalemia ($K > 5.2$ mEq/L) who received a study agent from September 2018 through August 2020 were included. Patients were mainly excluded if they were on renal replacement therapy; an insulin, bicarbonate, or loop diuretic continuous infusion; or chronic SZC/SPS. The primary objective was to determine if there was a difference in the number of patients who achieved normokalemia when comparing patients treated with SZC or SPS at 24 hours after drug administration. Secondary objectives included comparisons of absolute serum potassium reduction and the number of patients with life-threatening hyperkalemia ($K > 6.5$ mEq/L) who achieved normokalemia.

Results/Conclusions:

In Progress

Tsai, Y. Vivian

Mentor(s): Dr. P. Brandon Bookstaver

Predictive Factors for Treatment Success in Patients with Nontuberculous Mycobacterial Infections

Nontuberculous Mycobacterial (NTM) infections are associated with significant morbidity and mortality and often require protracted courses of antibiotics. The purpose of this study is to identify predictors of favorable treatment outcomes in patients with NTM infections. This was a retrospective, single-center, observational cohort study at Prisma Health Midlands that included patients at least 18 years of age with a positive culture for an NTM species from January 1, 2010 to June 30, 2020. Patients were excluded if they had a concurrent *M. tuberculosis* infection or a monomicrobial culture positive for *M. gordonae*. The primary endpoint of favorable treatment outcomes is defined as successful completion of prescriber-intended treatment course without death, rehospitalization or reinfection at 1 year. Multivariate logistic regression analysis will be used to assess factors associated with a favorable treatment outcomes. Frequency of and reasons for antibiotic regimen changes will be described.

Tucker, Klariz

Mentor(s): Dr. Roy Mathew

Drug-induced thrombotic microangiopathy from herbal healing drops containing silver and arsenic

Patient is a 65-year-old male who was sent by his PCP to the VA ED due to a recent lab finding of acute renal failure on chronic kidney disease that developed within the past two months. His baseline Cr was 1.7 and had risen to 15.9 at a primary care follow up two months later. Further work-up ruled out causes of hemolytic anemia: serum C3, C4, and C50 and feces negative for Shiga toxin. ADAMTS-13 was slightly below normal limits, but ANCA, platelet factor 4 antibody, Hepatitis A, B, and C, and HIV were negative. SPEP showed biclonal IgG lambda and IgG kappa spikes. Renal biopsy was completed and was sent for pathology. Pathology of renal tissue showed severe segmental sclerosis and greater than 80% interstitial inflammation and tubular atrophy in the renal cortex. One out of the three visualized glomeruli was globally sclerotic. Patient later revealed that he was taking 10 homeopathic drops given to him by his friend for the past 2 months. A full inductively coupled plasma mass spectrometry of the homeopathic drug that contained elements of Zinc 1.4 ug/g, Magnesium 1.9 ug/g, Arsenic 40.4 ug/g and silver 70.1 ug/g. The patient's presentation of acute kidney injury, thrombocytopenia and microangiopathic hemolytic is consistent with thrombotic microangiopathic anemia (TMA). Proximate exposure to a new pharmaceutical agent suggests the possibility of drug induced thrombotic microangiopathy (DITMA). Nutraceuticals are products commonly used for nutrition are also used as medicine that have physiological benefits or provide protection against chronic disease. However, unlike either foods or drugs, supplements do not need to be registered or approved by the FDA prior to production or sales. Arsenic and silver were substances found in this homeopathic supplement and most likely could have contributed to this patient's acute renal failure. Thus, nutraceuticals are not to be viewed as a benign treatment and it is always pertinent to review non-prescribed medications.

Verhoef, Adam

Mentor(s): Dr. Paul Bornemann

The Relationship between Eye Contact and Patient Satisfaction in Primary Care

While electronic medical records (EMR) have many advantages including improved reporting capabilities, care coordination, and quality management, they can present practical challenges in the clinical setting. Time restrictions on patient visits necessitate that providers actively use the EMR during patient visits, which may lead to decreased patient satisfaction overall. This study aims to determine if the duration of

eye contact between the provider and the patient during the visit impacts a patient's satisfaction with a provider in a primary care setting.

This pilot study analyzed 38 patient visits by X number of physicians at the Prisma Health Family Medicine Center. After patient consent, visits were video recorded remotely and subsequently analyzed for total visit time and patient/provider eye-contact time. Participants completed the validated Scale of Patient Overall Satisfaction with Primary Care Physicians, a ten-question survey, completed immediately after their visit. Patient satisfaction surveys were compared to how much time providers spent making eye contact with patients during their visits.

Overall, patients were highly satisfied with 80% giving their visit a perfect score (70/70) while 98% have scores of 60 and higher, denoting very high satisfaction. Doctors spent on average 48% of visit time making eye contact with patients. Spearman's rho coefficient was 0.467, with a P value >0.05, indicating no significant relationship between direct patient interaction and patient satisfaction.

Ultimately, this study was unable to establish a relationship between patient/provider eye contact and patient satisfaction. This is likely either related to the small sample size or the patient satisfaction survey that was used. Possible future directions for this research include increasing the number of enrolled subjects in the study. Another possibility is changing to a different satisfaction survey, as most patients gave their provider full marks and nearly all providers scored >60/70. A different satisfaction survey may be better suited to this patient population in elucidating the finer details about patient satisfaction.

Warren, Erin

Mentor(s): Dr. Brandon Bookstaver

Use of nafcillin plus ceftaroline in refractory methicillin-susceptible *Staphylococcus aureus* bacteremia: a case report

Objective: To evaluate if nafcillin plus ceftaroline is useful in treating refractory methicillin-susceptible *Staphylococcus aureus* (MSSA) bacteremia.

Patient Case: A 26-year-old man with a history of asthma and substance use disorder was transferred to our facility for MSSA bacteremia and tricuspid valve endocarditis diagnosed 10 days prior. Upon transfer, temperature was 100.2oF, heart rate 130s/min and WBC 21,000/mm³. Blood cultures were positive for MSSA on hospital day (HD) 1 and cefazolin 2 g IV every 8 hours was continued from transfer. Surgical intervention was not considered an option at that time. Blood cultures initially cleared on HD 3, although fevers persisted. On HDs 18 and 24, repeat blood cultures were again positive for MSSA, and the patient remained febrile, intermittently tachycardic with leukocytosis. On HD 24, cefazolin was discontinued and nafcillin 2 g IV every 4 hours was initiated. The following day (HD 25) ceftaroline 600 mg IV every 8 hours was initiated. Blood cultures on HD 28 were negative and the patient experienced resolution of fever and tachycardia. Ceftaroline was continued for 7 days. The patient had valvular repair on HD 31 and on HD 36 ceftaroline was discontinued. After 3 days (HD 39), therapy was changed back to cefazolin to complete a six week course. Blood cultures remained negative throughout hospitalization and patient was discharged with a one-time dose of dalbavancin 1500 mg IV on HD 60.

Discussion: Persistent MSSA bacteremia is common, however there are limited data on preferred management strategies. We present a novel case of combination nafcillin plus ceftaroline for refractory MSSA bacteremia. Ceftaroline is a unique cephalosporin with potent activity against MRSA due to affinity for penicillin binding protein (PBP) type 2a. When used for MSSA, it is thought to bind preferentially to PBP 2, with additional nonspecific binding to PBPs 1 and 3. Nafcillin exhibits non-specific binding to PBPs 1-3. The combination may be synergistic by saturating PBPs to maximize activity in a high burden infection. The addition of ceftaroline to nafcillin facilitated rapid clearance of bacteremia in a patient with persistent MSSA bacteremia. Follow-up in vitro study is warranted.

Warren, Erin

Co-Author(s): Courtney Lukitsch

Mentor(s): Dr. Christopher Goodman, Dr. Donna Ray

Drivers of Effective Quality Improvement Mentorship

Quality Improvement Education and Systems Training (QUEST) is a 7-month learning collaborative hosted by the University of South Carolina and Prisma Health and open to learners in all healthcare professions. QUEST pairs learners with mentors in clinical QI teams and provides structured content, tasks, and feedback culminating in poster presentations at UofSC Discover Day. In total, 45 students have completed the QUEST program resulting in 27 unique QI projects, and participation in QUEST has increased QI knowledge and readiness to team among participants. While the model has been successful in professional development for learners, mentorship development has received little attention. We know that mentors are crucial to project success; however, we do not know the specific and impactful knowledge, skills, and attitudes necessary for successful mentor-mentee relationships and, by extension, QUEST projects. Prior to any program changes related to mentorship development, we will conduct structured interviews with QUEST program mentors with the primary goal to identify drivers of successful QI mentorship and projects. Identifying and understanding the drivers of effective QI mentorship will allow the collaborative to equip mentors with the necessary tools to lead their teams well.

Welch, Madelyn

Mentor(s): Dr. Carlos Martinez

Mandibular Fracture Association with Incidence of Blunt Cerebrovascular Injuries

Background: The incidence of carotid injuries in blunt trauma is rare and often missed but may have life threatening complications. Currently, the Eastern Association for the Surgery of Trauma (EAST) guidelines recommend computer topography angiogram (CTA) for patients with complex mandibular and Lefort II and III fractures. Mandible fracture was added as a risk factor for blunt cerebrovascular injury (BCVI) in the expanded Denver criteria. The research aims of this study were identifying if certain mandible fracture patterns were associated with blunt carotid injuries and identifying the incidence of BCVI in patients with mandibular fractures.

Method: The Palmetto Health Trauma Registry provided a list of patients meeting the study criteria of all trauma patients admitted to Palmetto Health Richland from 1/1/2013 – 12/31/2019 who had a mandibular fracture and/or blunt carotid injury. Patients with BCVI but without mandibular fracture diagnosis and procedure code were included in order to review films for potentially missed fractures. Data was collected and verified by EMR. Study endpoints included mechanism of injury, mandibular fracture pattern, other facial fractures, and presence or absence of blunt carotid injury.

Results: A Wilcoxon rank-sum test was performed. Of mandibular fractures, the most common locations associated with BCVI were condyles (10.3%) and body (6.3%), more specifically the left condyle (12.5%) and right body (9.9%). The incidence of BCVI in patients with mandible fractures over the 7-year span was 3.8% with a 95% confidence interval of 0.024-0.058. For patients with other specified fractures, the incidence of BCVI was 60% for C1, 50% for C2, 50% for C3, and 30.77% for Le Fort III fractures. While confidence intervals for these additional fractures were wide, the elevated percentage suggests an association, which is consistent with previous screening protocols for BCVI.

Conclusion: While many studies have not published data on the risk of mandible fracture alone on incidence of BCVI, the 3.8% risk found in this study is consistent with existing literature. This suggests that current guidelines are useful and well suited for screening the patient population at Prisma Health. Next steps may involve developing a prospective screening protocol within the Prisma trauma department.

Wheeler, Evan

Mentor(s): Dr. Laura Nolting

Impact of COVID-19 Pandemic on Emergency Department Patient Volume

The SARS-Cov-2 pandemic prompted global quarantine operations in an effort to “flatten the curve” and reduce community transmission of the COVID-19 virus. It was reported that as emergency departments (EDs) in certain US cities, such as New York City, swelled beyond capacity with critically ill COVID-19 patients, there was a paucity of traditional emergencies like strokes and myocardial infarctions. On March 15, 2020, governor Henry McMaster announced the closure of all South Carolina public schools and expanded statewide quarantine efforts over the next several weeks to include a “home or work” order that stayed in effect until lifted on May 4, 2020. In this observational study, we compared rates of ED presentation for several categories of “traditional emergencies” including ST segment elevation myocardial infarction (STEMI), stroke, blunt and penetrating trauma and cardiopulmonary arrest. Data for each of these categories has been obtained from a single center (Prisma Health - Richland) in order to compare overall volume for each of these diagnoses during the eight week quarantine period to the same eight week window from the previous year. The aim of this study is to determine if ED volume at Prisma Health - Richland followed a similar reported downward trend during that window and if this difference is statistically significant or not.

White, MD, D. Zack

Co-Author(s): Matthew Gleaton, MD

Mentor(s): Dr. Morgan Rhodes, Dr. Andrew Vaughan, MD

How'd We Do? Rapid Telehealth Implementation in a Residency Clinic

Telehealth origins trace back to the very invention of the telephone with its forward evolution mirroring technological advancements in both computing and video, yet it took the public health emergency of the SARS-CoV-2 (COVID-19) pandemic to catalyze the rapid adoption of telemedicine by the U.S. healthcare system. Concerns for public safety as well as social distancing requirements prompted primary care clinics to rapidly integrate and shift patient interactions from in-person consultations to virtual visits via video and telephone modalities. Many primary care physicians had little training, if any, on utilizing telehealth for patient care, especially which very likely extends to clinics in which primary care trainees are cutting their teeth. While Richland County, South Carolina followed suit with rapid adoption of virtual visits due to the aforementioned public health concerns, the impact on both patient and provider satisfaction from this rapid transition was largely unknown. This study aimed to determine patient and provider satisfaction in the delivery and quality of telehealth care in the Richland County community. To accomplish this objective, a retrospective cohort study consisting of both 300 patients as well as 30 providers and patients and providers at an urban, single-institution, academic center family medicine clinic were provided validated telehealth satisfaction surveys, namely and respectively The Telehealth Patient Satisfaction Survey and Telemedicine Program Provider Satisfaction Surveys, respectively. Patients were selected as those who were 18 years of age and older and who had received a telehealth visit (video or telephone) between the dates of February 1, 2021, to March 5, 2021. The survey was sent electronically via email to patients and providers. Additional patient information in the form of gender, age, insurance type, and modality were collected. Providers ranged from PGY 1-3 as well as attending providers who similarly conducted telehealth visits between February 1, 2021, to March 5, 2021.

Williams, Austin

Mentor(s): Dr. Brandon Bookstaver

Evaluation of the diagnostic utility of metagenomic next-generation sequencing testing for pathogen identification in infected hosts

Background/Purpose: Metagenomic next-generation (mNGS) testing is a blood test to detect cell-free DNA to identify pathogens, though data on its utility are lacking. The purpose of this study is to evaluate the clinical utility of mNGS testing and to identify factors associated with high diagnostic utility.

Methodology: All mNGS tests ordered from June 2018 through May 2020 were screened. Tests ordered for clinical diagnostic purposes in hospitalized patients at Prisma Health Richland or Prisma Health Children's hospital were included. Repeat tests were evaluated on an individual basis. Criteria to determine diagnostic utility were created a priori. Two researchers independently reviewed tests and categorized each to either high or low diagnostic utility. A stepwise regression analysis was used to identify factors associated with high diagnostic utility.

Preliminary Results: In progress

Conclusions: In progress

Williamson, Lindsay

Mentor(s): Dr. Floyd Bell, Dr. James Cook

Simulation for Training in Pelvic Ultrasound: A Randomized Controlled Trial Comparing Simulation versus Written Presentation

Introduction: Transvaginal ultrasound provides invaluable clinical insight to skilled providers but is a challenging and sensitive exam. Ultrasound simulation is a well-established means of teaching in medical education. We examined differences in competence and confidence in novices using traditional didactic presentation alone versus in combination with simulation.

Methods: One-hundred and twenty-six third-year medical students entering their obstetrics and gynecology clerkship were randomly assigned to experimental (ultrasound simulator + didactic presentation) or control (didactic only) groups. Differences in proportion of correct answers regarding skills involved in transvaginal ultrasound were evaluated with an image-based exam and chi-square test. Student preferences and confidence were determined with tallied anonymous survey results.

Results: There was no statistically significant difference in exam performance between groups (% correct control: 59.5% and % correct experimental 58.2%; $p=0.617$). The students' subjective evaluation of the benefits of simulation demonstrated a positive perception overall; 96% of students indicated that simulation improved understanding of spatial relationships, and no students indicated a preference for learning transvaginal ultrasound through didactic presentation without simulation.

Conclusion: Incorporating simulation into didactic learning was at least as effective as traditional education alone. Overall student perception was encouraging regarding the use of simulation for learning more sensitive ultrasound scans.

Witt, Perry

Co-Author(s): Stephen Hoy

Mentor(s): Dr. Morgan Rhodes

Stigma among healthcare professionals on treatment of patients with Opioid Use Disorder (OUD)

Opiate use disorder (OUD), which involves the misuse of prescribed opioid medications, has reached epidemic levels since the 1990's. In 2018, 128 people died in the United States each day from overdosing on opioids. Additionally, studies show that 21 to 29 percent of patients prescribed with opioids misuse them, 8- 12% develop OUD, and 4 – 6% transition to heroin. In South Carolina, there were 67,367 drug overdose deaths reported in 2018, with 835 of these involving opioids. Although OUD is a recognized national crisis, the stigma, defined as a mark of shame or discredit, associated with it is still rampant. In the general population, over half of Americans believe that effective treatment for OUD does not exist. 78% of Ameri-

cans believe that people who are addicted to prescriptions are to blame for the problem and 72% believe that people addicted to opioids lack self-discipline.

While stigma that exists in the general public is noteworthy, it is important to consider that this stigma exists in healthcare professions also. Stigma in the healthcare setting is not as widely studied, but without a doubt plays a role in the treatment of OUD patients. A 2013 study detailing stigma among healthcare professionals about substance abuse disorders found that not only did health professionals have a generally negative attitude toward patients with substance use disorders, they also lacked proper training, education, and support structures to properly treat these patients. Another survey conducted among medical students found that only 29.1% felt comfortable working with patients with OUD, and 27.7% preferred not to work with them at all. The goal of this project was to assess stigma among health care professionals working in the family and internal medicine teaching floors at Prisma Health Richland. An 11 question survey about perceptions of patients with OUD and recovery language was developed. The optional, anonymous survey will be sent to all health care professionals on the family and internal medicine teaching floors in March 2021.

The results will be used to design a plan to address healthcare-associated stigma and improve patient care for patients with OUD.

Wooten, Bailey

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Longitudinal Healthcare Screening Education to Increase Knowledge Retention Among Internal Medicine Residents

Preventative healthcare is a vital component in the field of primary care medicine and an important topic to emphasize during internal medicine residency training. This includes secondary prevention with screening to allow for early detection of serious medical conditions in otherwise asymptomatic patients. While screening guidelines for various topics are freely available from multiple organizations and societies, providers often follow the recommendations set forth by the Best Practice Advisories (BPA's) that serve as passive reminders in the EMR. This may be effective for several commonly addressed screening topics including colon cancer, AAA, breast cancer and Pap smear. However, there are multiple screenings and preventive medicine interventions that are precluded from these BPA's and are often missed. The United States Preventive Services Task Force (USPSTF) offers information on Grade A & B recommendations for frequently overlooked topics such as osteoporosis, lung cancer screening, depression, alcohol, hyperlipidemia, high risk breast cancer prophylaxis screening, and more. The aim of this project was to develop a longitudinal curriculum to educate residents and reinforce current healthcare maintenance screening guidelines for these important topics. We hoped that by introducing screening guidelines and reinforcing learning objectives with post-quizzes over time, retention of knowledge would be higher among the IM residents. We introduced one guideline per month during a resident conference that was preceded by a pre-quiz to assess baseline knowledge then followed by a post-quiz to assess retention several months later. With completion of this academic year we hope to assess whether we have increased residents' knowledge of the screening guidelines and also review whether we have seen an increase in compliance with these guidelines in our clinic population. We will additionally assess whether the incorporation of our curriculum has led to a change in practice.

York, Mikaela

Mentor(s): Dr. Roy Mathew

Patterns of usage of time angiotensin receptor/neprilysin inhibitor in patients with heart failure and chronic kidney disease in the Veterans Affairs system.

Background: The cardiovascular benefits of angiotensin receptor/neprilysin inhibitors (ARNI) have clearly been demonstrated among patients with heart failure with reduced ejection fraction (HFrEF). The benefits extend to reductions in heart failure hospitalizations, cardiovascular death, and some studies have also revealed potential renal benefits and safety in patients with estimated glomerular filtration rate (eGFR) down to 25 ml/min/1.73m²; however most controlled trials exclude patients with an eGFR < 30.

Methods: This study aims to determine current utilization of ARNI and associated clinical parameters in chronic kidney disease patients with its use in this population in a large administrative dataset. The Veteran's Affairs Electronic Health Record was queried for the first prescription for ARNI between 01 January 2016 and 31 January 2020. All pharmacologic, clinical, and laboratory data were extracted relative to the index ARNI prescription and patients were grouped according to year of index ARNI prescription.

Results: A total of 5138 patients were identified with systolic heart failure who were prescribed an ARNI between 2015 and 2020. Of these patients, 111 had an eGFR < 30 (86 with eGFR 15-29; 25 eGFR < 15). There was also an increase in proportion of patients who were de Novo users of ARNI (i.e. no prior ACEI/ARB prescription identified in the VA records) (2020: 15.4% vs. 2016: 6.6%, p<0.001).

Conclusions: The results indicate that ARNI use in a large VA population has demonstrated an increasing inclusion of patient characteristics including lower eGFR, as well as likely trial of ARNI as first line renin-angiotensin-system inhibition in patients with HFrEF. Further research and trials are needed to examine these characteristics as truly beneficial uses of ARNI.

Zhou, Emily-Rose

Mentor(s): Dr. Christine Schammel

Accurate Diagnosis of B Cell ALL Mutations Using Karyotyping and Fluorescence In-Situ Hybridization (FISH) in Adolescent/Young Adult and Adult Populations

Introduction: While B-cell acute lymphoblastic leukemia (B-ALL) is associated with high survival rates and clear testing and treatment protocols in the pediatric population, adolescent/young adult (AYA) and adult patients tend to have much poorer survival rates and less standardized testing methodology. Overall survival of AYA patients is better when pediatric regimens are used (60-70%); however, these regimens show no survival advantage in adults, potentially due to lower tolerance of the toxicities of this regimen. A contributing factor to poorer prognosis in older patients may be the presence of worse prognostic cytogenetic markers, and this problem may be compounded by a diagnostic system that fails to adequately detect all relevant mutations.

Methods: Since there is controversy over which tests to perform in the AYA and adult population, we compared the efficacy of cytogenetic testing methods in all three populations (pediatric, AYA, and adult) at our institution in a retrospective study. We also compared treatment and outcome data.

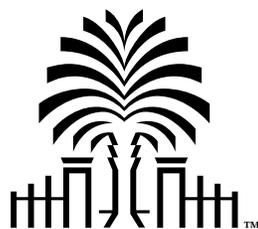
Results: Though karyotype was consistently performed in pediatrics, AYA, and adults (94%, 95%, and 87% respectively), only pediatric patients (94%) also regularly received FISH compared to AYA (62%) and adults (65%). The prevalence of certain common mutations found to be "cryptic" (meaning that they were detected by FISH and not by karyotype) was significantly different between the pediatric/AYA/adult cohorts (60% vs 100% vs 50%; p=.005). Meanwhile, PCR evaluation for the 9;22 translocation (BCR/ABL; Philadelphia chromosome) revealed one cryptic case in the adult cohort. The AYA cohort had the most variability in treatment protocols which appeared to be reflective of the ordering physician (pediatric or adult) and had a significantly higher death rate than the pediatric cohort. Likewise, recurrence rates were significantly higher in the AYA cohort when compared to the other groups (p=0.05).

Conclusions: This study revealed the lack of standardized testing in adult and AYA B-ALL as well as a lack of standardized treatment protocols for the AYA population. Our findings led us to recommend

performing karyotyping, FISH, and PCR as the initial tests in both AYA and adult patients in order to most effectively detect prognostic and treatment target markers.

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