

Early Language and Literacy Acquisition in Children with Hearing Loss



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ABSTRACT

The purpose of this poster is to present the Year 1 findings of the ELLA study, a longitudinal investigation of the development of early language, phonological, and orthographic skills in preschool children with hearing loss. Participants are 4-year-old children with bilateral hearing loss and 4-year-old children with normal hearing. Participants complete measures of early language and literacy acquisition at 6-month intervals. At age 4, children with hearing loss and children with normal hearing did not differ on nonverbal intelligence, phonological awareness, rapid naming, or alphabet knowledge. Children with hearing loss scored lower than children with normal hearing on overall oral language, vocabulary, morphosyntax, phonological memory, and concepts of words in print. Over time, the longitudinal study will compare developmental trajectories of children with hearing loss and children with normal hearing and identify early predictors of later literacy achievement. The ELLA study is funded by an NIH/NIDCD R03 (1R03DC014535-01) awarded to the first author.

BACKGROUND

Children with hearing loss exhibit deficits in oral language, phonological processing, and orthographic knowledge. Multiple aspects of oral language skills for children with hearing loss who develop spoken language are poorer than their peers with normal hearing: vocabulary (Pittman, Lewis, Hoover, & Stelmachowicz, 2005; Wake, Poulakis, Hughes, Carey-Sargeant, & Rickards, 2005), morphosyntax (McGuckian & Henry, 2007), and complex syntax (Elfenbein, Hardin-Jones, & Davis, 1994). Likewise, phonological processing deficits in children with hearing loss abound (Ambrose, Fey, & Eisenberg, 2012; Easterbrooks, Lederberg, Miller, Bergeron, & Connor, 2007; Lund, Werfel, & Schuele, 2015). Within print knowledge, alphabet knowledge appears to be relatively intact in children with hearing loss (Easterbrooks et al., 2007; Werfel, Lund, & Schuele, 2015); however, print concept knowledge is impaired (Werfel et al., 2015).

Research has established that children with hearing loss who use spoken language exhibit deficits in these early skills; however, this piecemeal research has not provided clear guidance for identification of children who are most at-risk to develop literacy deficits. To date, investigations of children with hearing loss have not included comprehensive longitudinal investigations of the acquisition of the early language, phonological, and orthographic skills that are implicated in later literacy achievement. Understanding the development of these early skills and how they relate to later language and literacy achievement will provide foundational knowledge that can guide early identification of the children with hearing loss developing spoken language who are most at-risk for later deficits.

PURPOSE

The purpose of this poster is to present the Year 1 findings of a longitudinal investigation of the development of early language, phonological, and orthographic skills in preschool children with hearing loss.

METHOD

Preschool children with and without hearing loss complete a battery of early language and literacy assessments every six months from age 4 to 6.

Table 1. Participant Demographic Information

Group	n	Age in Months (SD)	Maternal Education in Years (SD)	Age at ID in Months (SD)	Age at Amplification in Months (SD)	Types of Amplification for CHL
Children with Hearing Loss	20	51.58 (4.07)	15.11 (2.47)	5.67 (10.02) Range: 0 – 36	9.47 (9.74) Range: 2 – 36	Bilateral CI: 9 Bilateral HA: 5 Bimodal: 4 BAHA: 2
Children with Normal Hearing	16	49.50 (4.50)	16.92 (1.55)	--	--	

RESULTS

Comparison of Children with Hearing Loss and Children with Normal Hearing

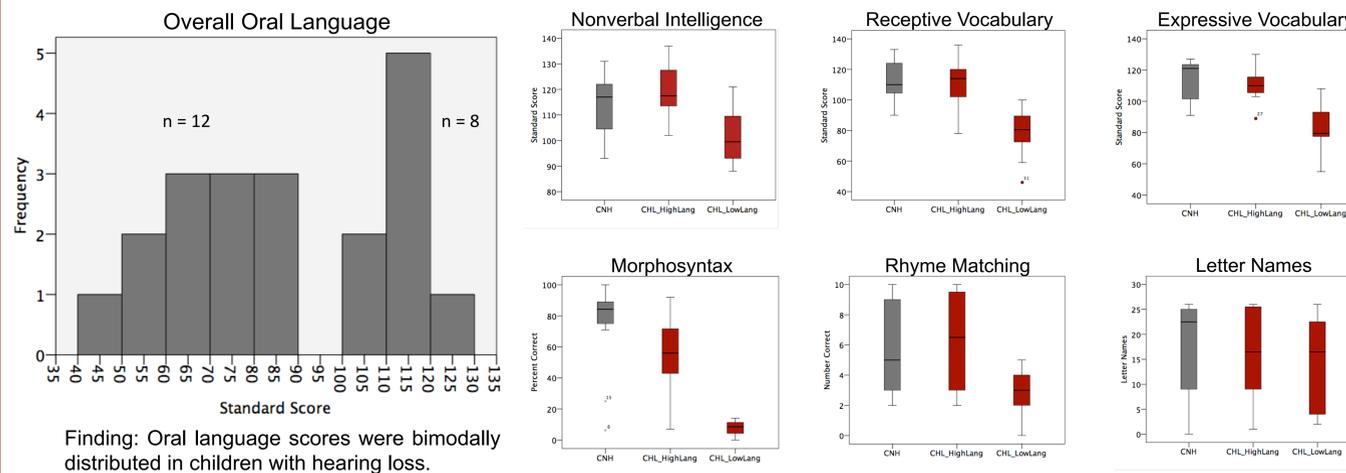
Table 2. Early Language and Literacy Skills of CHL and CNH

Domain (Measure)	Type of Score	CHL Mean (SD) Range	CNH Mean (SD) Range	p	d
Nonverbal Intelligence (PTONI)	Standard Score	108.60 (13.93) 88 – 137	113.73 (11.41) 93 – 131	.253	0.40
Omnibus Language (TELD-3)	Standard Score	86.10 (25.54) 41 – 125	111.31 (16.46) 74 – 135	.000	1.17
Receptive Vocabulary (PPVT-4)	Standard Score	91.75 (22.38) 46 – 136	112.56 (13.01) 90 – 133	.001	1.14
Expressive Vocabulary (EOWPVT-4)	Standard Score	93.45 (19.85) 55 – 130	113.07 (13.44) 91 – 127	.002	1.16
Morphosyntax (TEGI)	Percent Correct	40.65 (32.76) 0 – 92	76.13 (27.19) 6.25 – 100	.008	1.18
Rhyme Matching (PALS PreK)	Raw Score: Max 10	4.25 (2.88) 0 – 10	5.81 (2.90) 2 – 10	.116	0.54
Initial Sound Matching (PALS PreK)	Raw Score: Max 10	4.10 (2.40) 1 – 9	3.81 (2.01) 1 – 7	.704	0.13
Letter Names (PALS PreK)	Raw Score: Max 26	14.95 (9.45) 1 – 26	17.50 (8.94) 0 – 26	.416	0.28
Letter Sounds (PALS PreK)	Raw Score: Max 26	7.40 (8.24) 0 – 23	7.19 (7.05) 0 – 17	.935	0.03
Digit Span (adapted from Gathercole & Adams, 1993)	Raw Score	2.75 (0.97) 1 – 5	3.75 (0.86) 2 – 5	.003	1.09
Rapid Naming – Animals (adapted from Catts, 1993)	Time in Seconds	59.00 (17.00) 37 – 85	60.93 (17.95) 37 – 94	.760	0.11
Print Concepts (PWPA; Justice & Ezell, 2000)	Raw Score: Max 18	5.85 (3.33) 0 – 12	7.00 (2.50) 2 – 12	.260	0.39
Words in Print (PWPA; Justice & Ezell, 2000)	Raw Score: Max 12	2.10 (2.45) 0 – 7	4.38 (2.92) 0 – 11	.016	0.85

Findings: Children with hearing loss scored below children with normal hearing on many measures of early language and literacy skills, including oral language, receptive vocabulary, expressive vocabulary, morphosyntax, phonological memory, and conceptual knowledge of words in print.

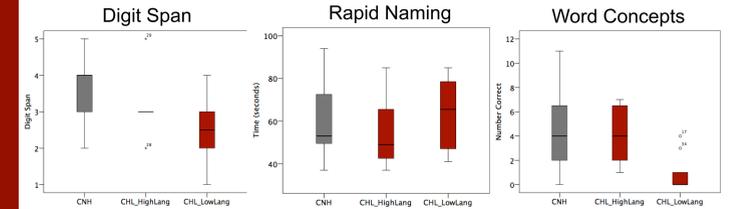
Significant differences were not observed on measures of nonverbal intelligence, phonological awareness, letter knowledge, phonological recoding, or conceptual print knowledge. Floor effects for both groups were present on measures of phonological awareness at Time 1.

Comparison of Children with Hearing Loss by Language Status



RESULTS

Comparison of Children with Hearing Loss by Language Status, cont.



Finding: Children with hearing loss who have high oral language skills did not differ from children with normal hearing on many measures of early language and literacy, including vocabulary, phonological awareness, phonological recoding, letter knowledge, and word concepts. Differences were observed, however, for morphosyntax and phonological memory.

IMPLICATIONS

This poster reports the findings from Year 1 of the ELLA study, a longitudinal investigation of early language and literacy acquisition in children with hearing loss. The findings suggest that children with hearing loss, when considered as a single group, score below children with normal hearing on all language measures and some early literacy measures.

- Consistent with previous research, children with hearing loss did not differ from children with normal hearing on measures of letter knowledge or phonological recoding. Children with hearing loss scored lower than children with normal hearing on measures of phonological memory and word concept knowledge.
- Inconsistent with previous research, children with hearing loss did not differ from children with normal hearing on either measure of phonological awareness; however, floor effects for both groups were observed.

When overall oral language skills of children with hearing loss is taken into account, two clear subgroups emerged. Children with hearing loss who have high oral language skills differed from children with normal hearing only on measures of morphosyntax and phonological memory. In contrast, children with hearing loss who have low oral language skills differed from children with normal hearing and children with hearing loss who have high oral language skills on all measures. Clinically, these findings suggest that even when children with hearing loss have language scores that do not qualify them for services, deficits in some skills persist which may negatively impact later language and literacy skills. For research, these findings call into question the typical practice of considering children with hearing loss as a single group in research studies.

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References available upon request: werfel@sc.edu