Predictors of Speech and Language Outcomes for Children Who are Hard-of-Hearing

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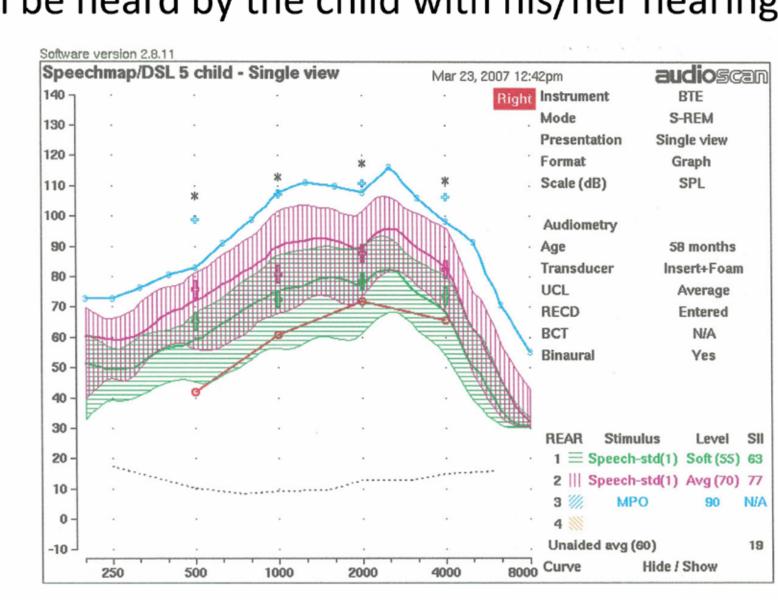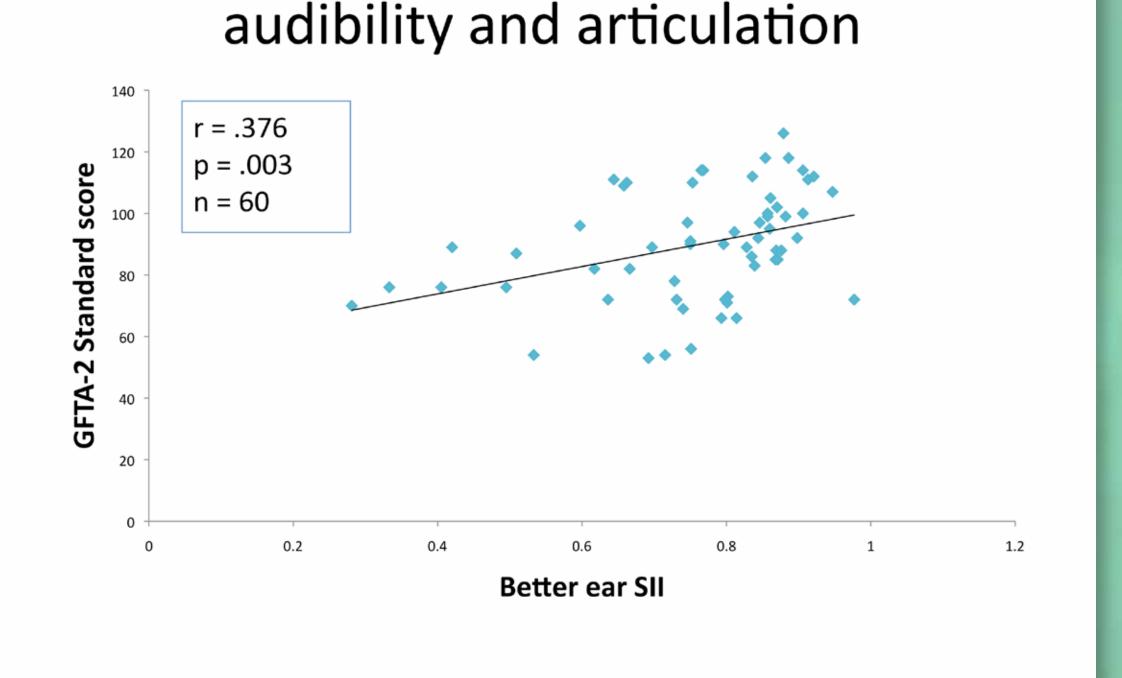
Introduction

Because of widespread implementation of universal newborn hearing screening and follow-up, families and service providers are now faced with making decisions about early intervention steps in younger children than ever before. There is a critical need for accurate information about how best to guarantee that children meet communication milestones. Previous research has clearly shown that important predictors for communicative and academic success for children with prelingual hearing loss include the age at which hearing loss is identified, the age at which early intervention begins and family involvement in the intervention program. Many of these studies have combined children who are deaf (usually profound hearing loss) with children who are hard-of-hearing (mild to severe hearing loss). These two populations, however, may have unique needs. In addition, previous research has not focused in a rigorous way on the role of the audibility of the speech signal in predicting positive outcomes. The Outcomes of Children with Hearing Loss (OCHL) study is a longitudinal, NIH-funded, multi-center study designed to explore the developmental outcomes of children who have mild ranging to severe hearing loss, those children usually referred to as "hard-of-hearing" and for whom hearing is usually the primary sensory modality used for communication. Data on psychosocial, communication, and academic outcomes are being gathered in an accelerated longitudinal design, in addition to descriptive data about variability in the provision of services. In this poster we describe the predictive factors for positive expressive and receptive speech and language outcomes.

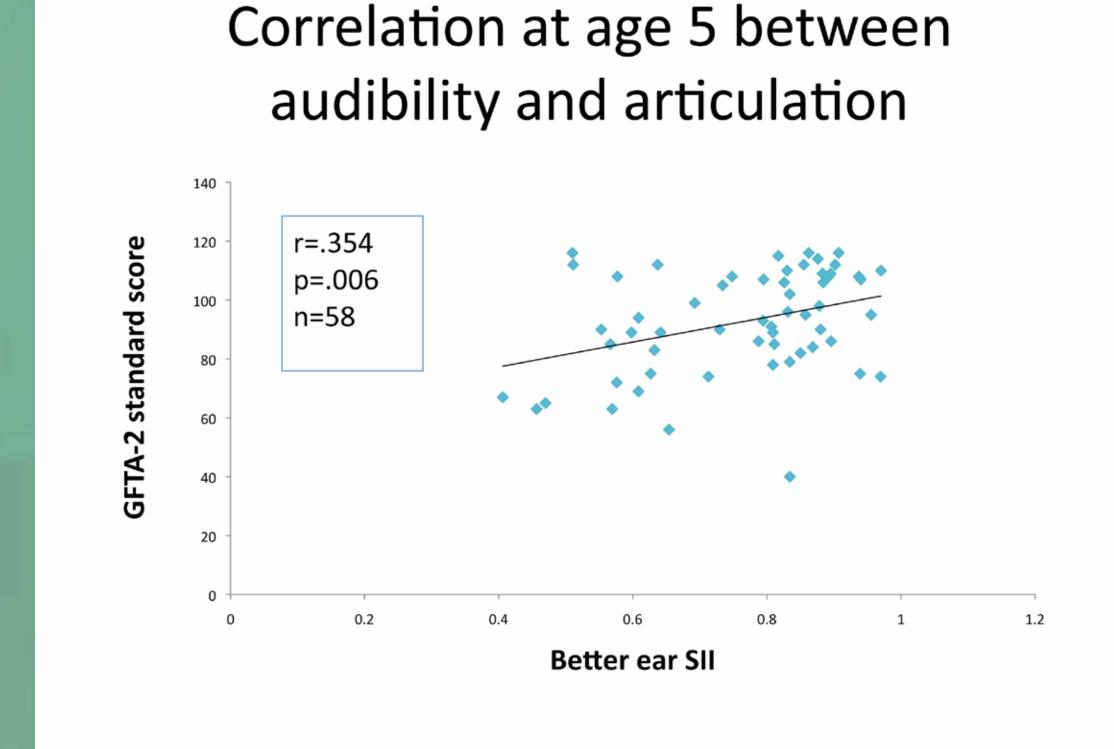### Participants from a large geographic area with three research teams

SII = Sum of weighted audibility for all bands in speech bands (bands weighted by importance to intelligibility): A way to measure how much of speech can be heard by the child with his/her hearing aids

Correlation at age 3 between audibility and articulation

r = .376
p = .003
n = 60

Correlation at age 5 between audibility and articulation

r=.354
p=.006
n=58
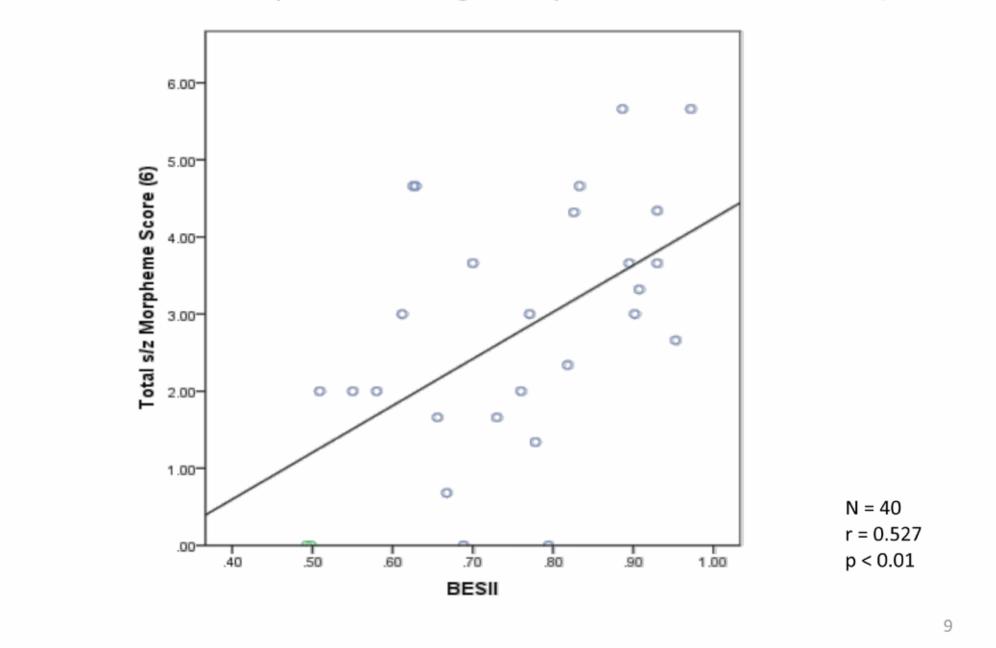
Correlation at age 5 between audibility and receptive vocabulary

r = .507
p < .001
n = 56
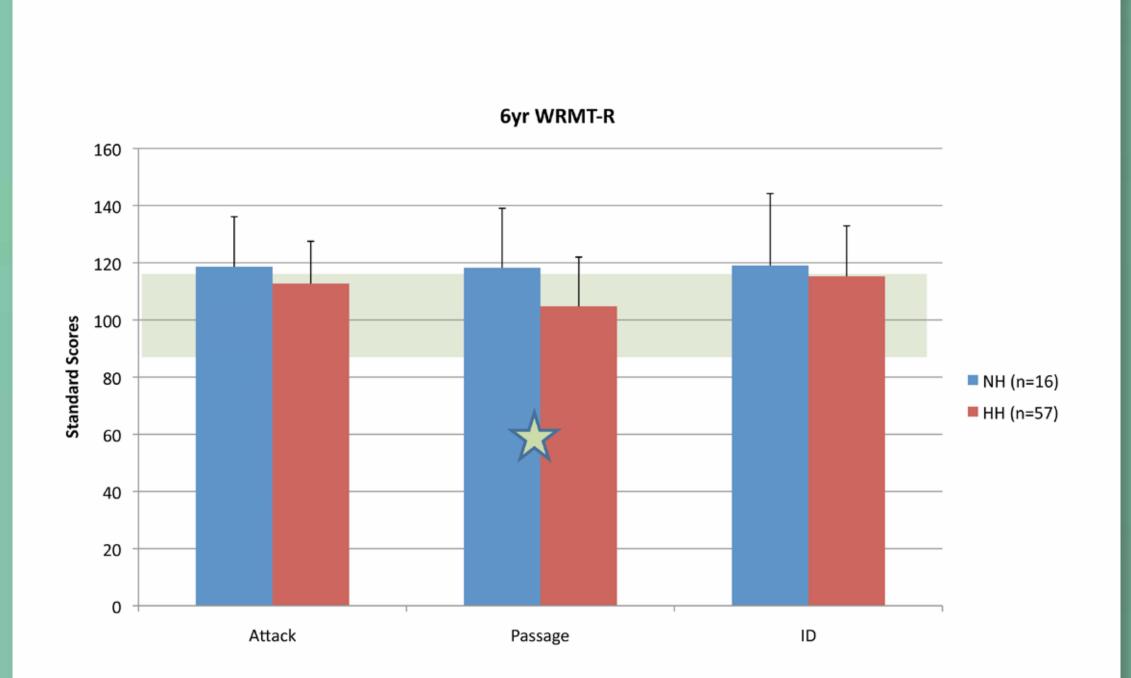
Correlation at age 5 between audibility and grammar

r=.375
p=.004
n=57

Audibility important for s/z morpheme production for 4-yr olds (plural marker, possessive marker, third person singular present tense verb)

N = 40
r = 0.527
p < 0.01

Woodcock-Johnson Reading Mastery Test

Pre-reading: Phonological awareness
(Test of Early Preschool Literacy, Comprehensive Test of Phonological Processing)

Phon Awareness	4-year old TOPEL	5-year old CTOPP	7-year old CTOPP
Audibility	n=40 r=.430 p=.006	n=39 r=.498 p=.001	n=17 (small N) r=.164 p=.529
Speech Perception	n=52 r=.179 P=.203	n=58 r=.355 P=.006	n=17 r=.367 P=.331
Speech Production	N/A	n=58 r=.445 P=.001	n=29 r=.305 P=.108
Vocabulary	n=58 r=.682 p=.001	n=57 r=.563 P=.001	n=29 r=.546 P=.002
Receptive-Expressive Language	n=53 r=.570 P=.001	n=49 r=.449 P=.001	N/A

Literacy correlations at 6 years

WRMT-R	Word Attack	Word ID	Passage Comprehension
Audibility	n=36 r=.201 p=.358	n=37 r=.120 p=.480	n=37 r=.033 p=.848
Vocabulary	n=53 r=.287 p=.034	n=56 r=.361 p=.006	n=56 r=.227 p=.092
Receptive-Expressive Language	n=56 r=.412 p=.002	n=57 r=.407 p=.020	n=57 r=.318 p=.016

Conclusions

- Many of our hard-of-hearing participants who wear amplification fall within the average range of speech and language measures compared to their hearing peers, but there is wide variability in scores.

- The factor of the quality of hearing aid fitting, as measured by the quantified audibility of speech, is emerging as a primary factor in determining later receptive and expressive speech and language measures, but not all measures of reading success. Some morphological markers are particularly vulnerable to the effects of poor audibility.

- These findings will lead to an improved understanding of the challenges faced by families and optimal recommendations regarding service provision for children who are hard-of-hearing.