Use of AVA Measures with Young Children who are Hard of Hearing

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Outcomes of Children with Hearing Loss
a study of children ages birth to six

Background

- Children who are hard of hearing are often are delayed in their consonant and syllable structure development.
- These delays may lead to delays in first word learning, expressive language, and speech production abilities.
- The LENA Automatic Vocal Assessment (AVA) is a practical means for examining broad developmental changes in vocalizations through reference to a large sample of young children.

Aims

(1) To determine how well aligned AVA developmental age scores are with the chronological ages of children who are hard of hearing (HH) as compared to children with normal hearing (NH)
(2) To determine if AVA standard scores differentiate children who are HH from children with NH.
(3) To examine the correlations between AVA standard scores and children's scores on traditional speech and language measures.

Methods

- Three LENA recordings were collected for children with mild to severe hearing loss (HH group, BEPTA: *M*=49.0 dB HL, SD=12.5) and children with normal hearing (NH group) at consecutive one-month intervals. Data were averaged across recordings for each child to control for variability.
- The speech and language skills of children with LENA recordings were assessed for a subgroup of children with LENA recordings as part of the Outcomes of Children with Hearing Loss study.

Area Assessed	AVA	Receptive Language Expressive Language	Phoneme Accuracy Word Acceptability
Measure	LENA Software	Mullen Scales of Early Learning	Open & Closed Set Test
NH group (age in mo)	*n*=15 *M* = 27.5 SD=7.6	*n*=12 *M*=24.8 SD=5.5	*n*=11 *M*=27.1 SD=3.2
HH group (age in mo)	*n*=41 *M*=26.1 SD=7.6	*n*=34 *M*=22.0 SD=4.5	*n*=28 *M*=25.4 SD=2.2

Results: Aim 1

NH *r*=.989 *p* <.001

HH *r*=.939 *p* <.001
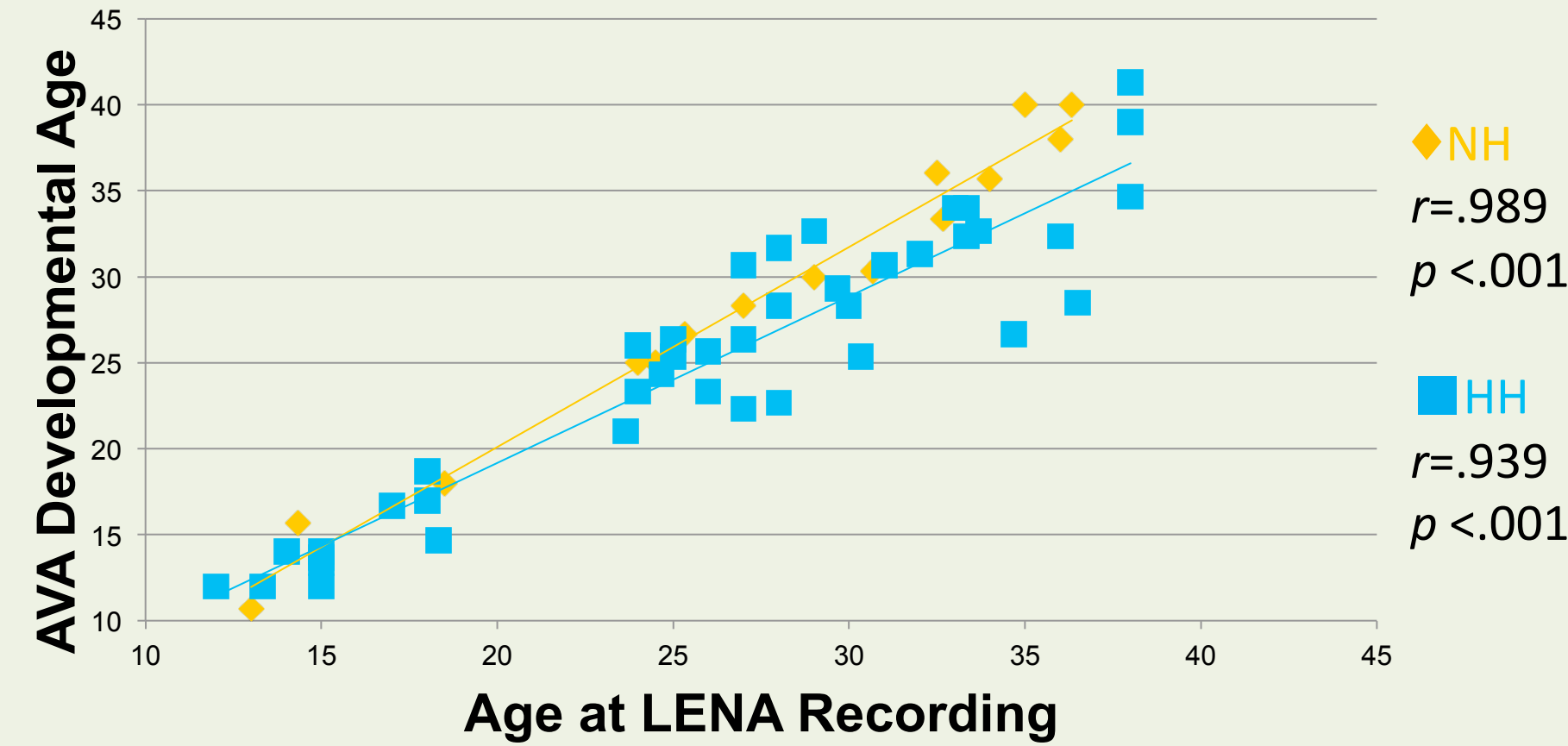
Results: Aim 2
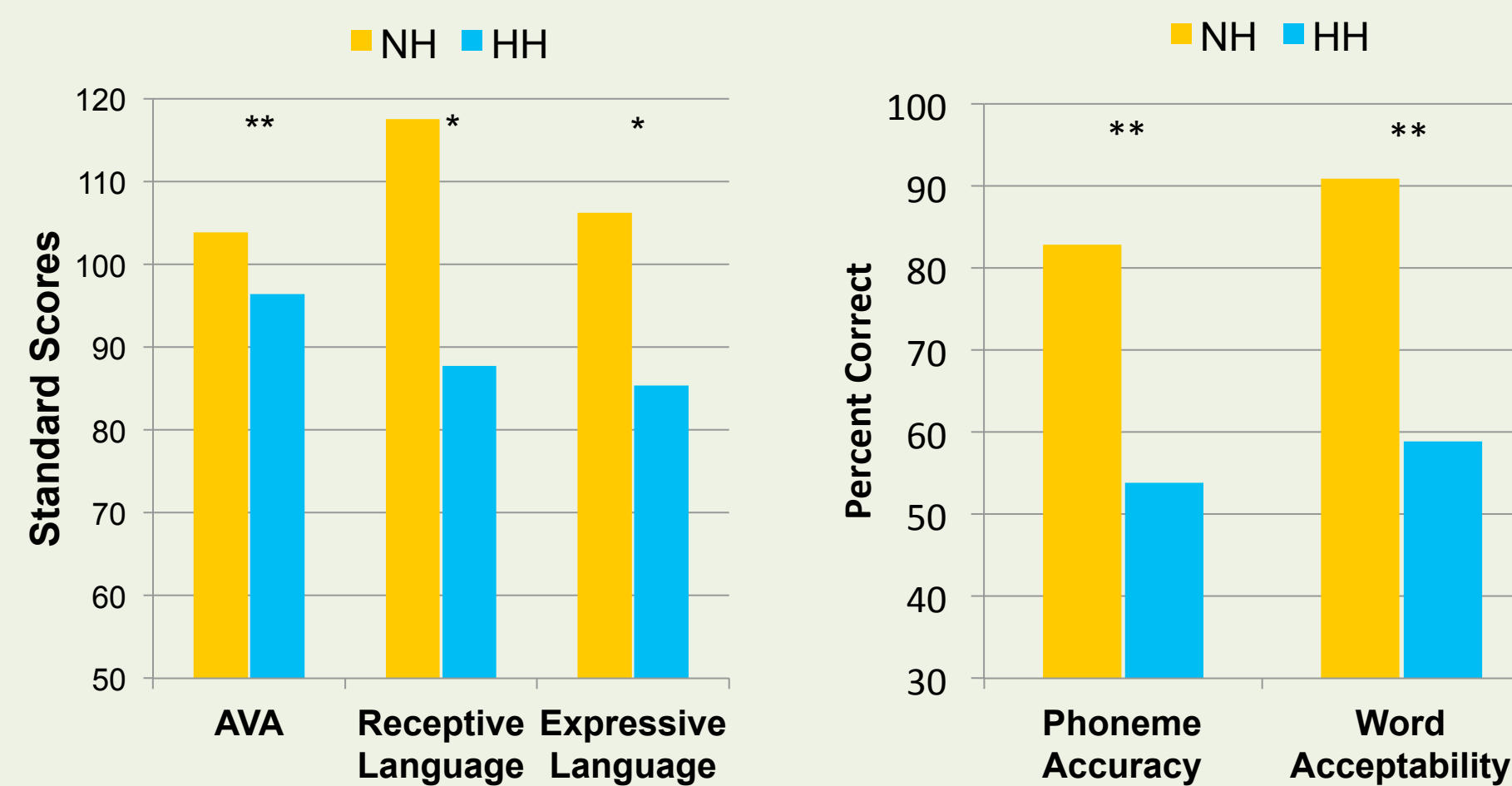
	AVA	Receptive Language[a]	Expressive Language[a]	Phoneme Accuracy	Word Acceptability
NH group	*M*=103.8 SD=6.7	*M*=58.8 SD=8.8	*M*=53.1 SD=7.3	*M*=82.8 SD=9.4	*M*=90.9 SD=8.3
HH group	*M*=96.4 SD=9.8	*M*=43.9 SD=14.2	*M*=42.7 SD=13.0	*M*=53.8 SD=25.8	*M*=58.8 SD=32.1
Between groups	*t*=2.68 *p*=.010	*t*=2.62 *p*=.012	*t*=2.61 *p*=.012	*t*=3.39 *p*=.002	*t*=3.05 *p*=.004

[a] Receptive and expressive language scores are expressed as T-scores in the table and were converted to standard scores for the figures.

Results: Aim 3
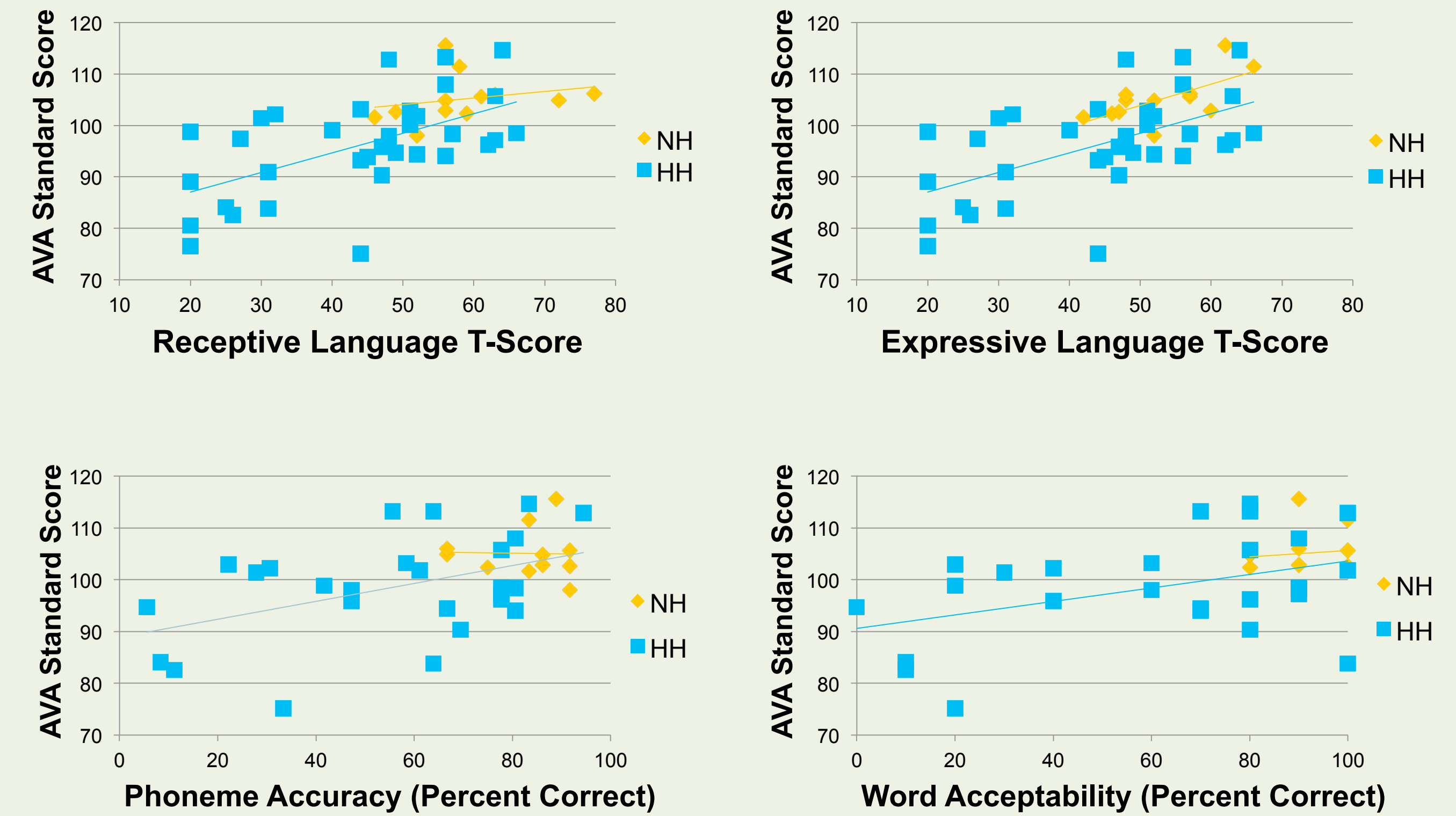
	Receptive Language	Expressive Language	Phoneme Accuracy	Word Acceptability
NH group	*r*=.245, *p*=.443	*r*=.659, *p*=.020	*r*=-.260, *p*=.940	*r*=.106, *p*=.758
HH group	*r*=.568, *p*<.001	*r*=.540, *p*=.001	*r*=.449, *p*=.022	*r*=.420, *p*=.033

Conclusions

- The developmental ages provided by the AVA are strongly correlated with chronological ages for children who are HH and NH.
- AVA standard scores are sensitive to differences in the prelexical vocal and early verbal development of children who are HH and NH.
- AVA scores are associated with clinician elicited measures of speech and language for children who are HH. This also appears to be the case with the language measures for children with NH, but a larger sample size is needed to confirm this impression.