

Understanding early communication outcomes in children who are hard of hearing

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Outcomes of Children
with Hearing Loss

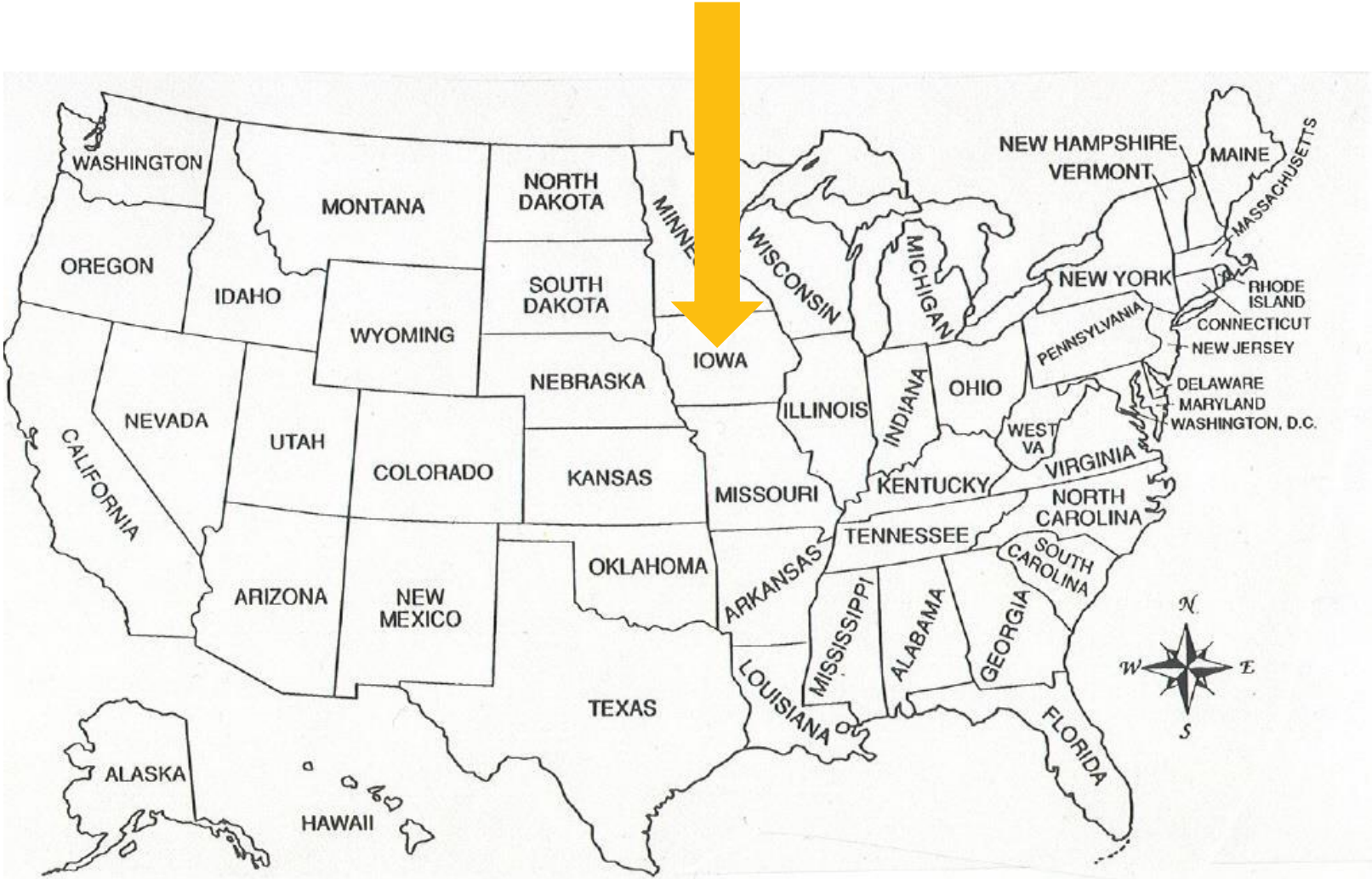
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4TH LATIN AMERICA PEDIATRIC CONFERENCE

Conflict of Interest Disclosure

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Iowa City, Iowa

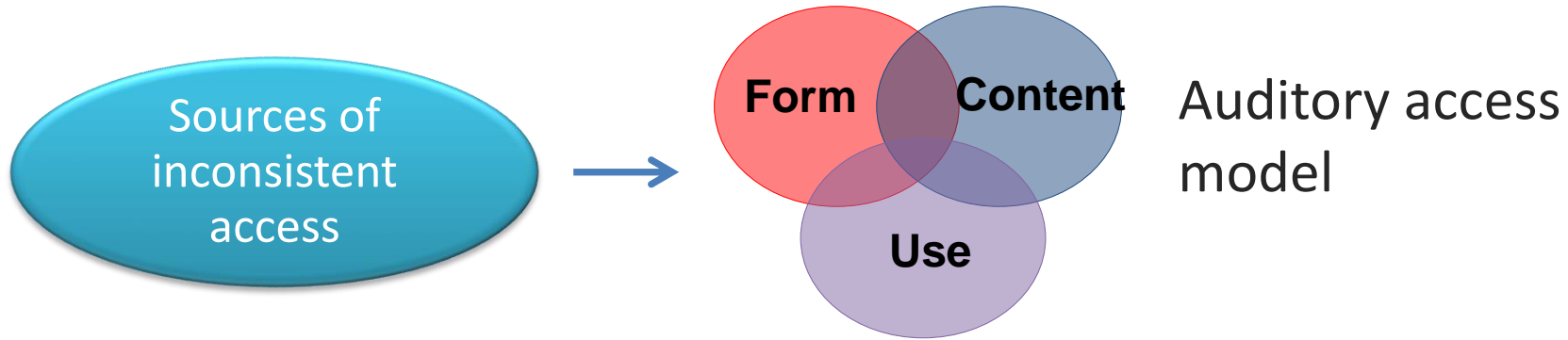


This talk focuses on the effects of inconsistent auditory access on outcomes for children who are hard of hearing



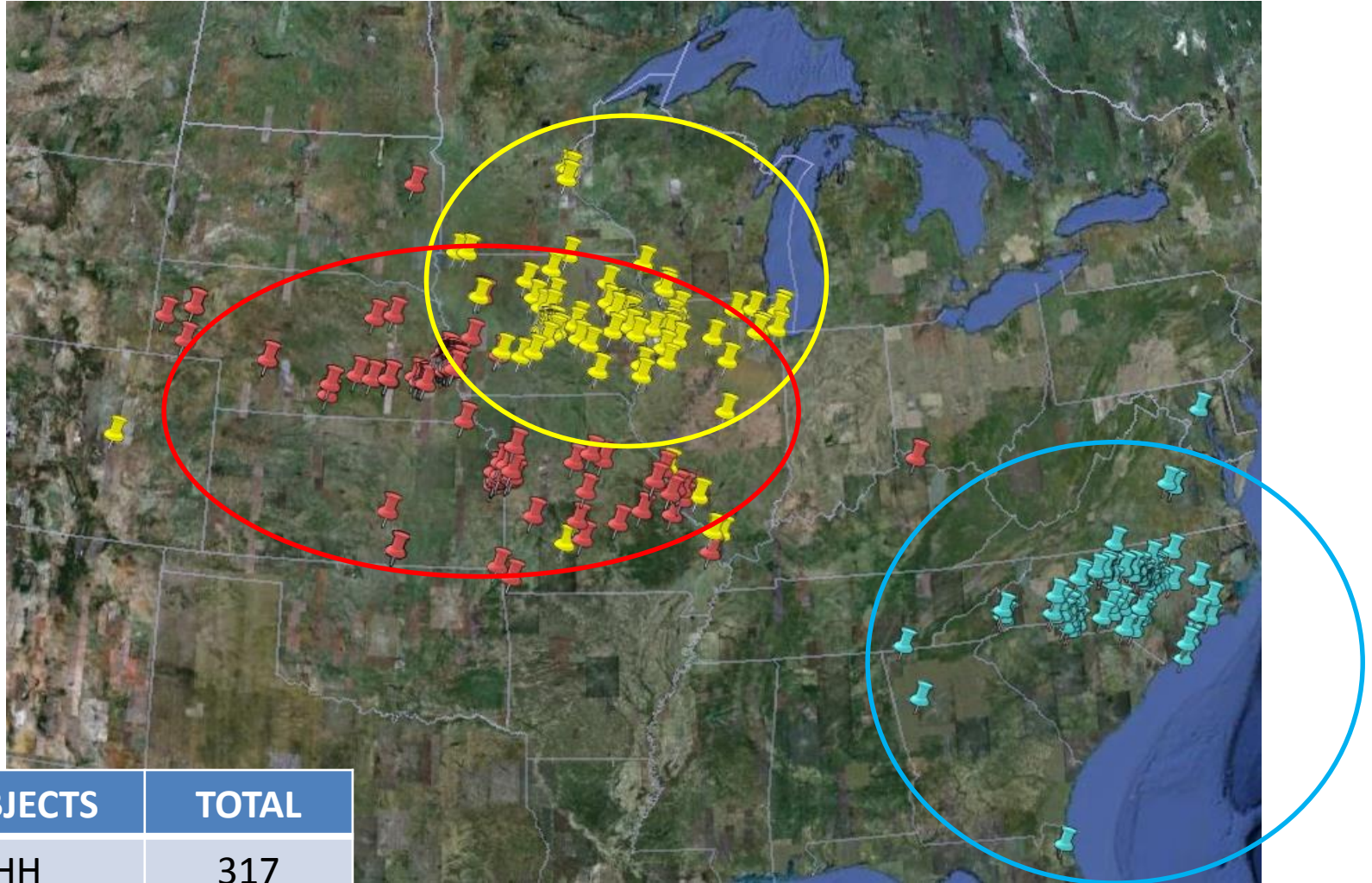
Outcomes of Children with Hearing Loss
a study of children ages birth to six

OCHL study overview



Outcomes and
Clinical
implications

The OCHL study is a multicenter, longitudinal study focusing on outcomes of children with mild-severe hearing loss



SUBJECTS	TOTAL
HH	317
NH	117



Study participants

Inclusion criteria

- 6 months to 7 years at entry
- English primary language
- No major secondary disabilities
- No cochlear implants
- Permanent mild to severe *bilateral* hearing loss

What guided the research goals of this multicenter study?



New generation
of children with
hearing loss

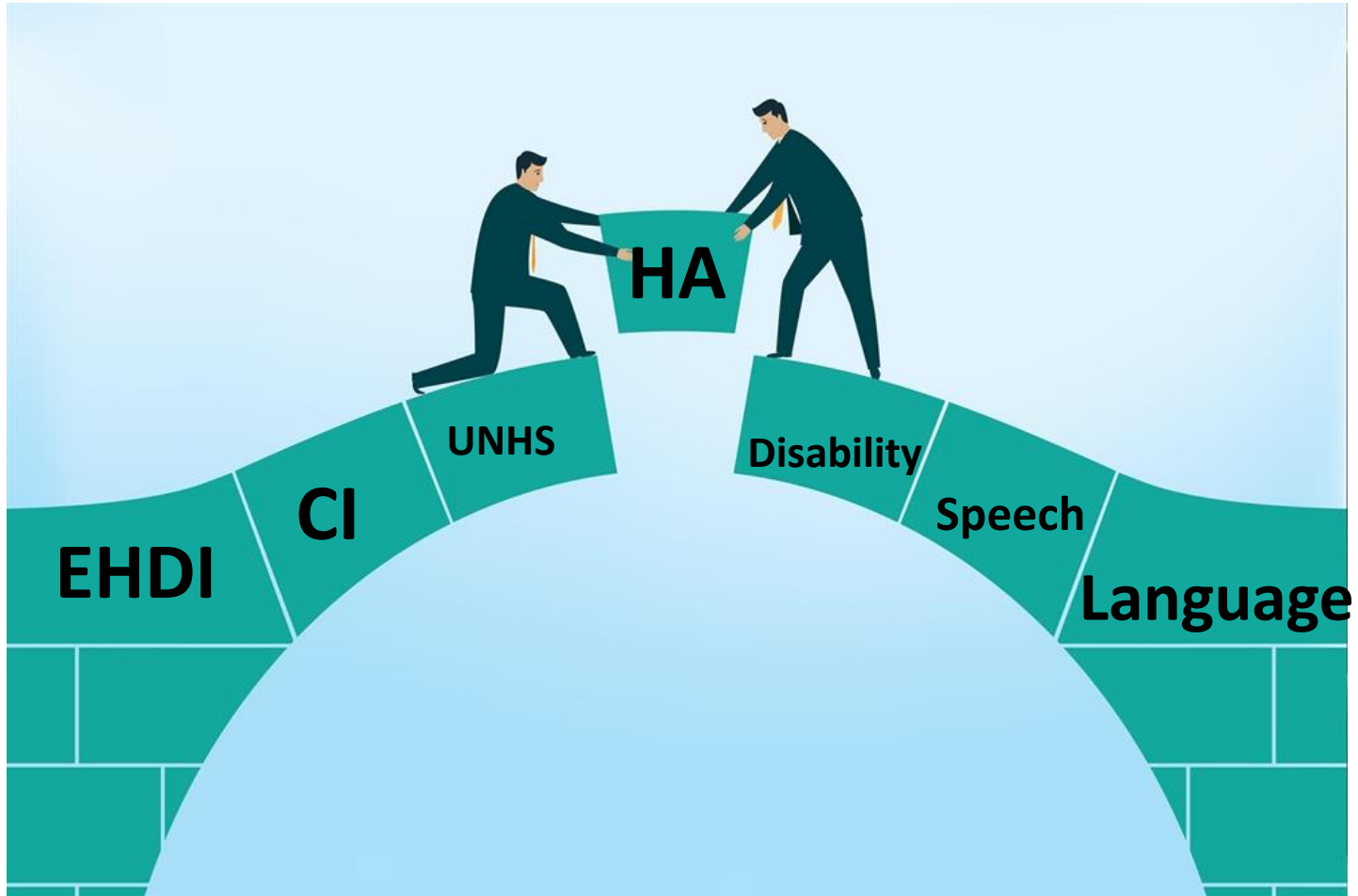


Are they achieving
expected outcomes?

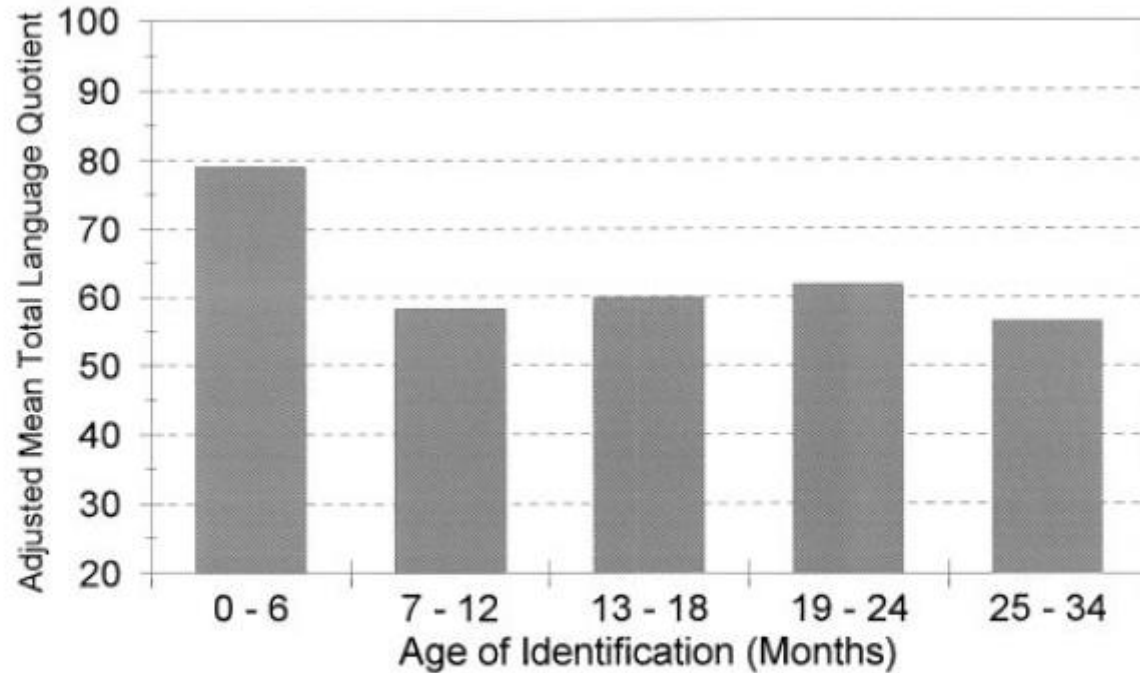


Does inconsistent **access**
lead to risk?

Research Gaps

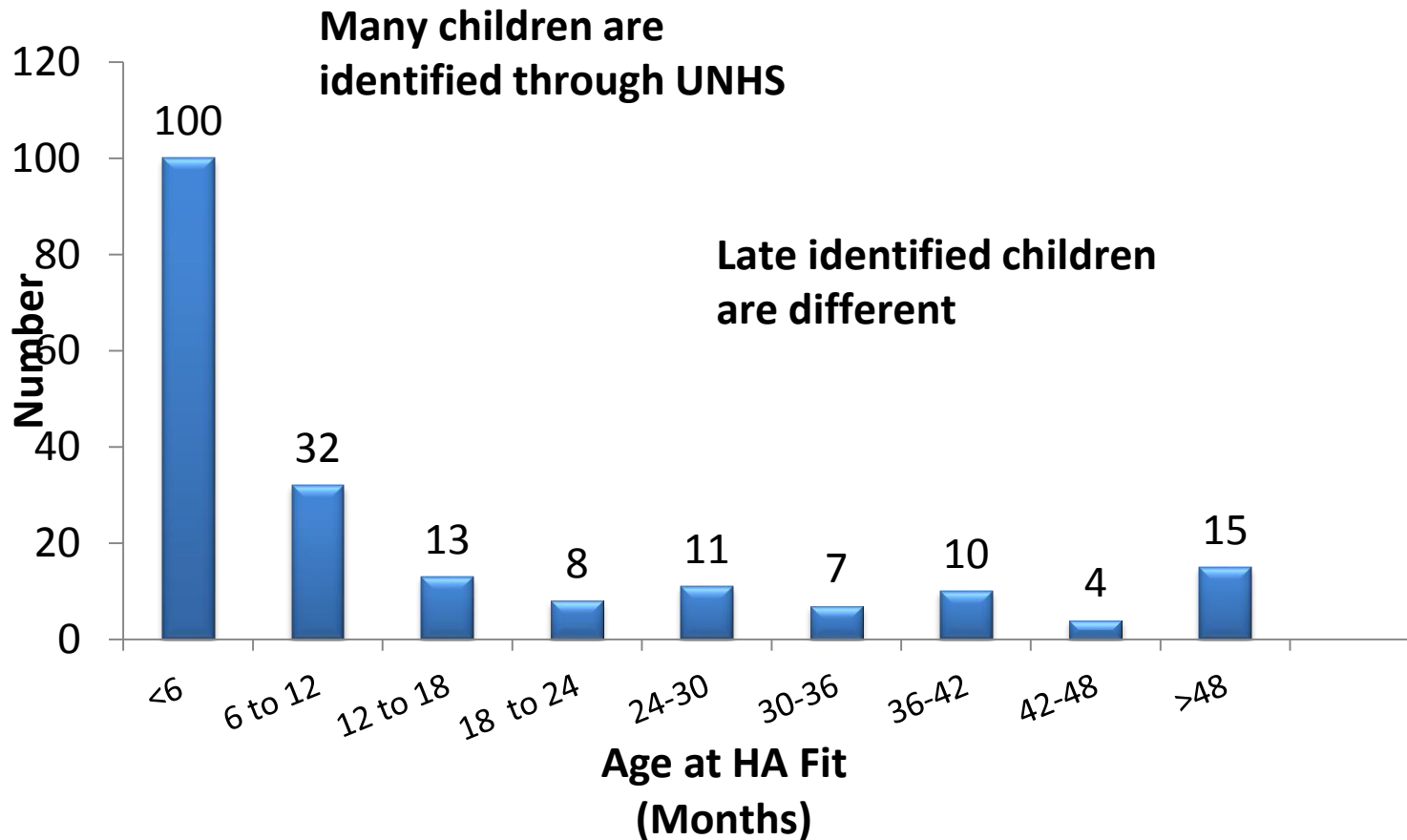


Duration Variables



Pure Tone Average:	63	62	80	72	64
Cognitive Quotient:	88	74	82	76	71

Problems with Duration Variables



Demographic Factors



Cochlear
implant

Girls

Milder degree
of HL



Additional
disabilities

Boys

Greater
degree of HL

Age of
amplification -
NS

What is good and bad about using demographic factors to understand outcomes?



Puts findings in context

Target intervention

Not malleable

Assumes demographic groups are homogeneous

i.e. Girls, Mild HL, Late ID

Send a frustrating message to parents/caregivers

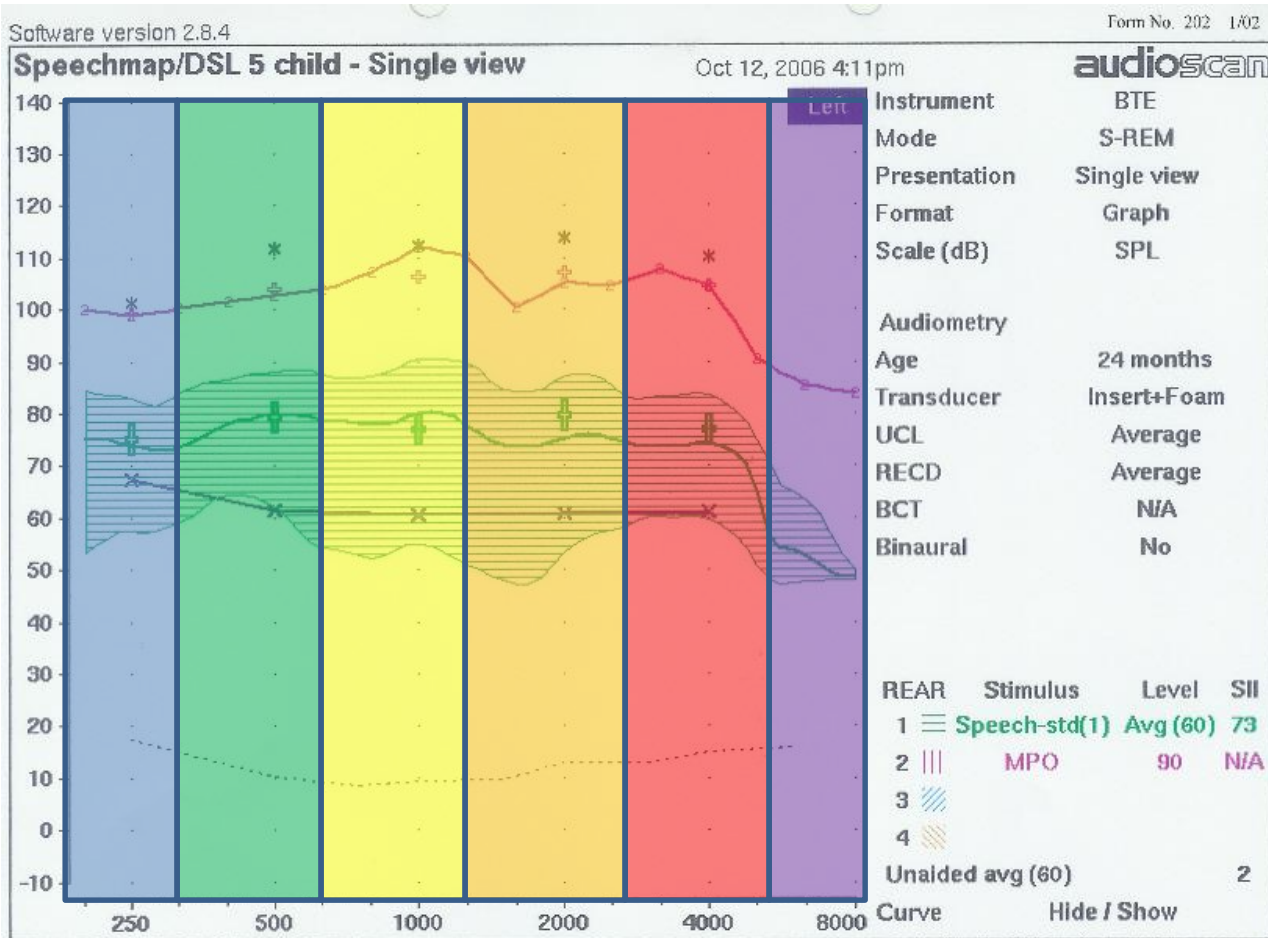
Auditory access model



Is auditory experience the same for all children with hearing loss?

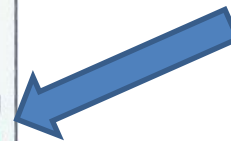
- Null hypothesis:
 - Infants and children wear their hearing aids all the time.
 - Hearing aids are fit appropriately and provide consistent audibility.
 - Demographic factors will predict outcomes

How do we measure aided audibility?....Speech Intelligibility Index



For each band –
 Audibility x FIW =
 weighted audibility

SII = Sum of
 weighted audibility
 of all frequency
 bands



How did we measure amount of daily HA use?

Subjective

Objective



**Hearing aid
questionnaire**

average # of hours
per day

**Hearing
aid
data
logging**

What were the audiological outcome measures?



Aided speech
recognition



Auditory
developmental
questionnaires

Open & Closed Set Test (O&C)

- Developed by: Ertmer, Miller, & Quesenberry, 2004
- Appropriate for ages 18 to 24 months
- A measure of perception and production
- 10 items using realistic pictures
- Production followed by picture identification

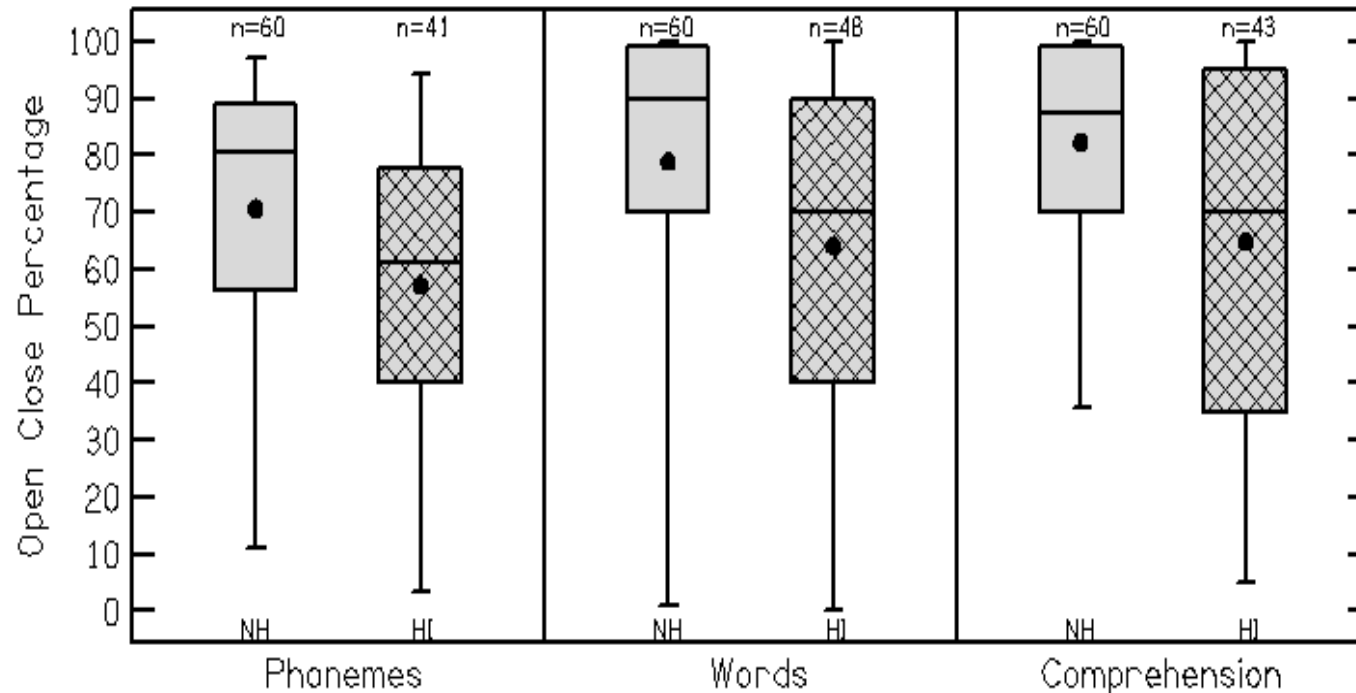
KEYS

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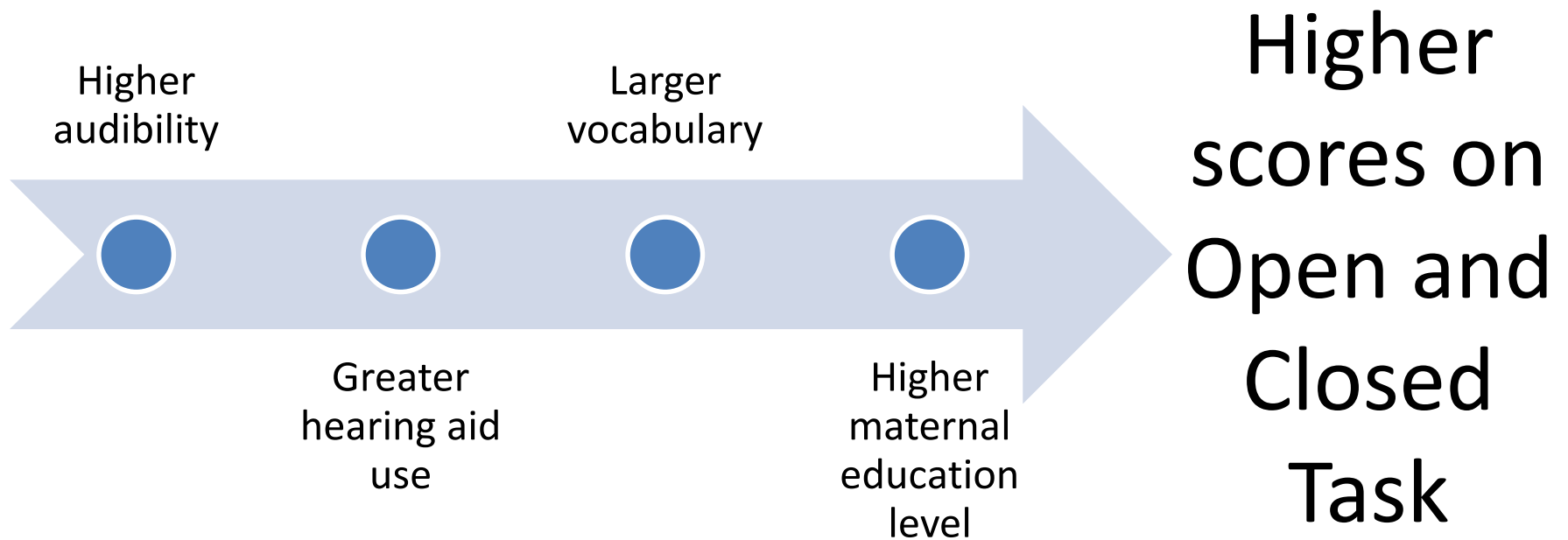
Open and Closed task (2 year olds)



Open and Closed Set Task



2 year-olds

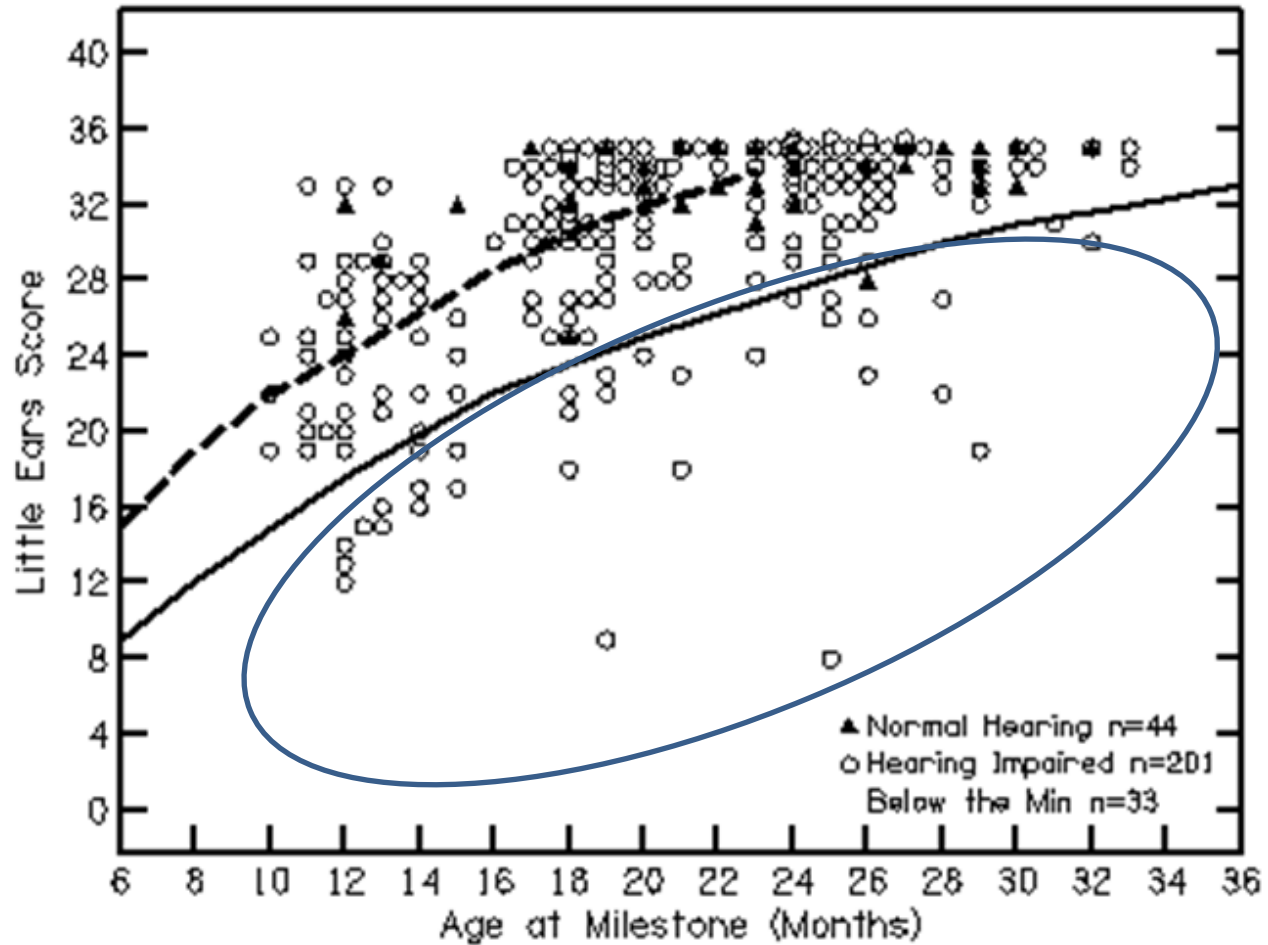


Model accounted for 35% of the variability.

Auditory Development Questionnaires

- LittleEars – 12 months – 2 years
- PEACH – 12 months – 2 years – once 28 on LittleEars

LittEARS



Higher
audibility

Larger
vocabulary

Higher
scores on
LittleEARS

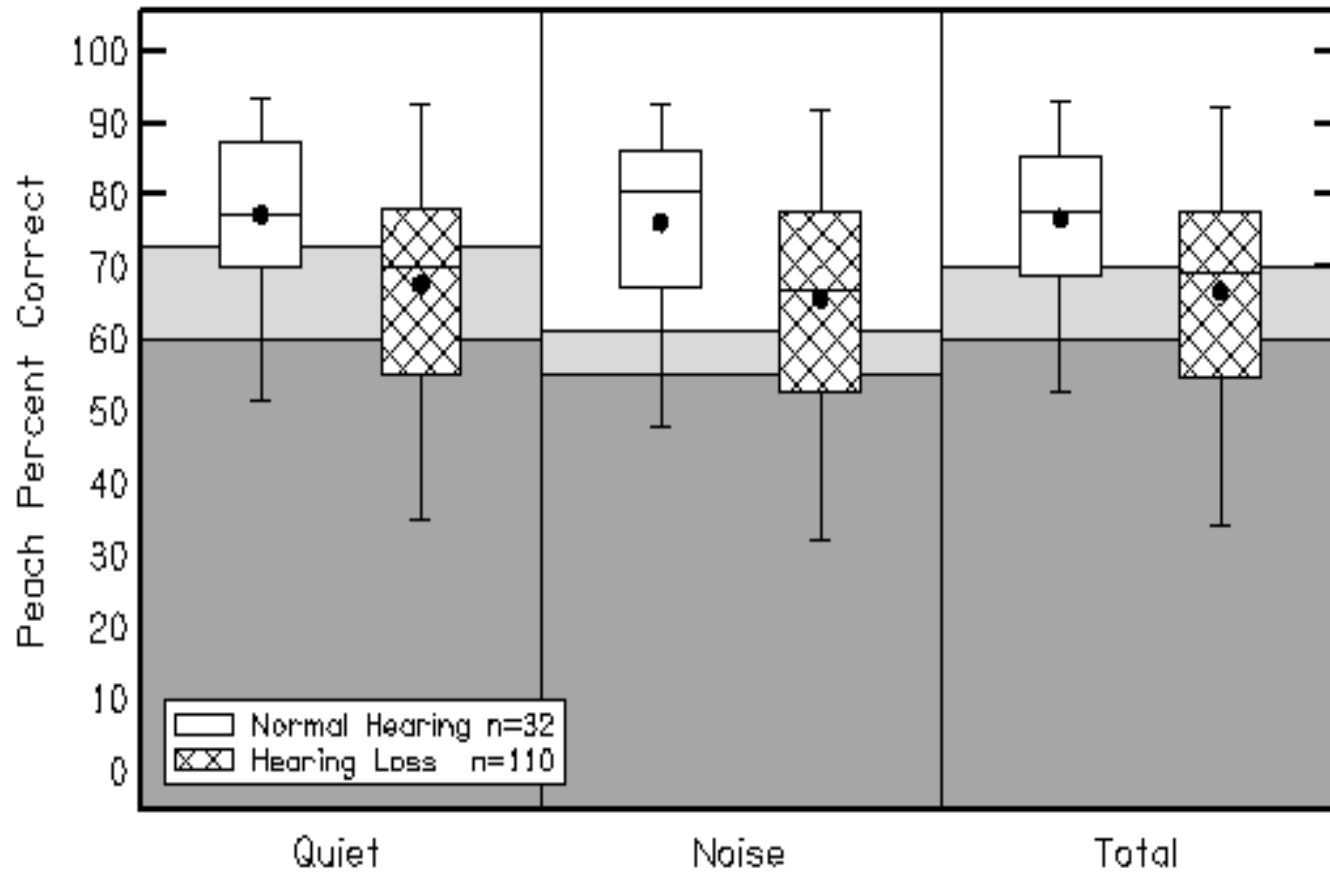
Greater
hearing
aid use

Model accounted for 48% of
the variability. Age and
maternal education level were
not significant

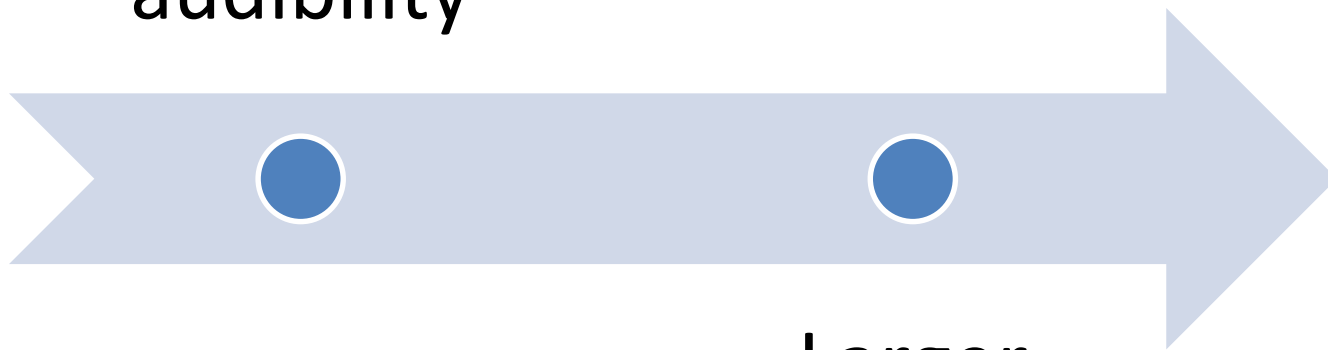
Parents Evaluation of Aural/Oral Performance in Children (PEACH)

- Questionnaire with Quiet and Noise subscales
- Developed by Ching & Hill (2006)
- Part of UWO-PedAMP protocol
- Initiated when subjects had 28 or higher on LittleEars
 - Average age 21 months

PEACH



Higher
audibility

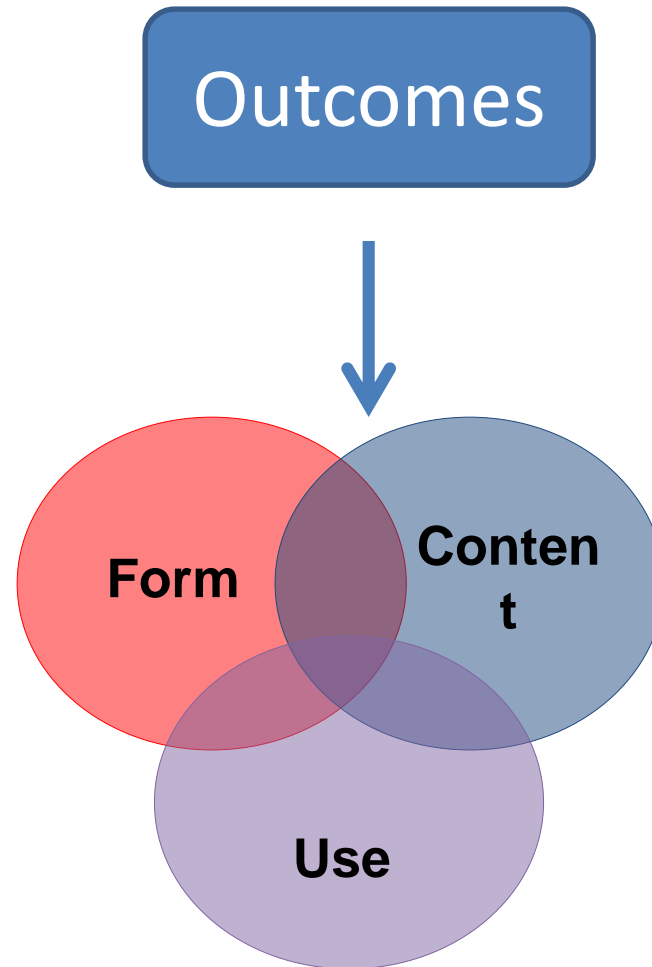


Larger
vocabulary

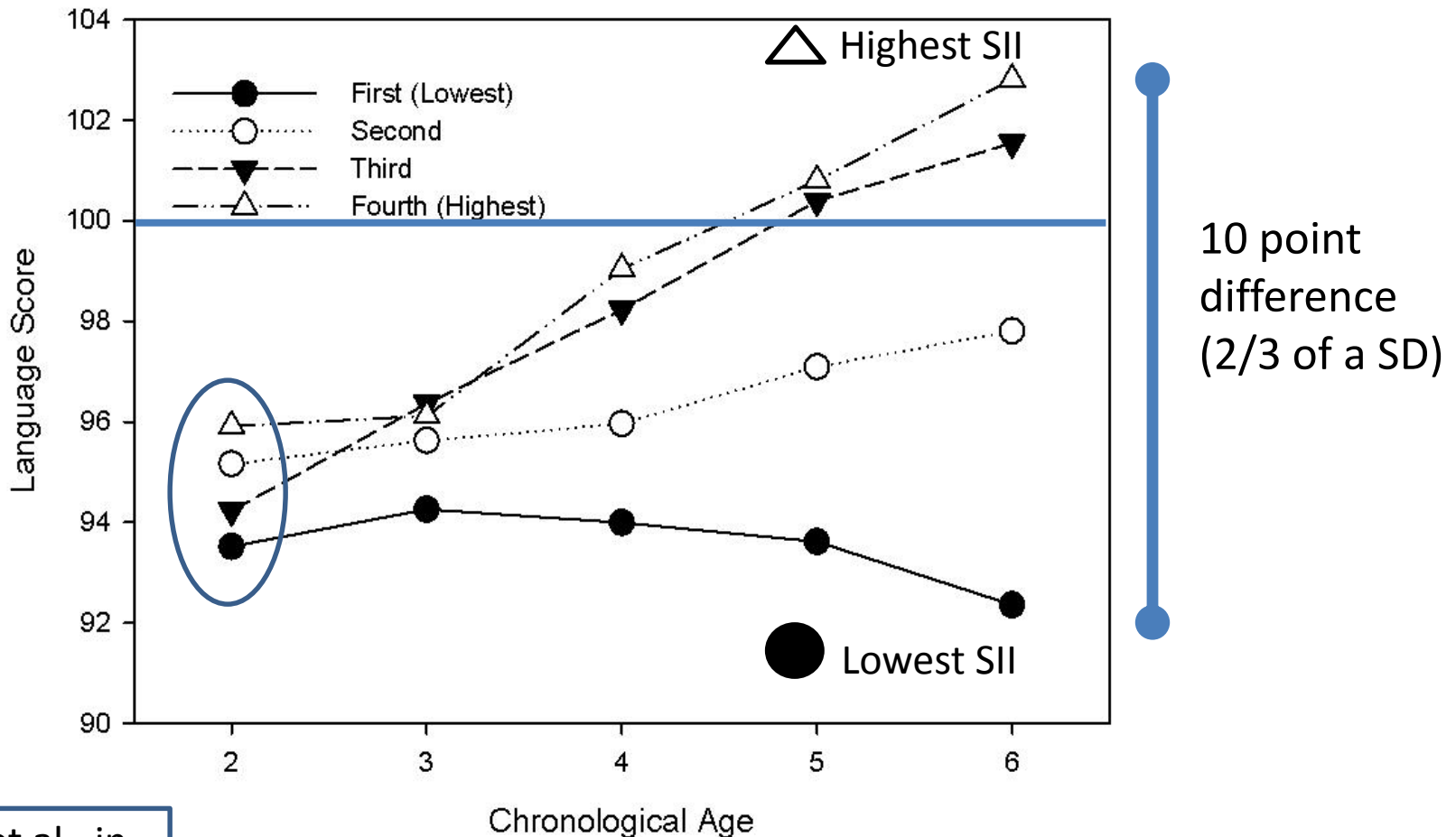
Higher
scores on
PEACH

Model accounted for 43% of
variance. Maternal education
level, hearing aid use were not
significant

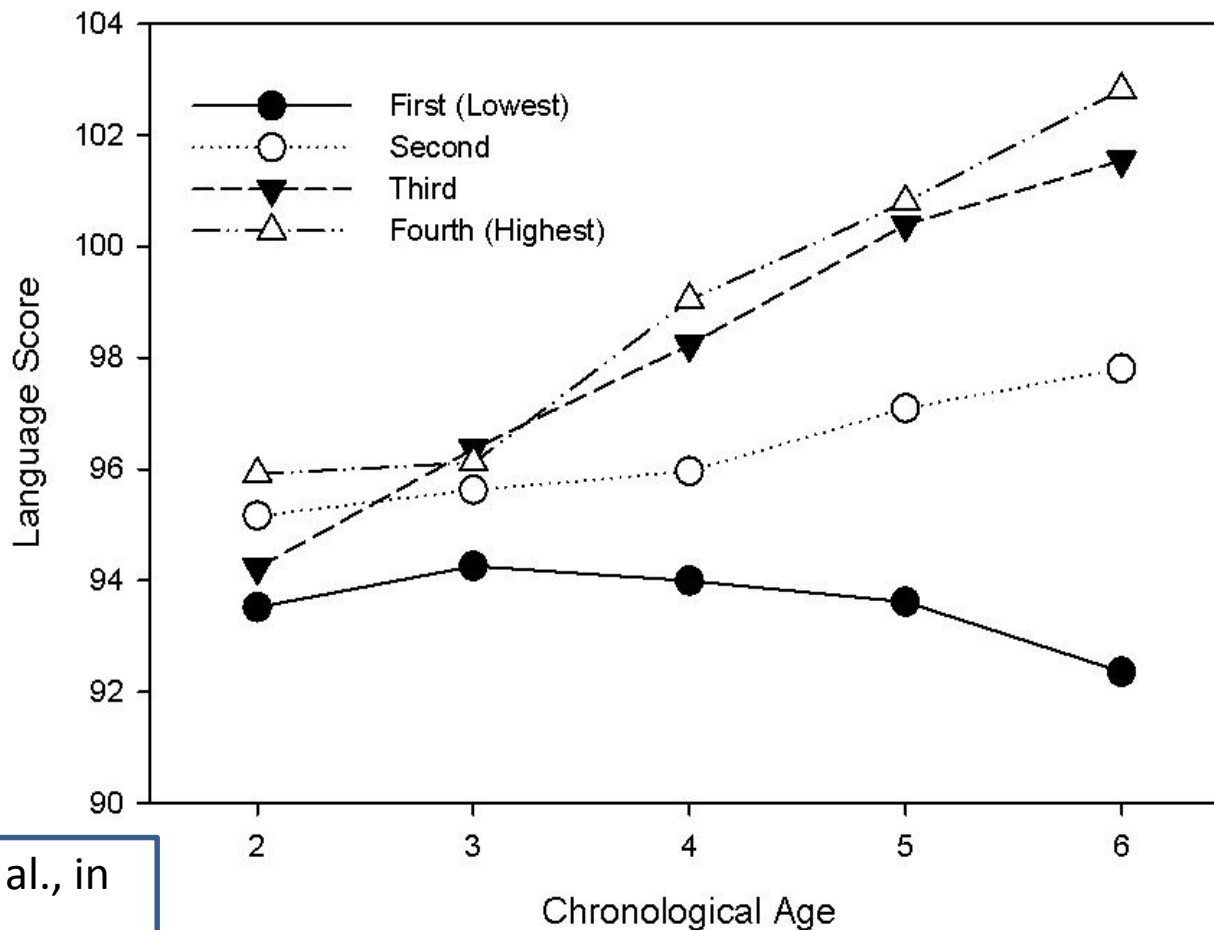
Does cumulative auditory experience influence language outcomes?



Language scores as a function of audibility



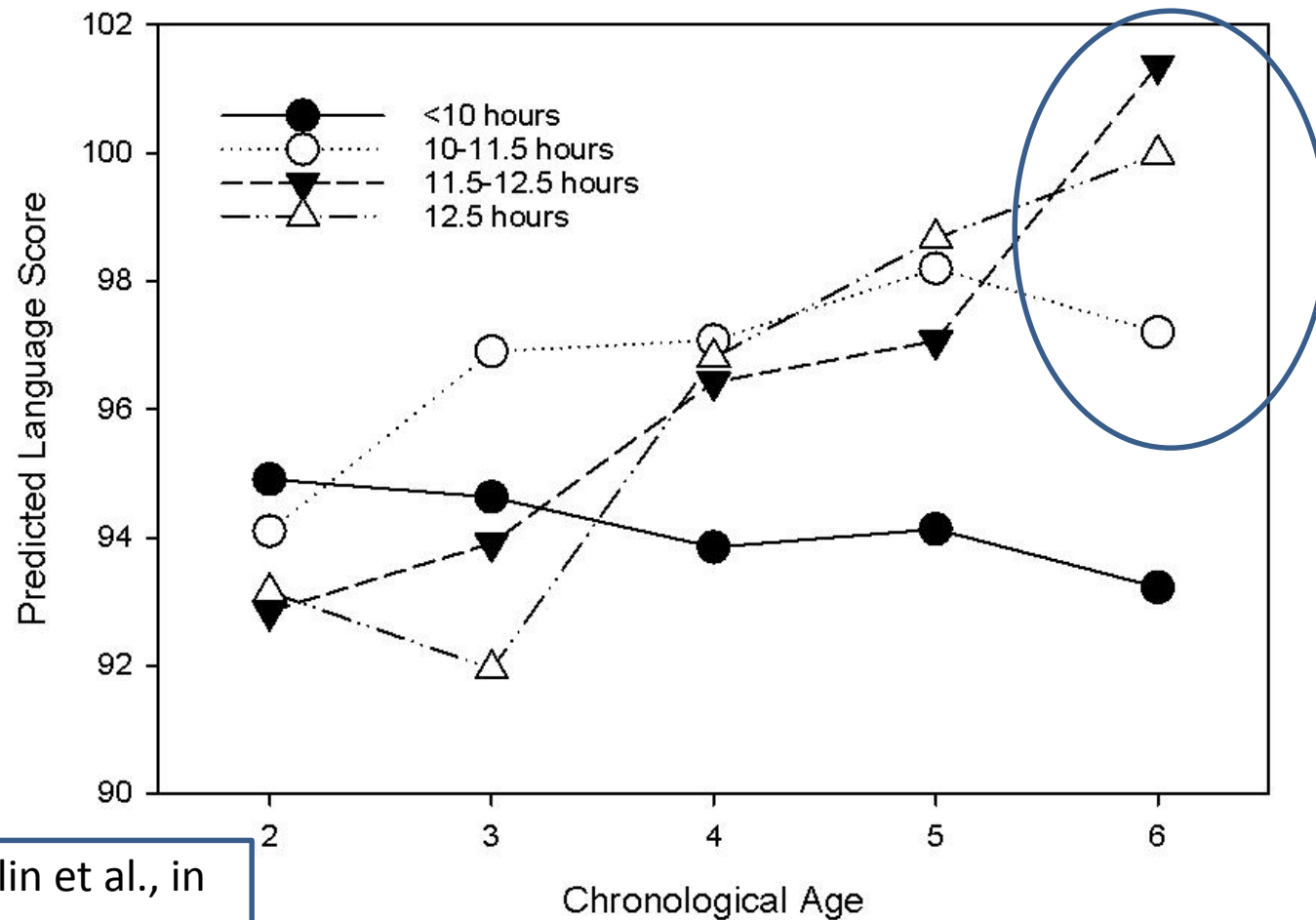
Tomblin et al., in
press



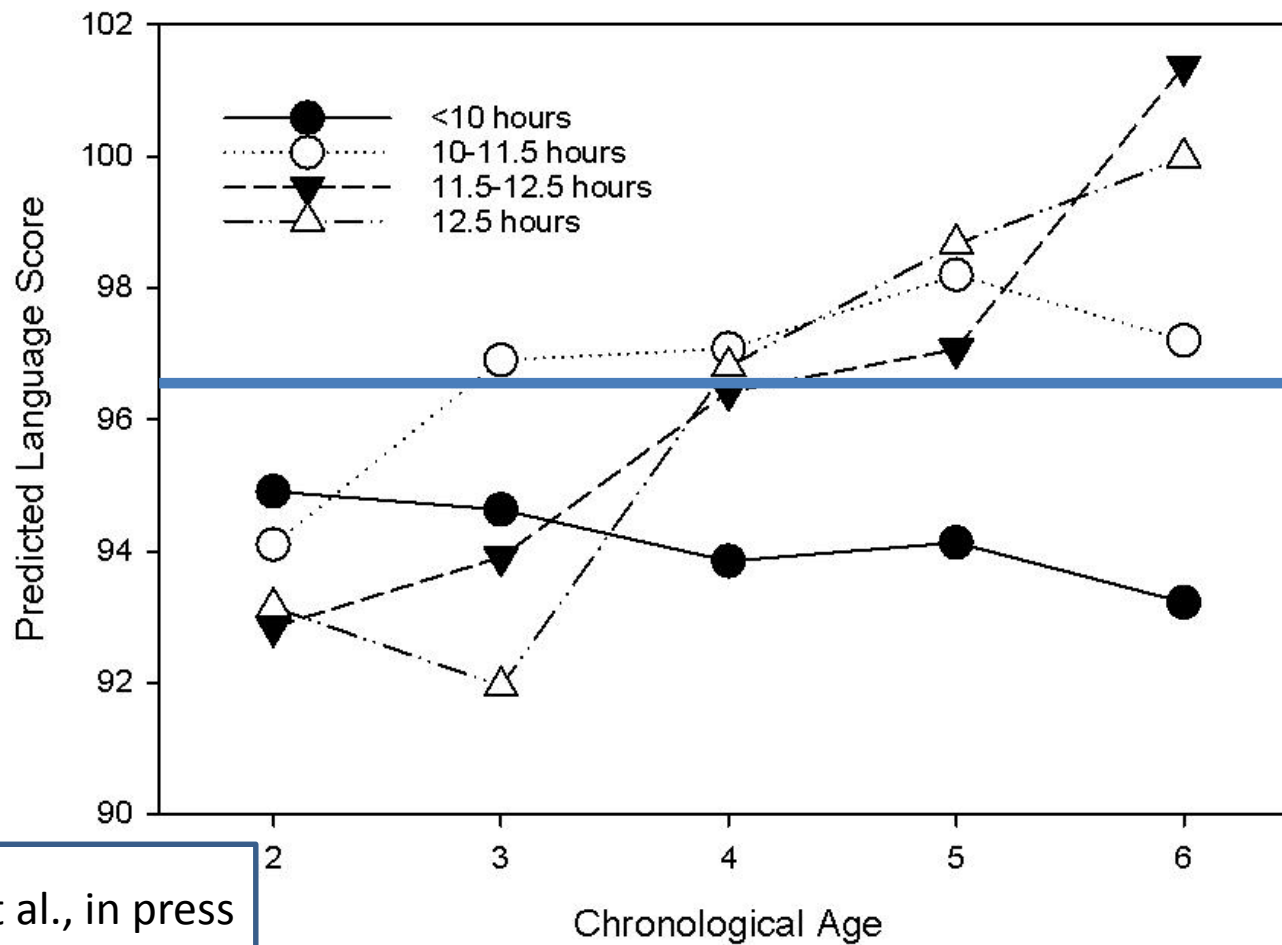
Tomblin et al., in
press

Children who receive the most benefit
from HAs show steeper growth in
language skills

Language scores as a function of daily HA use



Tomblin et al., in
press



Tomblin et al., in press

Children who wear HAs more than 10 hours/day show steeper growth in language skills

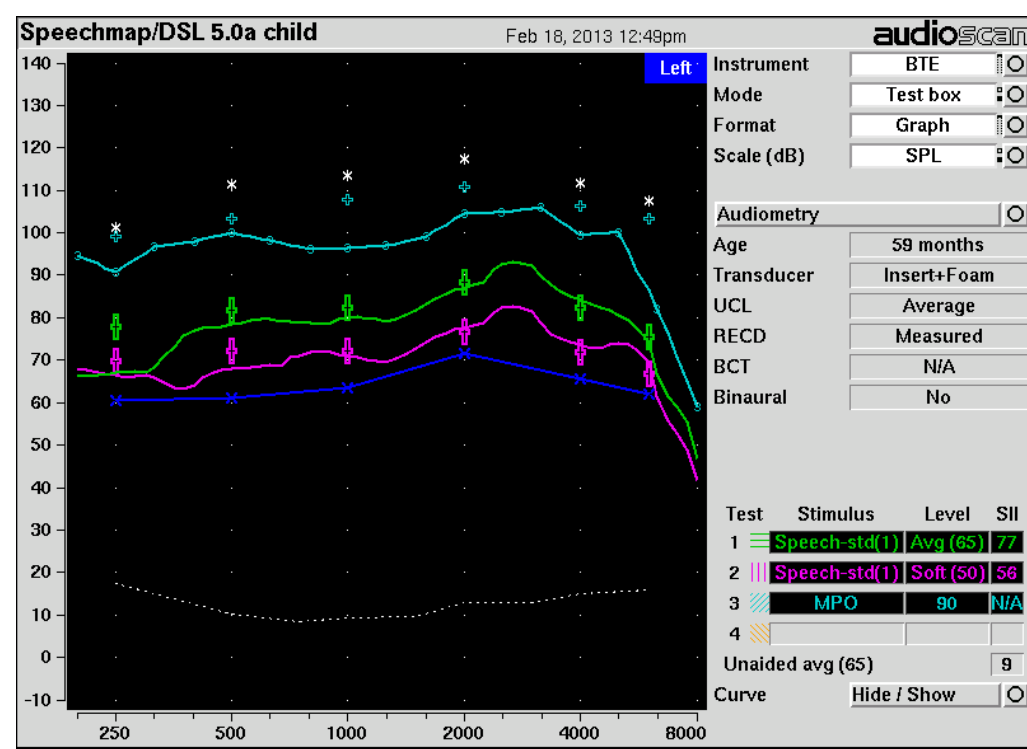


The best part of me is my ears. I use my ears to hear. I love my ears because they are white.



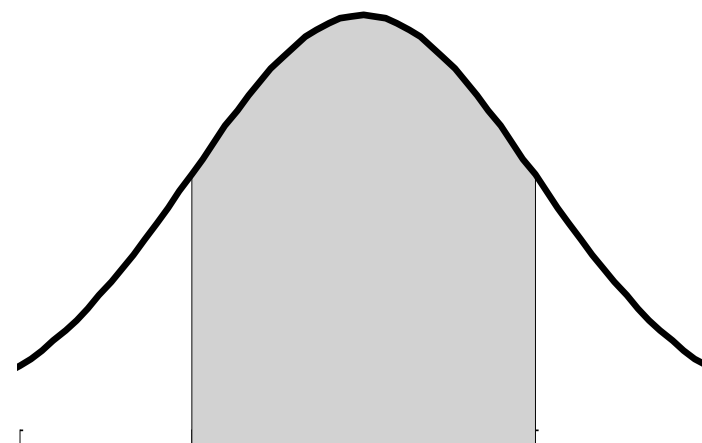
The best part of me is my ears. I use my ears to hear. I love my ears because they are white.

Molly



Amount of daily hearing aid use

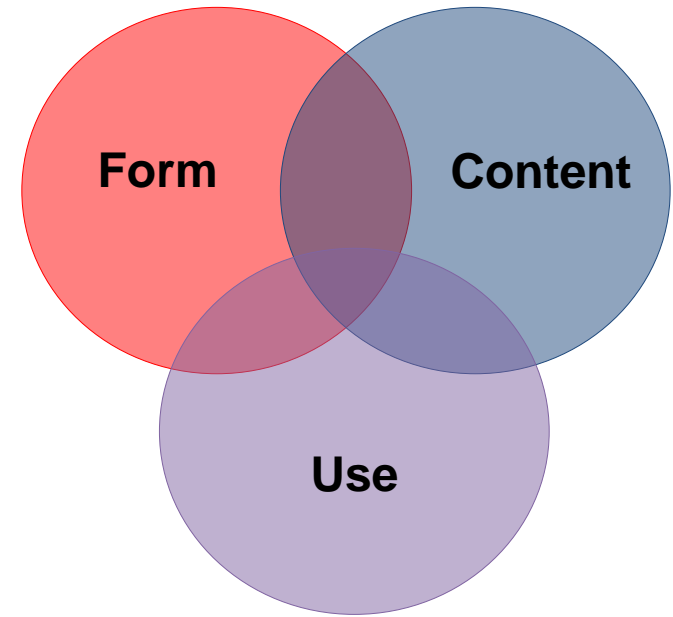
12.2 hours/day left ear and 12.7 hours/day right ear



PRINT AWARENESS			★
SYNTAX			★
VOCABULARY		★	
SPEECH PRODUCTION		★	

What are the clinical implications?

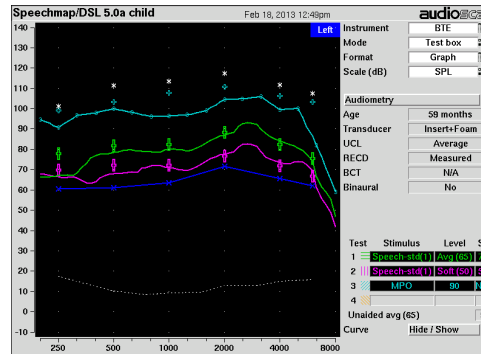
Children who are hard of hearing are at risk for delays in language acquisition



Protective factors include:



timely detection and intervention services



Hearing aids that are fit to prescriptive targets



early and consistent use of hearing aids