Outcomes for Children with Hearing Loss

Effects of age of ID, sign support, and auditory prosthesis

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Overview of Presentation

• I. Background and Design (10 min)
• II. The BIG Picture (15 min)
• III. The Interesting Side Stuff (10 min)
• IV. Clinical Implications (10 min)
• V. Summary and Conclusions (5 min)

50 minutes
Background and Design
Independent Variables

Hearing loss

Age of Identification (ID) of hearing loss

Use of signs to support spoken language input – or not

Type of prosthesis
hearing aid (HA)
cochlear implant (CI)
Characteristics of Participants

• No secondary handicaps
• English as the only language
• Children with HL
  – Greater than 50 dB HL PTA in better ear
  – Receiving intervention at least once per week before 36 months of age; increases at preschool
  – Parents want child to have spoken language as their mode of communication
Characteristics of Samples

• This study used large, diverse samples of the populations to be tested. In this way the effects of variability in variables not of interest were minimized.

• All parents explicitly stated that their goal for their children was that they would be mainstreamed without sign language interpreters.
Note on Sign Language

• For parents in this study sign input was used by parents as support to spoken language input.

• Stated reasons for use were to promote development of spoken language, alleviate frustration, and provide communication prior to implantation.
What we tested

- Parenting Stress: Parenting Stress Index (PSI)
- Child Negative Behaviors: Child Behavior Check List (CBCL)
- Adaptive Behavior: Scale of Independent Behavior-Revised (SIBR)
- Nonverbal cognitive intelligence: Leiter
What we tested

• Auditory Comprehension of Language
  PLS-4
• Expressive Vocabulary
  LDS & EOWPVT
• Language Function
  Unstructured and Elicited Samples
• Language Form
  including SALT
What we tested

- Acoustic analysis of speech samples
- Speech intelligibility
  CSIM
- Parental Language Style
Rigorous Test Procedures

• Examiners trained and certified
• Examiners made as few scoring decisions as possible
• Scorers at central site were blind regarding participant characteristics
• Two scorers made every measurement, entered every data point, reliability checked at each step
Big Picture Results
No group differences found for anything that does not involve language.
Finding #2

Having a hearing loss delayed language development even for children with everything going right.
No strong effects of sign language were found for language development or behavior, for children with NH or with early IDed HL.
Finding #4

Only mild delays generally found for late IDed HL, with some more significant delays for children using signs.
Finding #5

Early IDed children with CIs were delayed compared to early IDed children with HAs.
Language Function and Form

Tested by scoring of 20-min samples of parent-child interactions.
Child’s Communication Acts

• Function
  – Parent-directed and child-initiated
  – Parent-directed response
  – Non-directed communication

• Form
  – Real word
  – Vocalization
  – Manual
Child-Initiated Acts

- Request for object
- Request for action
- Protest
- Comment
- Inquiry
- Routine
Directed-Response Acts

Acknowledgement
Answer
Imitation

Non-directed Acts

Comment
Request
Object address
Talk through
SALT

Starting at 30 mos.

- Mean length of utterance – word and morpheme
- Number of different words
- Number of pronouns
- One-word utterances
- Modal/auxiliary verbs
- Number/type conjunctions
- Question words
Language Function and Form

• Children with HL use fewer utterances with real words, give fewer answers, and imitate more frequently.

• Sign support has little effect, for children IDed at birth.

• Only mild delays for children IDed late, except greater delays for those using signs.

• For early IDed children, CI users trail HA users.
Parental Language

- Inquiry
- Directive
- Imitation
- Routine
- Visual cue
- Explanation
- Talk through
- Comment

- Verbal approval
- Nonverbal approval
- Verbal response
- Nonverbal response
- Verbal disapproval
- Nonverbal disapproval
- Nonverbal model
- No response
Parental Language

• Parental use of verbal responses strongly correlated with child’s language development.

• $r = .78; r^2 = .61$
The Interesting Side Stuff
Are there Stars?

Criteria, from SALT

- Within $\frac{1}{2}$ SD of NH mean on:
  - MLU
  - Total # Words
  - # Different Words
  - # 1-word utterances

4 Stars Found at 36 m

- 1 with HAs
- 2 with CI/HA combo
- 1 with CI/HA combo to 30 m, then bilateral CIs
Interesting Stuff

- Age of implantation had no effect on outcomes.
- Two prostheses were always better than one.
- Having an HA on the unimplanted ear was better than having nothing or having two CIs.
- Socio-economic status had stronger effects for children with NH.
Clinical Implications
Seven Principles

#1: Identify children with HL as young as possible.

#2: No need to use sign support, unless the goal is explicitly that the child will be using ASL.

#3: Provide as much spectral input, for as long as possible.

#4: Let children see you talking.
Seven Principles

#5: Train parents to:
   Be sensitive to children’s communicative attempts.
   Provide the language the child needs at the moment.
   Encourage children to produce their own language.
Seven Principles

#6: Train parents NOT to:
   Simply label objects
   Use directives to get children to talk
      (“Say _______”)
#7: Use complete language structures.
Summary

• HL delays language development…. even when children have everything going for them.
• Sign support has no effect, unless HL was identified late.
• Early IDed children with CIs trail peers with HAs.
• Late ID had mild negative effect, mostly for children using signs.