Children Who are Hard of Hearing…
A New Chapter

EHDI: Partnering for Progress
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Children who are “Hard of hearing”

- Inconsistent definition in the literature
  - Audiolological criteria
  - Functional communication criteria
  - Cultural affiliation/Identity

- For our purposes today
  - Children in mild and moderately-severe range
  - Use hearing aids rather than CIs
  - Reliant *primarily* on speech and listening for functional communication (Jamieson, 2010)
Standing on the shoulders of giants...

We must maximize residual hearing & understand holistic developmental needs...

Our terms lead to underestimation of children's needs....What does "mild" convey?

These are our "Forgotten Children."

Mark Ross, Ph.D.

Noel Matkin, Ph.D.

Julia Davis, Ph.D.

“Using the understanding gained by major thinkers who have gone before in order to make intellectual progress.”
Why called “Forgotten Children?”

- Underestimation of needs
- Limited training of classroom teachers, school personnel
- Little is known about:
  - educational achievements
  - problems faced in regular classrooms
  - acceptance or non-acceptance by peers
  - extent of support services & impact
- Poorly monitored amplification

Davis, J. (1977)
A New Generation...

- This population is “on the move” due to:
  - early identification
  - improved auditory access
  - early and effective family-centered programs

How do we maximize this opportunity for the majority of infants and families?
New Chapters...
Chapter 1: The path to discovery differs

- Information is unsolicited and may conflict with observation
- Delivered at a sensitive & potentially vulnerable time *(ASHA, 2008)*
- Family perception of a “timetable of development”
  - Service delays equated with harm *(Young & Tattersall, 2007)*
  - Families focus on later outcomes; limited understanding of preverbal stages/supports *(McCraeken, et al., 2008)*
- Developmental expectations *(Young & Tattersall, 2007)*
Supporting families on the path…

- Balance of informational and adjustment counseling (ASHA, 2008)
- Practical baby-focused supports for families
- Care about development discussions
- Sensitivity to affective dimensions
Chapter 2: We need more evidence to support best practice

- Most outcome studies focus on children who are deaf
- Reduced body of literature concerning children who are HH (Mild and moderately-severe degrees)
  - Sample sizes are small or mix D/HH children
  - Lack of control of amplification histories/audibility
  - Few studies attempted a population sample
  - Varied measurement strategies; earlier generation technologies
Longitudinal Study of Outcomes

University of NC-Chapel Hill
University of Iowa
Boys Town National Research Hospital

PIs: J. Bruce Tomblin, Ph.D. and Mary Pat Moeller, Ph.D.

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Study design

- Each child followed for 3 years+.
- Retrospective data prior to enrollment obtained by medical record history.
Participants

<table>
<thead>
<tr>
<th>Centers</th>
<th>HH</th>
<th>TH</th>
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<tr>
<td>Boys Town</td>
<td>117</td>
<td>40</td>
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<tr>
<td>Iowa</td>
<td>85</td>
<td>48</td>
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<tr>
<td>North Carolina</td>
<td>104</td>
<td>24</td>
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<tr>
<td>Total</td>
<td>306</td>
<td>112</td>
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- Ages 6 months – 6; 11
- English spoken in the home
- No major secondary disabilities
- Permanent Mild to Severe Hearing Loss
- PTA of 25-75 dB HL (500, 1k, 2k, 4 kHz)
  - Normally distributed by degree
  - Majority early identified; ~78% fit by 6 months
Age-appropriate vocabulary, on average at later ages

Mean at 60 months = 99.28
Mean at 84 months = 98.47
Aided Hearing Matters for Vocabulary Development

$r = .510^{**}$

$n = 59$
Syntax appears to be more challenging
Reading Skills within Average Range at Age 6

6yr WRMT-R

Standard Scores

- NH (n=16)
- HH (n=57)
Chapter 3: We need to identify & address areas of development that may be “at risk”

- The “complexities of developing spoken language are ameliorated, but not eliminated, by early amplification and interventions.” (Blamey, et al., 2002)

- Impact of inconsistent access
  - Phonological learning
  - Morphological development
  - Advanced syntax
  - Social reasoning
Is phonology “at risk” in some HH children?

Bilateral mild-moderate hearing loss
Articulation at 3, 5, & 7 years: GFTA

Green = HH
X = TH
Is morphology “at risk?”

We developed a DVD to probe 9 different morphological endings

Regular Plural

Irregular plural
Mean BEPTA = 51.0 (SD = 14.9); Mean SII = .75 (SD = .16); Mean Age = 49.5 months

Influences?
- Bandwidth/Audibility
- Phonology
- Sentence position
- Input frequency

3s = he walks
Advanced Skills: Social Reasoning

Theory of Mind Task
Theory of Mind Performance at Age 5 years

NH pass rate = 90.9%**
HH pass rate = 34.2%

Chi square = 22.260; p = .001

Correlated with CELF
r = .546, p = .001
Verbal reasoning
r = .563, p = .001
Narrative: Candy Stealing Story
Chapter 4: Maybe we need to ask some different questions...
“Acoustic Ecology” (McKellin, et al., 2007): Need for more focus on accessibility/inaccessibility

“In spite of the crucial role of hearing inaccessibility in the lives of children who are hard of hearing, there has been no interdisciplinary, systematic attempt from a developmental perspective to integrate what is known about the acoustic ecology of childcare and educational settings with the lived experience of the hard of hearing children who inhabit them.”
Impact of Poor Classroom Acoustics on Hearing Students (McKellin et al., 2007)

- Acoustic Ecology Project
  - 36 students, grades 1-7, worked at their desks
  - wore ear-level microphones, so that a stereo recording of the noise and conversation at the wearer’s ear could be recorded
  - the pragmatics were significantly altered as the level of background noise at ear level increased:
    - e.g., soliloquy and parallel talk, which reflected verbal and social isolation
Impact of Inconsistent Access on Socialization of HH Students

- Jamieson, Poon, Zaidman-Zait & Hodgson (2009)
  - Studied peer interactions of 11 HH elementary students
  - Classroom & playground observations, interviews of parents & classroom and resource teachers
  - Measured classroom acoustics
Language/Social Accessibility or Inaccessibility affected by interacting factors:

- Child's Hearing Loss
- Age & Language Abilities
- Room Acoustics & Adaptations
- Classroom activity
- Teacher Understanding & Adaptations

Buffered by child’s personal resiliency, parent advocacy, Informed staff
For hard of hearing children:

- Most important relationship is between child and teacher
  - Does the teacher understand and accommodate hearing loss?
- Difficulty overhearing social cues; if social skills not explicitly taught, group entry skill often not developed
  - Child may withdraw socially
  - Intrude inappropriately

Jamieson, et al., 2009
For hard of hearing children:

- Some difficulties with social skills when adults not present
- May establish pattern as “loner” or “follower”
- In the classroom, often follow lead of other students
- By 4th grade, classroom teacher expects self-reliance in terms of hearing aids

Jamieson, et al., 2009
“...a year or two ago, the children’s conversation was less complicated and less rapid-fire, less witty, less all those things. It was easier for her to keep up. And I’d say the more she ages, the more she’s unable to stay a part of the conversation. So I’d say more and more her strategy is that she’s just leaving and just not bothering.”

Jamieson, et al., 2009
Socialization matters for Learning

- Quality of social relationships tied to academic progress
- Learning with friend vs. classmate impacts:
  - Conflict management
  - Deductive reasoning
  - Problem solving
  - Exploration
Classroom Social Experiences

Bottom line:  Promotion of positive relationships with peers contributes not only to social development, but emotional and cognitive (learning/academic)

Flook, Repetti & Ullman, 2005
A Resource for Families

- Seven Essential Life Skills
  - Focus and self control
  - Perspective taking
  - Communicating
  - Making connections
  - Critical thinking
  - Taking on challenges
  - Self-directed, engaged learner
Summary

- Need to recognize unique and ongoing family support needs
- Need for more research focused on children who are hard of hearing
  - Interdisciplinary input
  - In complex listening environments typical of real settings
- Understanding factors promoting positive psychosocial development
- Need for sensitive measures and an integrated view of language and social cognition
Longitudinal Study Team Members

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Thanks

Any questions?