

ROLE OF PARENT QUESTIONNAIRES IN ASSESSING AUDITORY SKILL DEVELOPMENT

Alison Meagher
Johanna Oropeza
University of Colorado



DISCLOSURE AND ACKNOWLEDGMENTS

We received support from the following grants for the research presented here:

This project was supported, in part, by the Health Resources and Services Administration (HRSA) under the Leadership Education in Neurodevelopmental Disabilities (LEND) Grant T73MC11044 of the U.S. Department of Health and Human Services (HHS). This information or content and conclusions are those of the author and should not be construed as the official position or policy of, nor should any endorsements be inferred by HRSA, HHS or the U.S. Government.

The contents of this poster were developed under a grant from the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR grant number 90RE5020-01-00). NIDILRR is a Center within the Administration for Community Living (ACL), Department of Health and Human Services (HHS). The contents of this poster do not necessarily represent the policy of NIDILRR, ACL, HHS, and you should not assume endorsement by the Federal Government.

This presentation was partially supported by the Disability Research and Dissemination Center (DRDC) through its Cooperative Agreement Number 5U01DD001007, from the Association of University Centers on Disabilities, and from the Centers for Disease Control (CDC) and Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the DRDC, AUCD or the CDC.

OUTLINE

- Reliability of parent report
- Auditory questionnaires for 0-3 years of age
- Colorado Home Intervention Program (CHIP)
- LittlEARS
- Auditory Skills Checklist
- Future directions

BENEFIT OF PARENT REPORT

- Used to assess early language development of young children
- Advantages¹:
 - 1. Access to parents' knowledge
 - 2. Cost-effective and time-efficient
 - 3. Not limited by factors that may affect performance during formal testing
- Parent involvement in therapeutic intervention

VALIDITY OF PARENT REPORT

- Parent questionnaires have been shown to be "suitable and reliable screening tools with high validity," Grimm and Doil (2000)²
- In language development data³:
 - Can provide data that's more representative of infant and toddler language lab samples
 - Less subject to situational influences of language sampling and structured tests

CONCERNS WITH PARENT REPORT³

- What if the parent misunderstands the instructions or misperceives or misreports child's ability?
- Decisions should be corroborated by clinical assessment(s)
- "When a crucial hypothesis is being tested, one that will affect the course of future work, it is wise to have confirming evidence of more than one type."

AUDITORY SKILLS QUESTIONNAIRES

- To determine hearing abilities of DHH children
- Can track progress over time for the same child
- Comparison to typically hearing peers
- Can help determine gaps for therapeutic intervention
- Help caregivers understand a child's abilities

AUDITORY SKILLS QUESTIONNAIRES

- IT-MAIS
- ELF
- PEACH
- LittlEARs
- Auditory Skills Checklist (ASC)

COLORADO HOME INTERVENTION PROGRAM (CHIP)

- A statewide, family-centered, in-home early intervention program that serves DHH infants and toddlers, birth to age three, and their families
- Follow child's learning and growth through the program
- Administer developmental questionnaires regularly
- Usually every 6 months

CHIP ASSESSMENTS

Demographics form

Auditory skills questionnaire

Child development questionnaire

Language assessment

Play assessment

Vision assessment

Parent needs questionnaire

Videotaped/transcrib ed language sample

COLORADO HOME INTERVENTION PROGRAM (CHIP)

- Several years' data from this program was used for our research
- Children with bilateral HL aged 6 36 months
- Normal cognition
- Did not control for age of intervention, type of therapeutic intervention, maternal level of education, hearing loss configuration, progressive hearing loss

DETERMINING DEGREE OF HEARING LOSS

Based on the better ear PTA at .5k, 1k, and 2k Hz

Normal: < 26

High frequency: >30 dB at 2k, 3k, and 4k Hz

Mild: 26 - 40

Moderate 41 - 55

Mod-severe 56 - 70

Severe-prof NR on ABR

Severe 71 - 90

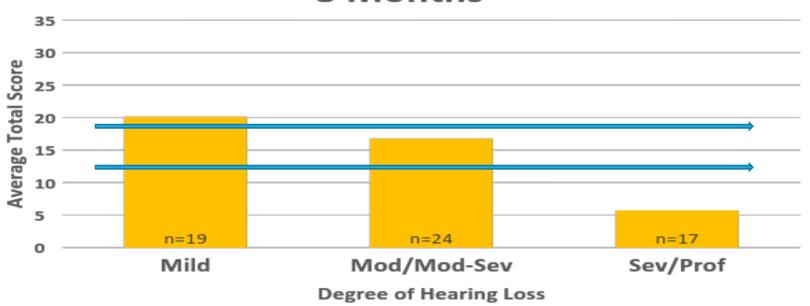
Profound > 90

LITTLEARS

- Aims to provide information to clinicians concerned with the progress of infants and toddlers with normal hearing or with infants who need f/u after NBHS⁴
- 35 "yes/no" questions to capture the receptive, semantic, and expressive behaviors and milestones of a <u>normally hearing</u> infant or toddler
- Follows children over time

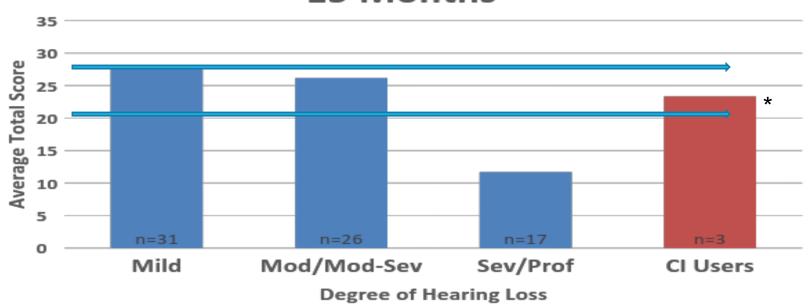
AVERAGE TOTAL SCORES

8 Months



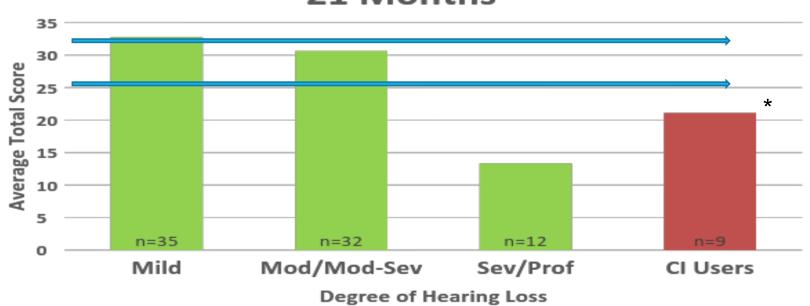
AVERAGE TOTAL SCORES

15 Months

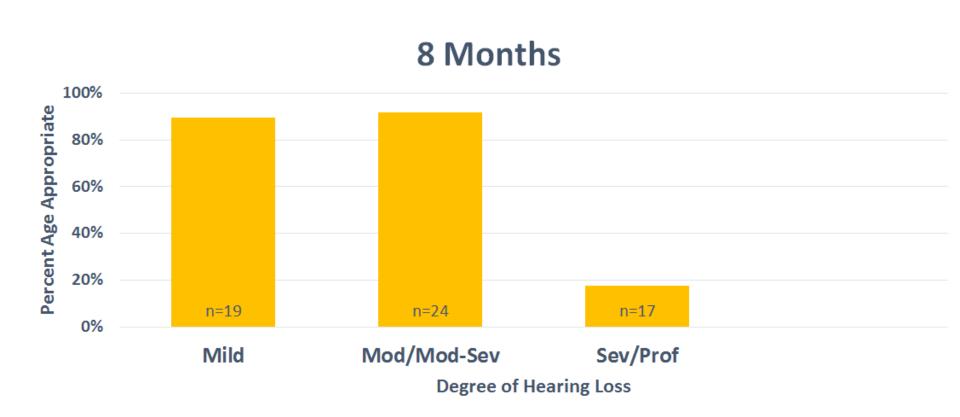


AVERAGE TOTAL SCORES

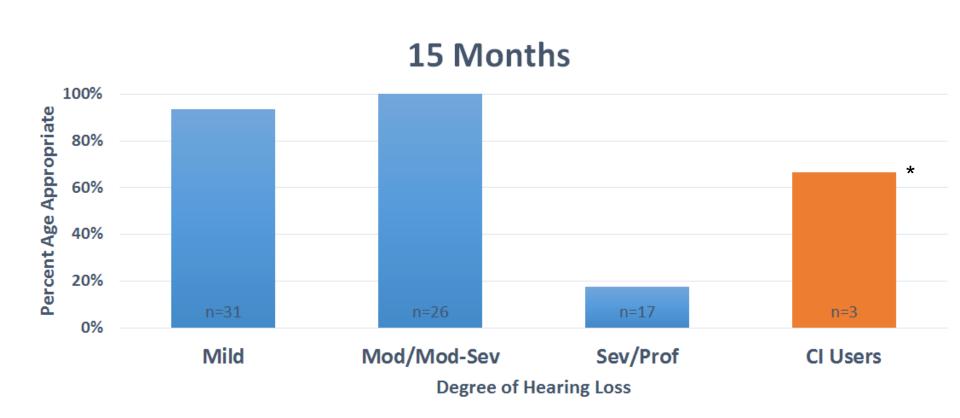
21 Months



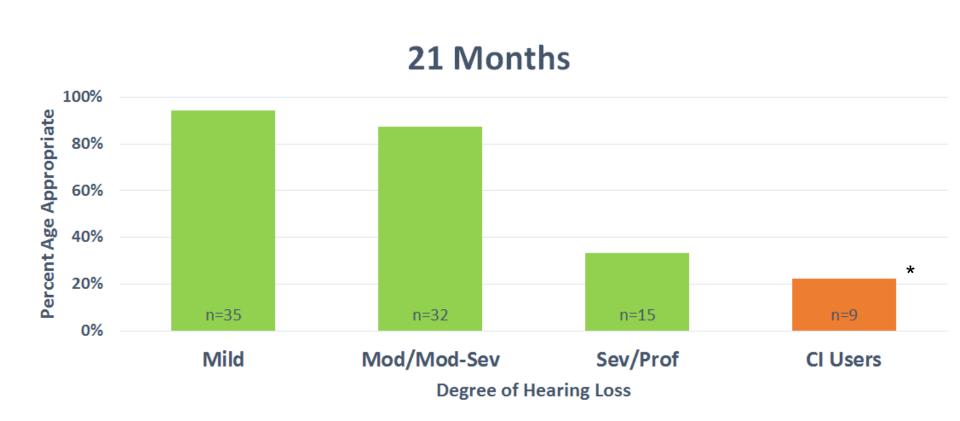
Percent of Children with Age-Appropriate Scores



Percent of Children with Age-Appropriate Scores



Percent of Children with Age-Appropriate Scores



LITTLEARS CONCLUSIONS

- As hearing loss increases total scores and age appropriate scores decrease
- For mild to moderate-severe hearing loss subjects:
 - Similar scores
 - As children age, total scores increase
 - Most children aged 15 months appear to have acquired the majority of the skills

THE AUDITORY SKILLS CHECKLIST⁵

Date of Visit:		e:		
Amplification Device:		Date of Birth:		
Amplification Date: Identificatio		ification Number:		
S = has skill			ekill	
DETECTION 5 - nas skill E - emerging skill D - doesn't nave skill DETECTION				
-	Does your child	н	0	
1	wear the amplification device during his/her waking hours?			
2	use body language to indicate when something is heard (ex. Turn head, and/or eye widening, quiets, stops action, changes facial expressions)?			
3	expressorss; show awareness (turns to the sound source, silents or quiets in response to loud sound) of loud environmental sounds (ex. dog backing)?			
4	show awareness of soft environmental sounds (ex. microwsve želi, clock licking)?			
5	show awareness of voices, spoke at typical loudness levels?			
6	detect the Ling Six Sounds (M, AH, OO, E, SH, S)?			
7	detect the speaker's voice when background noise is present?			
8	search to find out where a sound is coming from?			
9	search to find out where a sound is coming from? localize correct sound source (to the direction the sound is coming from)?			
DIS	CRIMINATION			
	Does your child	н	0	
10	discriminate the voice of a speaker talking and sounds in his/her environment?			
11	discriminate different types of environmental sounds (ex. dog barking versus a felephone ringing)?			
12	discriminate a speaker using a soft voice (whisper) and a loud voice (conversational level)?			
13	discriminate a person singing (ex. "Happy Birthday") from a person having a convenation?			
14	discriminate family members voices (ex. Ded's voice versus Mom's voice versus a sibling's voice)?			
15	discriminate minimal pair words (Similar sounding words such as pet, bet, and met)?			
16	discriminate similar sounding phrases and sentences (ex. "How old are you?" versus "How are you?")?			

Auditory Stills Checklist

S = has skill E = emerging skill D = doesn't have skill н о Does your child. 18 identify an item with an associated sound (ex. a train goes choo choo)? identify one-syllable words versus two and three-syllable words (ex. ball vs. hotdog vs. computer)? 20 understand if the speaker is happy, angry, or surprised by the change in their yousi tones? identify or recognize commonly used words (varies from child to child): identify the Ling Six Sounds (M. AH. OO. E. SH. SY? Does your child... н о 24 follow one-step directions (ex. "Get your shoes.")? 25 follow two-step directions (ex. "Get your shoes and open the door.")? 26 follow three-step directions (ex. "Get your shoes, open the door, and walk outside.")? 27 have an auditory memory for # Items (ex. being able to remember boat, apple, cup, and shoe would be 4 items!) 28 have an auditory memory for phrases/sentences (ex. "The girl jumped over the fence to get the ball.")? 32 understand the use of negatives in phrases and sentences (ex. no, not, no more)? 33 understand frequently heard phrases/sentences (ex. "Brush your teeth and get ready for bed.")? 35 understand most of what is said through audition alone?

ASC

Designed to identify the auditory skills of children in four domains

- •Detection: 8
- Discrimination: 7
- •Identification: 7
- •Comprehension: 12

Dat	te of Visit: Name:					
٩m	plification Device: Date of Birth:	Date of Birth:				
٩m	implification Date: Identification Number:					
	S = has skill E = emerging skill D = does	n't have :	skill			
DE	TECTION			1		
	Does your child	н	0	1		
1	wear the amplification device during his/her weiding hours?			1		
2	use body language to indicate when something is heard (ex. Turn head, and/or eye widening, quiets, stope action, changes facial expressions)?					
3	show awareness (furns to the sound source, elects or quiets in response to loud sound) of loud environmental sounds (ex. dog banking)?					
4						
5	show ewareness of voices, spoke at typical loudness levels?					
6	detect the Ling Six Sounds (M, AH, OO, E, SH, S)?					
7	detect the speaker's voice when background noise is present?					
8	search to find out where a sound is coming from?					
9	5 search to find out where a sound is coming from? 1 toositize correct sound source (to the direction the sound is coming from)?					
DIS	DISCRIMINATION					
_	Does your child	н	0	1		
10	decriminate the voice of a speaker talking and sounds in his/her environment?					
11	decriminate different types of environmental sounds (ex. dog barking versus a felephone ringing)?					
12	discriminate a speaker using a soft voice (whisper) and a loud voice (convenational level)?					
13	decriminate a person singing (ex. "Happy distribley") from a person having a conversation?					
14	discriminate family members voices (ex. Dad's voice versus Mom's voice versus a sibling's voice)?					
15	decriminate minimal pair words (Similar sounding words such as per, bet, and mat)?					
16	descrimate similar sounding phrases and sentences (ex. "How old are you?" versus "How are you?"??					

DE	NTIFICATION		
	Does your child	н	O
17	identify his/her name when called?		
18	identify an item with an associated sound (ex. a train goes choo choo)?		Г
19	identify one-syllable words versus two and three-syllable words (ex. ball vs. holding vs. computer)?	П	Г
20	understand if the speaker is happy, angry, or surprised by the change in their vocal tones?		Г
21	identify or recognize commonly used words (veries from child to child)?		Г
22	Identify the Ling Six Sounds (M, AH, OO, E, SH, S)?	Т	Г
23	Identify familier songs (ex. "Happy birthday", "Itsy Biltsy Spider", "Old McDoneid")?		Г
co	MPREHENSION		
	Does your child	н	C
24	follow one-step directions (ex. "Get your shoes.")?		
24 25	follow one-step directions (ex: "Get your shoes.")? follow two-step directions (ex: "Get your shoes and open the door")?	\vdash	
_			
25	foliow two-step directions (ex. "Get your ahoes and open the door.")?		
25 26	follow two-step directions (ss. "Get your shoes and open the door")? follow tree-step directions (ss. "Get your shoes, open the door, and walk outside.")?		
25 26 27	follow less-skep directions (sec. "Out your above and open file door ")? Moles Brow-skep directions (sec. "Out your above, upon the door, and walk cubids.")? Name are adding memory for #Brow (se, being able to remember loos, epide, cup, and above would be 4 family?		
25 26 27 28	Makes New ready directions (in: "Diff year whose and quair the date"?? Makes New ready directions (in: "Diff year whose, upon the date; of walk activities"?? Allow Steve and Allow ready the Allow (in: "Diff year whose, upon the date; of walk activities"?? New see in auditory readers year Allow (in: "Diff year Allow or purpose of whose whose of the date"?? New see in auditory readers yet yet presentation control. One "They gift proposed over the finite one by yet find bath??		
25 26 27 28 29	Note the case of directions (or. "Oil year africe and quantite disor")? Note the case of direction (or. "Oil year africe, specific disors, of a direct and with middle")? Note or modifiery memory for \$2\texts(mid. or. \texts(mid. or.		
25 26 27 28 29 30	Make two map distribute (in: "Dat your about and specified about?") About the man of the control of the contro		
25 26 27 28 29 30 31	Nation through directions (in: "Diet your about and upon the date;")? State throws the direction (in: "Die your about and upon the date; and with includin")? Nation throws the direction (in: "Diet your line direction of a date; and with includin")? Nation in multiple required to the "Lambour (in: Initial bits in branched bits of gaple, top, and about another for a date;")? Nation in multiple required for presentation (in: "The principant race the flows to put this ball?")? Applicable required the "Diet of the "Diet of the "Diet of the date;" in the date; "I would not be desired, "I would not be desired, "I would not be desired," "I would not be desired, "I would not be desired," "While I reduce the opening the principant of the date;" "While I reduce the opening the principant of the date;" "While I reduce the opening the principant of the date;" "While I reduce the opening the principant of the date;" "While I reduce the opening the principant of the date;" "While I reduce the opening the principant of the date;" "While I reduce the opening the principant of the date;" "While I reduce the opening the principant of the date;" "While I reduce the opening the principant of the date;" "While I reduce the opening the principant of the opening the principant of the date;" "While I reduce the opening the principant of the opening the principant of the opening the principant of the opening		
25 26 27 28 29 30 31	More two-step directions (in: "Oil your about and upon the data"?) More two-step direction (in: "Oil your about, upon the data", and with includin "?) More in million years of the "		

ASC

Points are given per question for a total max of 70

- •2 points = child has skill
- 1 point = skill is emerging
- •<u>O points</u> = child does not have skill

Dat	te of Visit: Name:				-
Am	nplification Device: Date of Birth:				
Am	nplification Date: Identification Numb	er:			
	S = has skill E = emerging skill	D = doorn't h		- 1-20	
S = has skill E = emerging skill D = doesn't have skill DETECTION					
	Does your child		н	0	1
1	wear the amplification device during his/her weiding hours?				1
2	use body language to indicate when something is heard (ex. Turn head, and/or eye widening, quiets, stope as expressions?	tion, changes fecial		г	1
3	show awareness (furths to the sound source, elects or quiets in response to loud sound) of loud environmental backing?	sounds (ex. dog		Г	1
4	show awareness of soft environmental sounds (ex. microwave Jell, clock ficking)?			\vdash	1
5	show awareness of voices, spoke at typical loudness levels?			1	
6	detect the Ling Six Sounds (M, AH, OO, E, SH, S)?			1	
7	detect the speaker's voice when beckground noise is present?			1	
8	5 search to find out where a sound is coming from?			100	
9	9 localize correct sound source (to the direction the sound is coming from)?				ľ
DISCRIMINATION					
	Does your child H O				1
10	decriminate the voice of a speaker talking and sounds in his/her environment?				1
11	11 decriminate different types of environmental sounds (ex. dog barking versus a telephone ringing)?				1
12	2 discriminate a speaker using a soft voice (whitiper) and a loud voice (convessational level)?			1	
13	discriminate a person singing (ex. "Happy Birthday") from a person having a convenation?			1	
14	4 discriminate family members voices (ex. Ded's voice versus Mont's voice versus a sibling's voice)?			1	
15	5 decriminate minimal pair words (Similar sounding words such as pet, bet, and mat)?			1	
16	6 decriminate similar sounding phrases and sentences (ex. "How old are you?" versus "How are you?"??			1	
_					

	S = has skill E = emerging skill D = doesn'	t have	skil		
IDE	IDENTIFICATION				
	Does your child	н	0		
17	identify his/her name when called?				
18	identify an item with an associated sound (ex. a train goes choo choo)?				
19	Identify one-eyllable words versus two and three-eyllable words (ex. ball vs. holding vs. computer)?				
20	understand if the speaker is happy, angry, or surprised by the change in their vocal tones?				
21	identify or recognize commonly used words (varies from child to child)?				
22	I Identify the Ling Six Sounds (M, AH, OO, E, SH, S)?				
23	I Identify familier songs (ex. "Happy birthday", "Itsy Bitsy Spider", "Old McDonaid")?				
COMPREHENSION					
	Does your child	н	0		
24	follow one-step directions (ex. "Get your shoes.")?	П			
25	foliow two-step directions (ex. "Get your shoes and open the door,")?				
26	follow three-step directions (ex. "Get your shoes, open the door, and walk outside.")?				
27	have an auditory memory for #items (ex. being able to remember boot, apple, cup, and shoe would be 4 items)?				
28	have an auditory memory for phrases/sentances (ex. "The girl jumped over the fence to get the ball.")?				
29	excitority sequence a story with _3 events, _4 events, _4-events (ex. ?" event =Steve went to the store; ?" event=He bought dog bones; 3" event = Steve took the bones home to the dog?	П			
30	understand the question formsWhet,Where,Who,When (ex. "Where is the dog?"; "Who broke the cup?")?				
31	understand concepts in phrases and sentences (ex. in, under, between, in front/?	П			
32	understand the use of negetives in phrases and sentences (ex. no, not, no more)?	П			
33	understand frequently heard phrases/sentences (ex. "Brush your teeth and get ready for hed.")?				
34	acquire information incidentally through audition alone?	П			
35	understand most of what is said through audition alone?	П			

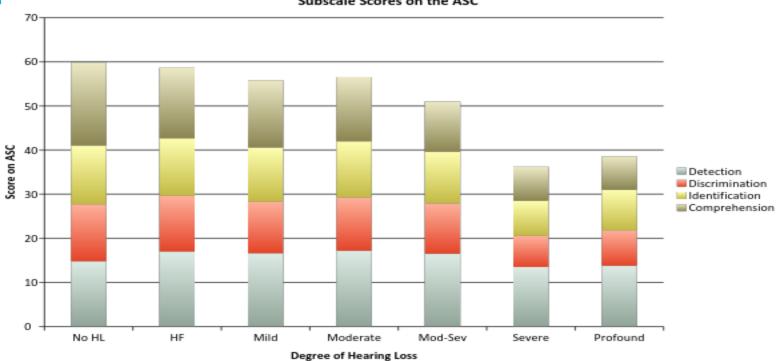
ASC SUBJECTS

- Over 200
- Aged 24-36 months
 - Previous research showed no differences between 24-27 month age range and 33-36 month age range

Degree of Hearing Loss	Number of Subjects
No hearing loss* 6	30
High frequency	13
Mild	59
Moderate	56
Moderate-Severe	15
Severe	19
Profound (CI)	25

ASC RESULTS

Subscale Scores on the ASC

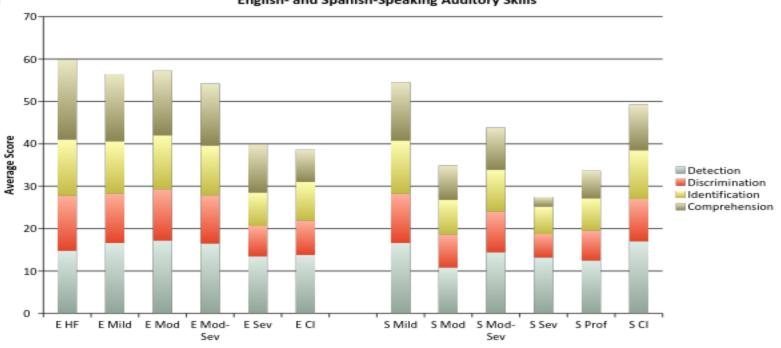


ASC CONCLUSIONS

- Typically developing children achieve the highest scores overall
- As hearing loss increases, scores on the ASC decrease
- Children with high frequency through moderate-severe degrees of hearing loss have similar total scores on the ASC
- All children do better on the basic skills than they do on the higherorder skills
- DetectionDiscriminationIdentification
 - Comprehension

ASC ENGLISH VS. SPANISH

English- and Spanish-Speaking Auditory Skills



Degree of Hearing Loss

SUMMARY

LittlEARs

Mild to moderatesevere hearing loss subjects:

As they age, total scores increase

Most at 15 months appear to have acquired the majority of the skills

As hearing loss increases total scores decrease

moderate-severe degrees of hearing loss have similar total scores

Children with up to

ASC

Typically developing children achieve the highest scores overall

All children do better on the basic skills than they do on the higherorder skills

FUTURE DIRECTIONS

- Reliability/validity of parent report
- Analysis of other questionnaires
- Comparison with other auditory questionnaires

THANK YOU



References

- 1. Fenson, L., Dale, P. S., Reznick, J. S., Thai, D., Bates, E., Hartung, J. P., Pethick, S., & Reilly, J. S. (1993). MacArthur Communicative Development Inventories: User's guide and technical manual. San Diego, CA: Singular Publishing Group, Inc.
- 2. Grimm, H., & Doil, H. (2000). Elternfragebögen für die Früherkennung von Risikokindern: ELFRA. Hogrefe, Verlag für Psychologie.
- 3. Fenson, L., Dale, P. S., Reznick, J. S., Bates, E., Thal, D. J., Pethick, S. J., ... & Stiles, J. (1994). Variability in early communicative development. Monographs of the society for research in child development, i-185.
- 4. Coninx, F., Weichbold, V., Tsiakpini, L., Autrique, E., Bescond, G., Tamas, L., ... & Brachmaier, J. (2009). Validation of the LittlEARS® Auditory Questionnaire in children with normal hearing. *International journal of pediatric otorhinolaryngology*, 73(12), 1761-1768.
- 5. Meinzen-Derr, J., Wiley, S., Creighton, J., Choo, D. (2007). Auditory Skills Checklist: Clinical tool for monitoring functional auditory skill development in young children with cochlear implants. *Annals of Otology, Rhinology, and Laryngology*, 116, 812 818.
- 6. Tyberg, L. (2013). Auditory skill development of children with normal hearing (ages birth to three years), as determined by responses to the Cincinnati Auditory Skills Checklist. University of Colorado, Boulder.