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The relationship between provider confidence and auditory skill development
in young children who are deaf or hard of hearing

by

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A thesis

submitted in partial fulfillment

of the requirements for the degree of

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Committee Approval

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The relationship between provider confidence and auditory skill development
in young children who are deaf or hard of hearing

Thesis Abstract--Idaho State University (2020)

The purpose of this paper was to determine the auditory skill development outcomes of children who are deaf or hard of hearing and the relationship of auditory outcomes to providers within the state of Idaho. Parents of 57 children completed the LittleEARS questionnaires. Twenty providers from IESDB completed the Listening2Learn checklist. The data from the LittleEARS and L2L was analyzed for child and provider outcomes and demographics. A correlational analysis was conducted to determine the relationship between child auditory outcomes and provider confidence. Results indicated that many children within Idaho are not meeting developmental milestones for auditory skills and providers are more confident in skills related to hearing technology than auditory skill development. There was a negative correlation between LittleEARS outcomes and caregivers conducting listening checks, a negative correlation between LittleEARS and hearing technology worn, and positive correlation was found between provider confidence in assessing discrimination skills and LittleEARS outcomes.

Key Words: auditory skill development, children who are deaf or hard of hearing, provider confidence, speech-language pathologist, teachers of the deaf or hard of hearing, early intervention

The relationship between provider confidence and auditory skill development in young children who are deaf or hard of hearing

Newborn hearing screenings allow for earlier identification of hearing loss resulting in increased auditory and communication development in children who are Deaf/Hard of Hearing (DHH) (Muse et al., 2013). The Joint Committee of Infant Hearing (JCIH, 2019) outlines best practice related to serving children who are DHH as early intervention services provided by providers with specialized skills and knowledge (Muse et al., 2013); however, in reality, many speech-language pathologists (SLPs) report a lack of training in serving young children who are DHH in their pre-professional education programs, particularly as it relates to hearing technology (Apuzzo & Yoshinaga-Itano, 1995; Babeu, 2016; Ben-Itzhak, Most, & Weisel, 2005; Harrison et al., 2016; Moseley, Brandt, & Fleming, 1994). However, full-time use of well-fit hearing technology is essential to the development of spoken language (Tomblin, Oleson, Ambrose, Walker, & Moeller, 2014; Tomblin, Harrison, Ambrose, Walker, Oleson, Moeller, 2015). To date, there has been little research examining the relationship between provider confidence and the auditory outcomes of children who are DHH. This project will examine if and how provider confidence and auditory skill development of children who are DHH are related. This will provide direction as to how to better educate service providers resulting in increased provider skill confidence for those who service children who are DHH.

Literature Review

The American Academy of Pediatrics (AAP) reports that hearing loss is the most prevalent congenital disorder within the United States with approximately 3 in 1000 infants born with hearing loss each year (AAP, 2019). The importance of timely identification and intervention for children who are DHH has been well established (JCIH, 2007; Sininger, Grimes,

& Christensen, 2010. Tomblin et al., 2014). Prior to newborn hearing screenings, the average age of identification was 24 to 30 months, or later, for children with a mild to moderate hearing loss (Barksy-Firkser & Sun, 1997). Lack of consistent auditory access can lead to delayed academic, cognitive, and linguistic development (Dobie & Van Hemel, 2004 & Hauser, Lukomski, & Hillman, 2008).

In 1993, the National Institute of Health (NIH) held the Consensus Development Conference that established recommendations for screening all newborns before they leave the hospital (National Institute of Health, 2018). This conference acted as a catalyst for the Newborn and Infant Hearing Screening and Intervention Act of 1999, resulting in increased funding for state by state newborn hearing screening programs. Since the establishment of newborn hearing screenings, 47 states have state legislation regarding newborn hearing screenings programs (National Center for Hearing Assessment and Management, 2019). Every state has Early Hearing Detection and Intervention (EHDI) programs responsible for tracking and early intervention services even if newborn hearing screenings are not state-mandated. For example, statistics reported to the Centers for Disease Control and Prevention (CDC) indicate that 99.4% of Idaho newborns received hearing screenings even though the state of Idaho does not mandate screenings (2016).

Roles of Early Intervention Service Providers

Skilled Early Intervention (EI) providers with experience servicing children who are DHH are needed to maximize the effects of newborn hearing screenings. Early interventionists are those who provide services to children ages birth to 3 who have been identified as having or being at risk for a disorder (Muse et al., 2013). Speech-Language Pathologists' (SLP) role in serving children who are DHH is to conduct evaluations and assessment regarding language,

speech, and cognitive-communication development (JCIH, 2007). While skilled EI providers are needed to maximize the impact of newborn hearing screenings, SLPs report low confidence in serving this population. Specifically, SLPs report decreased confidence in understanding hearing technology devices, supporting hearing technology wear time, and communication related to validation of fit of technology.

Previous Studies on Provider Confidence

Moseley, Mahshie, and Brandt (1994) conducted a national survey to assess the formal training of 487 SLPs serving children who are DHH. The survey used a 5-point Likert (1 = very good and 5= poor) scale that was divided into four categories including: fundamentals of speech and language, audiology, clinical procedures, and deafness. Respondents reported confidence in their understanding of normal speech and language development with a mean score of 1.8 but indicated decreased comfort in clinical procedures when providing speech and language intervention to children with hearing loss with a range of scores from 2.4 to 3.4. The lowest scores were found in SLP's assessment procedures to fit the client's primary communication modality. If SLPs report low confidence in adjustment of clinical and assessment procedures it may be possible that they are not fully considering the impact of auditory skill development on listening and spoken language outcomes.

Compton, Tucker, and Flynn (2016) evaluated the preparation and preparedness of SLPs to service school-aged children with cochlear implants. The study included 190 school-based speech language pathologists from the state of North Carolina. Results of the survey indicated that 79% of the participants reported little to no confidence in providing services or maintenance to children with cochlear implants. Only 3% of the participants indicated training on cochlear implants, 6% on troubleshooting, and 21% on habilitation and rehabilitation treatment methods

for children with cochlear implants. Of the respondents, more than 65% of SLPs over 46 years of age reported no formal education on CI devices. This value is a reminder that as the field of speech-language pathology evolves, many SLPs may not receive formal education on new research and practice methods. The results indicate an overwhelming amount of SLPs who are not adequately prepared to service and maintain hearing technology. It was noted that most contact with audiologists occurred in the preschool years.

Within the last decade, the research regarding hearing loss and speech language pathology has grown. Kobylas (2016) investigated the knowledge of school-based speech-language pathologists (SLPs) related to children's hearing technology with the goal of better understanding if there was a need for updating graduate requirements related to serving children who are DHH. Of the 400 SLPs who received surveys, 95 completed and returned the surveys. Over 96% of the SLPs who responded had children with hearing loss on their caseload. Few SLPs (37.6%) responded that they did not have any access at all to an educational audiologist. In the survey, most of the SLPs reported that they "*somewhat disagreed*" (*a mean of 3.69 from a 1-7 scale from "strongly disagree" to "strongly agree"*) that graduate school prepared them to serve this population (Kobylas, 2016). Specifically, participants reported that they were not comfortable performing maintenance tasks on hearing technology.

Babeu (2016) studied hearing technology and challenges of academic settings SLPs experience within the state of New Hampshire. Of the 37 American Speech Language Hearing Associated (ASHA) certified speech language pathologists who participated in the study, less than half (43%) indicated formal training on cochlear implants and only 19% reported receiving training in graduate school (i.e., the majority of training was received through continuing education courses). While SLPs report inadequate training, only 50% of SLPs report using

available resources such as online resources, continuing education, and in-service training (Babeu, 2016). When evaluating skills related to service provision, SLPs reported they were moderately *confident* in their ability to provide intervention related to speech, language, and literacy, as well as, their ability to complete hearing technology maintenance skills such as troubleshooting devices and creating optimal sound field environments (Babeu, 2016). Consistent with the findings that there is a lack of preparation, 100% of the participants *strongly agreed* that more training is needed (Babeu, 2016, p. 19).

These findings were supported by the five-year multisite project, Outcomes of Children with Hearing Loss (OCHL) (Tomblin et al., 2015). As part of this larger study, Harrison et al, (2018) studied the relationship between factors that influence the self-confidence of service providers through a questionnaire of providers who serve children who are DHH. Participants included 122 caregivers and 131 early intervention (EI) providers associated with children who were DHH enrolled in the OHCL study (Harrison, et al., 2016). Results indicated professionals with a higher prevalence of children who are DHH on their caseload are more likely to report self-confidence in service delivery than those with fewer children who are DHH on their caseloads. Education level and the number of years of EI service provision were less indicative of provider confidence. Regardless of education level, professionals with a bachelor's, master's, or doctorate had an overall average score of 3 on a scale of 1 to 4 in terms of comfort level (Harrison et al., 2016).

Page, Harrison, Moeller, Oleson, Arenas, and Spratford (2018) also examined provider confidence and collaboration with audiologists. In this survey of SLPs, teachers of the DHH (TODHH), and audiologists, 133 preschool and 104 elementary service providers responded to questions related to service roles, education, confidence, and years of experience. The majority

of respondents were SLPs and TODHH. TODHH reported significantly more confidence than SLPs in treating children who are DHH. Respondents indicated that graduate training did not provide them with the skills necessary to develop listening and spoken language skills and that continuing education was essential in their ability to specialize in hearing loss.

The Joint Committee of Infant Hearing (JCIH) (2013) outlines that EI services to be provided by EI providers with “specialized skills and knowledge,” (p.1330), yet this research suggests that for the last 30 years there has been a consistent lack of preparation in the ability of EI providers to adequately service children who are DHH. A lack of understanding of hearing technology was a consistent theme between the studies. Auditory skill development is part of the bridge between hearing technology and speech and language skills. If providers are not confident in adapting treatment and assessment procedures, as well as managing hearing technology, then it is likely that confidence in auditory skill development is lacking.

Auditory Skill Development

Decreased access to auditory input negatively impacts auditory skills that are foundational for development of spoken language. Sininger et al. (2010) explained that development of spoken language is dependent upon an acoustically rich environment and the ability of the auditory system to transport acoustic and linguistic input to the central nervous system during early development. Sininger et al. (2010) indicated that children by 6 months of age are able to distinguish speech (as cited in Kuhl, 1979). McCreery et al. (2015) reported that children who are DHH score lower than typical hearing peers in auditory and speech recognition and continue to experience delays in these skills. They further noted that even with increased timeliness of age of amplification, pediatric hearing loss naturally alters the experiences and opportunities for auditory development.

Auditory skill development is described as occurring in four stages including detection, discrimination, identification, and comprehension. Detection skills include responding and recognizing the presence of sound. Discrimination skills includes recognizing that sounds are different. Identification skills include understanding simple words and phrases. Comprehension includes the ability to use vocabulary to think, describe, answer questions, and utilize sounds for language.

Measures of Auditory Skill Development

Documentation of auditory skill development and speech recognition have been reported as essential for evaluating the effectiveness of service provision by early intervention providers (McCreery et al., 2015). Parent reports through use of questionnaires are recommended as a primary method for documentation and assessment of auditory skill development (Bagatto et al., 2011b). Grim and Doil stated that parent questionnaires are a reliable means for infant and toddler testing because infants and toddlers are less likely to participate in unfamiliar situations and environments making it difficult to complete formalized testing (as cited by Coninx et al, 2009). Furthermore, Ching et al. (2013), indicated that parent ratings of auditory skill development during early infancy can support predictions of language abilities of children 3 years of age. As a result, new parent-based questionnaires continue to be developed for use of assessment of auditory skills (as cited by Ching & Hill, 2006; Tsiakpini et al., 2004). Of the many questionnaires that have been developed to assess auditory outcomes in children who are DHH, the LittleARS, ABEL, and PEACH are some of the more reliable and frequently used questionnaires.

Questionnaires Frequently Utilized

Bagatto, Moodie, Richard, Seewald, Bartlett, and Scollie (2011a) reviewed subjective tools used to measure auditory outcomes of children who are DHH between the ages birth to 6. The purpose of this study was to support development of an evidence-based assessment protocol system by performing analysis on subjective assessment tools currently in use. In this review, the Andresen (2000) operational definition and grading scale was used to compare and assess the quality of subjective questionnaires that measure auditory outcomes of DHH (Bagatto et al, 2011a). The inclusionary criterion for selected questionnaires included an age range of birth to 6, questionnaire or interview format, parent/caregiver response, audiologist administration and scoring, auditory related outcomes, and application CWDD. The 12 selected assessments were graded based upon 13 psychometric properties, administrative properties, responsiveness, and adaptations based upon format, culture, and language characteristics. Findings indicated that only 4 of the 12 assessments received high grades on most grading criteria. Of those 4, the LittleEARS Auditory Questionnaire and the Parents' Evaluation of Aural/Oral Performance of Children (PEACH) Rating Scale were found to be the most reliable to include in a set of guideline standards for measures of auditory outcomes.

Purdy, Farrington, Chard, and Hodgson created the Auditory Behavior in Everyday Life (ABEL) questionnaire to analyze parents' perceptions of their children's "auditory communication, environmental awareness, functional independence, and social communication skills" in a "reliable and easily quantifiable manner" (2008, p. 72). The questionnaire contains 38 items divided into 4 categories: auditory communication, environmental awareness, functional independence, and social communication. The questionnaire uses a 7-point Likert scale rating from 0 to 6. Two studies were conducted to assess the reliability of the questionnaire.

The assessment was given to parents of 28 children who are DHH between the ages of 4 and 12 (Purdy et al, 2008) with degree of hearing loss ranging from mild to profound. The analysis of the questionnaire indicated that 11 of the test items had poor reliability and item-total correlation. Once the 11 items were removed the overall reliability of the test increased to 0.94 using Cronbach's alpha.

In a second study, the authors completed a pilot study on children with cochlear implants. The ABEL questionnaires were administered to 7 parents of children, ages 3 to 12, who were about to receive the Nucleus 22 cochlear implants (Purdy et al, 2008). The results of this pilot study demonstrated increased scores on the ABEL and speech perception. The significant relationships in this pilot study further support the reliability of the ABEL.

The authors were successful in creating a simple and accurate questionnaire that measured auditory communication, environmental awareness, functional independence, and social communication. Future research on a larger sample population for both experimental group one and on children with cochlear implants is needed to further verify the clinical relevance of this tool.

Ching and Hill (2007) created the Parents' Evaluation of Aural/Oral Performance of Children (PEACH) Scale to be used as a parent report journal to determine the effectiveness of amplification systems in children who are DHH across daily living activities of oral and aural activities (2007). The PEACH is an 11-item questionnaire that provides space for parents to journal question responses. Parents are instructed to daily document observations for each item. The PEACH was designed to be used as a compliment to a battery of assessments for children who are DHH.

The PEACH was evaluated on 90 subjects of parents to children who were DHH and 90 parents to children with normal hearing (Ching & Hill, 2007). The children who are DHH ranged in degree of hearing loss and included children with no hearing aids, hearing aids, cochlear implants, and a hearing aid and cochlear implant used in conjunction together. The parents were instructed to document observations related to each question item in the book for the duration of one week. Evaluation of the PEACH indicated adequate internal consistency and test-retest reliability. Two of the questions on the PEACH related to device usage had low item total correlation and consequently were removed from the questionnaire. The PEACH should be further evaluated to assess validity and sensitivity.

The PEACH has been found to be a reliable parent questionnaire to document the auditory and oral performances of DHH (Ching & Hill, 2007). One strength of the PEACH is the use of journal entries to allow for flexibility in responses that fits the unique characteristics and situations of each child. Then again, short questionnaires may be more appealing to families as usage of journal entries may be unrealistic for families to complete in an accurate manner across an extended period of time.

The LittleEARS (The Ear Foundation, n.d.) parent questionnaire was created to assess the auditory development and function of children between the ages of birth and 24 months. It consists of 35 yes or no questions and is ordered based upon age and developmental milestones important to language development including semantics, receptive, and expressive language. The LittleEARS is evidence based-practice and can be used to monitor progress and expected outcomes for children with hearing loss (Coninx et al., 2009).

The assessment was originally written and validated in German and has since been translated into over 16 languages. In 2009, Coninx and colleagues reported two major validation

studies that led to the LittleEARS being translated into over 16 languages. The original validation through statistical analysis consisted of 218 children from ages 5 days to 24 months in Austria and Germany who had normal hearing. The analysis included split-half reliability, internal scale consistency using Cronbach's alpha, influence of gender, and influence of administration techniques (interviewers versus paper questionnaire) (Coninx et al, 2009). It was found neither gender or type of test administration significantly impacted total scores. A normal curve and confidence interval were developed using age as the independent variable and total score as the dependent variable.

The purpose of the second study was to translate and validate language appropriate versions of the LittleEARS for multiple countries to determine if the standard scores on the bell curve obtained from the German questionnaire would be transferable across languages. The second study included 3,309 typically hearing children from 16 different countries with a minimum of 48 children per language (Coninx, 2009). The researchers were able to create normal curves allowing for language specific norms. In addition, a normal curve was developed using all 3,309 children. The researchers found "very good comparability of all language-specific norm data, i.e., the German and Austrian curve and the overall norm curve" (Coninx, 2009). The LittleEARS was used for this study because it is simpler to complete and record responses than the PEACH. Furthermore, it was normed on a larger sample population and has the youngest age range at which it can be used.

This research paper addresses the auditory skill development of DHH within the state of Idaho and the relationship of auditory outcomes to provider confidence. The LittleEARS has been chosen as the means for measuring auditory skill development because it is a valid and reliable tool that has been norm-referenced on thousands of children and in multiple languages. The

LittleEARS will most accurately capture the data this project seeks to collect. It is simple to administer and provides more concrete responses than questionnaires using Likert rating scales and journal entries. The use of a yes or no response allows for easy and accurate measure of a child's skill development. The frequent use of the LittleEARS by professionals in research and clinical practice attest to accuracy and feasibility of the assessment.

The purpose of this paper is to examine the relationship between provider confidence and auditory skill development of children who are DHH in the state of Idaho to better educate service providers resulting in increased provider confidence and outcomes of children who are DHH. This paper asks three research questions. First, what are the auditory skill development outcomes of children who are DHH in the state of Idaho? Second, what are the provider confidence levels within the state of Idaho? Third, is there a correlation between provider confidence outcomes of children who are DHH?

Methods

Instrumentation

Data was analyzed from two existing data sources: the Idaho Collaborative Assessment Project (ICAP) and the Idaho Educational Services for the Deaf and Blind (IESDB) Listening and Spoken Language Professional Development Initiative. The ICAP project uses parent-completed surveys that have been entered into Qualtrics with the publisher's approval. This project focuses on the auditory skill development results obtained from the ICAP, specific to the LittleEARS. In Fall 2019, families of children who are DHH between the ages of 9 months and 5 years and enrolled in IESDB programs were invited to participate, 56 families have participated in the ICAP project to date. Providers from IESDB completed the surveys that had been entered

into Qualtrics with publisher's approval. This project focuses on provider confidence reports collected from the Listening2Learn (L2L) survey.

Protocols

LittleEARS. The LittleEARS is a parent report questionnaire that is used to assess auditory outcomes of children who are DHH (Coninx, 2009). The LittleEARS is scored by looking at the total number of correct items and is examined relative to the child's age in months. The data obtained from the LittleEARS can be analyzed to see the trends and development of auditory skills of children who are DHH within the state of Idaho. In addition, this project examines each item of the LittleEARS to determine if there are trends in auditory skill development. See Appendix A for a copy of the LittleEARS form.

Listening2Learn. (L2L; Thompson, Blaiser & Yoshinaga, 2020). The L2L is a provider checklist that can be used with professionals to self-assess, reflect, and develop professional development goals as it relates to listening and spoken language development of young children who are DHH. The checklist includes four chapters with questions related to level of knowledge, a reflection of how parents are using specific skills, and confidence in the strategies that are related to serving and coaching families in that area. See Appendix B for the for the questions that are asked in this study. Providers involved in the study were emailed an access code to complete the survey using Qualtrics. Descriptive data was collected to determine the level of confidence service providers express in their ability to perform skills necessary for promoting auditory skill development.

Participants

This study included 57 children who were DHH from the ICAP project who completed LittleEARS questionnaires. One participant was not included due to inconsistencies between the

age identified, age fit with technology, and age of enrollment into services. Therefore, the study included 56 children in the analysis. The participants ranged in age from 8 to 54 months and were grouped based upon their region of residence. This allowed for analysis both at the individual and regional level. Of the participants 15% (n=9) were from Region 1, 8% (n=2) from Region 2, 20% (n=14) from Region 3, 21% (n= 10) from Region 4, 13% (n=7) from Region 5, 14 % (n= 8) from Region 7, and 10% (n=6) were unknown. As shown in Table 1, participants wore hearing technology including hearing aids, cochlear implants, or had not yet been fit with technology.

Table 1.
Hearing Technology

Type of Technology	Number of Participants	Percentage
Hearing Aids	43	76%
Cochlear Implants	4	7%
No Technology	9	16%

EI providers employed by IESDB were invited to participate in the study because IESDB is a primary service provider of children who are DHH in the state of Idaho. This broadened the educational background of providers to include TODHH, SLPs, Early Childhood Specialists, and Outreach Consulting Teachers of DHH. Nineteen IESDB providers completed the Listening2Learn survey (L2L; Thompson, Blaiser & Yoshinaga-Itano, 2019) as part of their listening and spoken language professional development plan. Providers were emailed an access code in November of 2019 and had through February 2020 to complete the survey. One-hundred percent of the participants who received an access code completed the survey. The providers were categorized by region to allow for later correlational analysis to be conducted with the

scores of the children on the LittleEARS. Demographic information was collected from the providers to highlight the level of certification and education held by service providers, as well as, the percentage of children who are DHH on their caseload. As demonstrated in Table 2, the majority of participants, (n=16) were TODHH. Some of the participants held more than one professional title; therefore, both titles were included within the demographic information. Seventy-four percent (n=14) of the providers held a Master's Degree. Approximately 87% (n=13) indicated receiving education in 4+ classes on servicing children who are DHH but only 32% (n=6) reported 4+ courses on Listening and Spoken Language. Approximately 69% (n=13) reported holding 2 or 3 certificates or endorsements and approximately 63% (n=12) indicated more than 15 years of experience providing services to children who are D/HH.

Table 2.
Provider Demographics

Professional Title	Number of Participants	Percentage
Teacher of the Deaf/ or Hard of Hearing/ Deaf Educator	16	84%
Early Childhood Specialist	2	10%
Outreach Consulting Teacher	1	5%
Speech-Language Pathologists	1	5%
Administrator	1	5%
Education Level		
Associate's	0	0%
Bachelor's	3	16%
Master's	14	74%
Doctoral	2	11%
Number of Courses in Serving Children who are D/HH		
0	0	0%
1-2	2	13%
2-3	0	0%
3-4	0	0%

4+	13	87%
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Number of Courses Focused on Listening and Spoken Language (LSL)

0	4	21%
1-2	3	16%
2-3	4	21%
3-4	2	11%
4+	6	32%

Number of Certificates and Endorsements

0	1	5%
1	6	32%
2	7	37%
3	3	16%
4	2	11%

Years of Experience

0-4	2	11%
5-10	2	11%
11-14	4	21%
15	3	16%
More than 15	8	42%

Percentage of Caseload using LSL

0	0	0%
1-10	1	5%
11-20	0	0%
21-30	0	0%
31-40	2	13%
41-50	4	21%
More than 50	12	63%

Percentage of Caseload using Total Communication

0	1	5%
1-10	4	21%
11-20	4	21%
21-30	3	16%
31-40	2	11%
41-50	3	16%
More than 50	2	11%

Percentage of Caseload using ASL		
0	4	22%
1-10	12	67%
11-20	1	6%
21-30	1	6%
31-40	0	0%
41-50	0	0%
More than 50+	0	0%

Analysis

LittleEARS

To answer the first research question, what are the auditory skill development of children who are DHH in the state of Idaho, the LittleEARS scores were collected from children in 2018 and 2019. LittleEARS score, age identified with hearing loss, type of technology worn, age enrolled into intervention, region number, and service provider was entered into an excel spreadsheet. The LittleEARS scores were based on the number of items the caregiver reported as developed. If children were within one week from the next month, their score was calculated based upon the age they would be within one week. It was found that the exact date for being fit with hearing technology was not reported. For example, multiple reports indicated the month and year but not the day of the month. Therefore, if the day of the month was not provided we input the 15th so that we would not alter the age of the child one way or another.

L2L

To answer the second research question, the provider confidence of service providers within the state of Idaho, L2L scores were collected from IESDB providers and input to an excel sheet for analysis. The L2L questionnaire contains four chapters but only two sections (*Amplification/Auditory Access* and *Auditory Skill Development*) related to auditory skill development were examined for the purpose of this study.

Descriptive data was collected for the LittleEARS and the L2L to identify trends in strengths and opportunities for growth. In addition, an item analysis (entering a 1 for a correct answer for each item and a 0 for an incorrect answer on an excel spreadsheet) was conducted to determine if there are trends in the items that are correct and incorrect.

Additionally, responses on the L2L were examined to determine the level providers feel that caregivers are incorporating auditory skills at home (reflected by the part A questions in each section). We scored the providers' confidence with each of the skills (reflected by the part B section of each of these questions). Part B of the L2L has providers rate their ability to perform a skill with the lowest rating as *Learn* it and the highest ratings *Expand* it. See Figure 1 and 2 for Part A and Part B of the L2L.

What percentage of families on your caseload understand the importance of an acoustically sound listening environment and advocate across settings for an optimal listening environment? (Circle one)

10%	25%	50%	75%	90%
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Figure 1. Part A

Level	Definition	Your Level
Learn It	I need to seek out more information on this topic and increase my knowledge in this area.	
Know It	I am knowledgeable in this skill but do not consistently use it in my sessions.	
Do It	I use this skill consistently in my sessions.	
Teach It	I teach parents to use this skill in my sessions.	
Coach It	I support parents using this skill, provide feedback to strengthen their ability, and provide opportunities for reflection and discussion.	
Confirm It	I confirm the parent's ability to independently demonstrate this skill in structured activities during the session.	
Expand It	Parents provide examples of how they independently integrate the skill into all aspects of child's daily routines.	

Figure 2. Part B

Correlation Between L2L and LittleEARS

To determine the third research question, the relationship between provider confidence and auditory skill development of children who are DHH in the state of Idaho, A Spearman's rho

correlation analysis was run between aggregate LittleEARS scores and Part A of the L2L. A correlation analysis between aggregate LittleEARS scores and provider confidence with use of part B of the L2L was conducted. These correlational analyses were conducted to determine the relationship between auditory skill development outcomes in children who are DHH and provider confidence.

The results for the L2L were coded for each provider. The scores of the providers were matched to each child they were a provider for and recorded in an Excel sheet. A correlational analysis was conducted between each question on the L2L and the child's LittleEARS composite score. We analyzed two sections of the L2L, *Amplification/Auditory Access* and *Auditory Skill Development*. Within each of these categories, we conducted correlational analysis for each individual question instead of the broader category. We were able to obtain more information about the relationship between provider confidence and LittleEARS outcomes if we conducted an analysis for each individual question. See Tables 3 and 4 for the L2L questions for Part A and Part B that were used to conduct correlational analyses to LittleEARS scores. A correlational analysis was conducted between the type of hearing technology worn by each child and LittleEARS scores.

Table 3.*Amplification/Auditory Access L2L Questions*

Part A	Part B
Percentage of caseload wearing hearing technology 10 hours/day or more	Provider level for reinforcing full time use
Percentage of caseload that conducts daily listening checks and is able to troubleshoot technology	Provider level for performing listening checks and troubleshooting hearing technology
Percentage of caseload that demonstrates ability to troubleshoot technology	
Percentage of caseload that can accurately describe child's hearing loss and explain it to others	Provider level for describing hearing loss
Percentage of caseload who advocate for an optimal acoustically sound listening environment across settings	Provider level for creating optimal acoustically sound listening environment

Table 4.*Auditory Skill Development L2L Question*

Part A	Part B
Percentage of caseload that embed listening opportunities	Provider level for embedding listening opportunities
Percentage of caseload that assess child's auditory discrimination skills consistently	Provider level for strengthening and assessing discrimination skills
Percentage of caseload that consistently elicit verbal responses from child	Provider level for consistently eliciting verbal responses
Percentage of caseload that use strategies to increase their child's auditory comprehension level	Provider level for assessing and strengthening child's auditory comprehension skills in daily activities

Results

LittleEARS Outcomes

LittleEARS reports were analyzed to determine the number of children who are DHH that are meeting developmental milestones. Using the LittleEARS (Bagatto et al., 2011b), child scores were plotted on a graph indicating if they were “meeting” developmental milestones. Of the participants, 57% (n= 32) were not meeting developmental milestones and 42% (n=24) were meeting developmental milestones. Of those meeting developmental milestones, 70% (n=17) met the minimum requirements for the “meeting” milestones and 29% (n=7) were average for the “meeting” milestones.

When evaluated by region, Region 1 had 33% meeting milestones (n=3) and 66% not meeting milestones (n=6). Region 2 had 50% meeting milestones (n=1) and 50% not meeting milestones (n=1). Region 3 had 57% meeting milestones (n=8) and 42% not meeting milestones (n=6). Region 4 had 60% (n=6) meeting milestones and 40% not meeting milestones (n=4). Region 5 had 28% (n=2) meeting milestones and 57% not meeting milestones (n=5). Region 7 had 37% meeting milestones (n=3) and 62% not meeting milestones (n=5). Of the children in unknown regions, 16% are meeting milestones (n=1) and 83% not meeting milestones (n=5). Table 5 shows the breakdown of those meeting and not meeting milestones by region number.

Figure 3 shows the LittleEARS scores plotted on the scoring chart to demonstrate those meeting and not meeting milestones. The data points are color coded by region (Unknown Region=blue, Region 1=red, Region 2=green, Region 3=yellow, Region 4=orange, Region 5=purple, Region 7=pink). Figure 4 utilizes a stacked graph to demonstrate those meeting and not meeting milestones by region.

Table 5.
Outcomes by Region

Region Number	Not Meeting Milestones	Meeting Milestones
1	66.66% (n=6)	33.33% (n=3)
2	50% (n=1)	50% (n=1)
3	42.86% (n=6)	57.14% (n=8)
4	40% (n=4)	60% (n=6)
5	71.43% (n=5)	28.57% (n=2)
7	62.5% (n=5)	37.5% (n=3)
Unknown	83.33% (n=5)	16.66% (n=1)

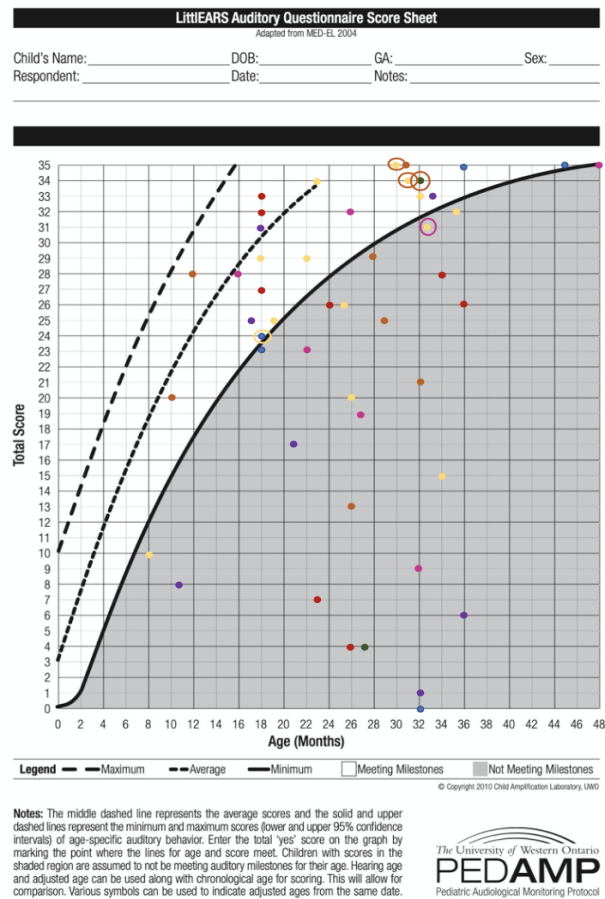


Figure 3. LittEARS Scores by Region

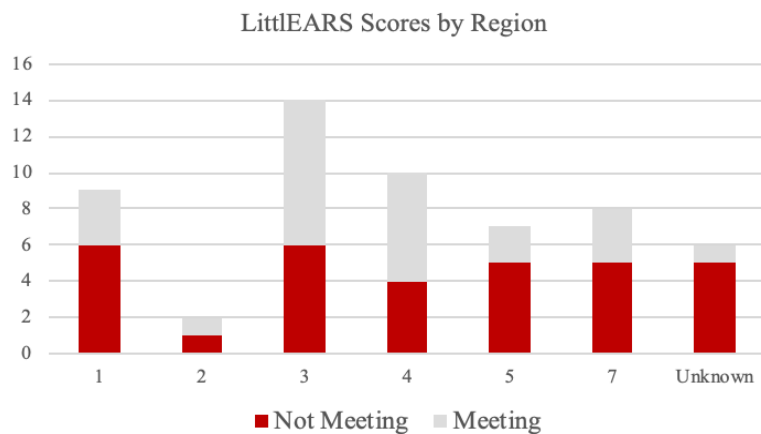


Figure 4. LittleEARS Scores by Region

Figure 5 represents the LittleEARS scores across children. Of the 35 questions on the LittleEARS, there were 14 skills that the majority of children were unable to demonstrate. This indicates that these children are unable to perform 40% (n=14) of foundational auditory skills. Of the questions missed, 8 of them were related to imitation skills, 2 related to identification, 2 related to sound-object association, and 1 related to complex directions. This data suggests that imitation skills may be a primary area of concern for providers as many of the skills related to imitation are not being performed by children. Table 6 provides a summary of the skills in which the majority of children were unable to perform.

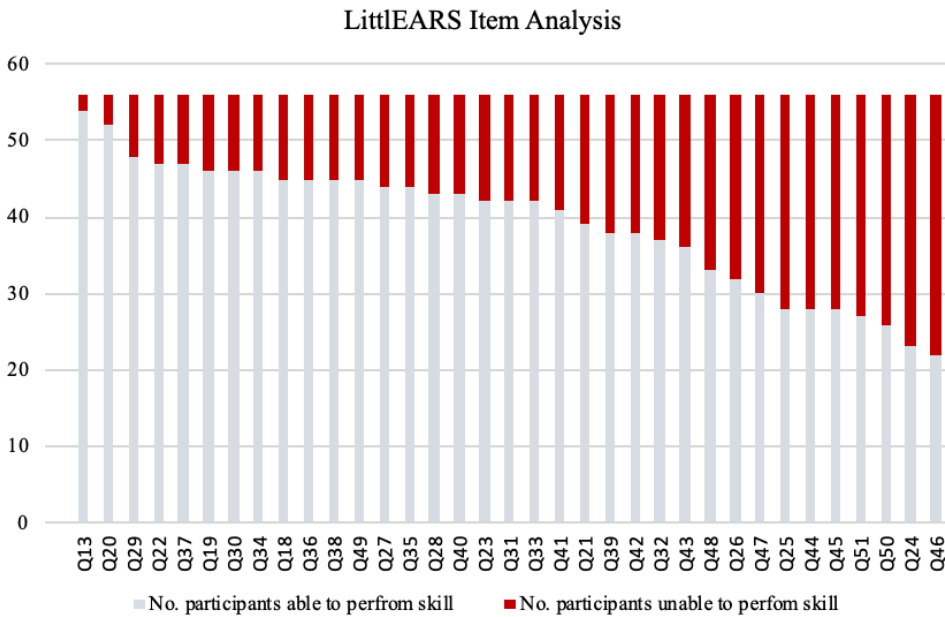


Figure 5. LittleEARS Item Analysis

Table 6.
LittleEARS Questions Not Achieved By Participants

Question Number	Skill	Number of Children missing skill	Skill Category
Q39	Imitate sounds when asked	18	Imitation (sound level)
Q42	Does your child bring items when asked	18	Identification (open-set)
Q32	Calmed by music	19	Link s-e with sound
Q43	Imitate sounds or words you say	20	Imitation (sound & words)
Q48	Repeat certain words when asked	23	Imitation (words)
Q26	Stop crying when you speak (without visual)	24	Link s-e with sound
Q47	Correctly repeat sequence of long and short syllables	26	Imitation (duration)

Q25	Sing along when hearing a song	28	Vocalization (rote)
Q44	Produce right sound with a toy	28	Sound-Object Association
Q45	Certain sounds with certain animals	28	Sound-Object Association
Q51	Sing along with familiar songs	29	Vocalization (rote)
Q50	Follow complex commands	30	Follow complex Directions
Q24	Select object from number of objects	33	Identification (closed)

Of the 35 questions on the LittleEARS, there were 21 questions that the majority of children were able to demonstrate. This indicates that these children are able to perform 60% (n=21) of foundational auditory skills. Of the skills children were able to perform, 13 of them were related to detection and localization of sound. This data suggests that localization and attending to sounds may be relative strengths of providers when providing intervention for children who are DHH. Table 7 provides a summary of the questions in which the majority of children were able to perform.

Table 7.
LittleEARS Questions Achieved By Participants

Question Number	Skill	Number of Children missing skill	Skill Category
Q13	Does your child respond to a familiar voice?	2	Detection
Q20	Is your child interested in toys producing sounds or music?	4	Detection
Q29	Does your child look for sound sources located at the left, right, or back?	8	Detection (Localization)
Q22	Does your child listen when the radio/CD/tape player is turned on?	9	Detection
Q19	When somebody is speaking, does your child turn his/her head towards the speaker?	10	Detection (Localization)
Q30	Does your child react to his/her name?	10	Detection
Q34	Does your child respond to music with rhythmical movements?	10	Detection (music)
Q18	Does your child listen to somebody speaking?	11	Detection

Q27	Does your child appropriately respond to short and simple remarks?	12	Detection (S-E)
Q35	Does your child know that a certain sound is related to a certain object or event?	12	Identification
Q23	Does your child respond to distant sounds?	14	Detection (Distance)
Q31	Does your child look for sound sources located above or below?	14	Detection (Localization)
Q33	Does your child listen on the telephone and does he/she seem to recognize that somebody is talking?	14	Detection
Q21	Does your child look for a speaker he/she can't see?	17	Detection (Localization)

Provider Confidence on the L2L

The first two sections of the L2L (*Amplification/Auditory Access and Auditory Skill Development*) were analyzed for overall confidence level of providers. In addition, providers reported the percentage of caregivers on their caseloads who perform each skill listed on the L2L. This allows for a direct comparison between provider confidence and caregiver use.

The four skills analyzed in the *Auditory Skill Development* section are: embedded listening opportunities throughout the day, assessing discrimination skills, eliciting verbal response, and increasing auditory comprehension. Provider reports indicated that parents demonstrated greater skills in embedding listening opportunities (with a mean of 45.26% of the, with a range of 10%-90%), eliciting verbal responses (with a mean of 45.83%, with a range of 10%-90%), and increasing auditory comprehension (with a mean of 46.11%, with a range of

10%-75%). However, providers indicated lower skills for caregivers' ability to assess discrimination (with a mean of 26%, with a range of 10%-50%). Assessing discrimination appears to be the least performed skills by caregivers as indicated by provider reports in this data.

On average, the highest skills for providers were embedded listening opportunities (with a mean 4.63, with a range of 1-7, with a mode of 5 (n=7) and elicit verbal responses with a mean of 4.22, range of 1-7, with a mode of 5 (n=9). The lowest skills were assessing discrimination with a mean of 3.83, range of 1-7, mode of 5 (n=6) and increasing auditory comprehension with a mean of 3.94, range of 1-7, mode of 5 (n=7). The mode scores placed providers at a *Coach* it level for all of the skills in this section of the L2L. Table 8 provides the cumulative mean, range, and mode for provider confidence and caregiver performance of each skill. Figure 6 demonstrates the cumulative mean results for all 19 providers.

Table 8.
Auditory Skill Development

Skill	Provider Confidence (Mean)	Range	Mode	Percentage of Families Performing Skill (Mean)	Range
Embed Listening Opportunities	4.63	1-7	5 (n=7)	45.25	10-90
Assessing Discrimination	3.83	1-7	5 (n=6)	26.11	10-50
Elicit Verbal Responses	4.22	1-7	5 (n=9)	45.83	10-90
Increase Auditory Comprehension	3.94	1-7	5 (n=7)	46.11	10-75

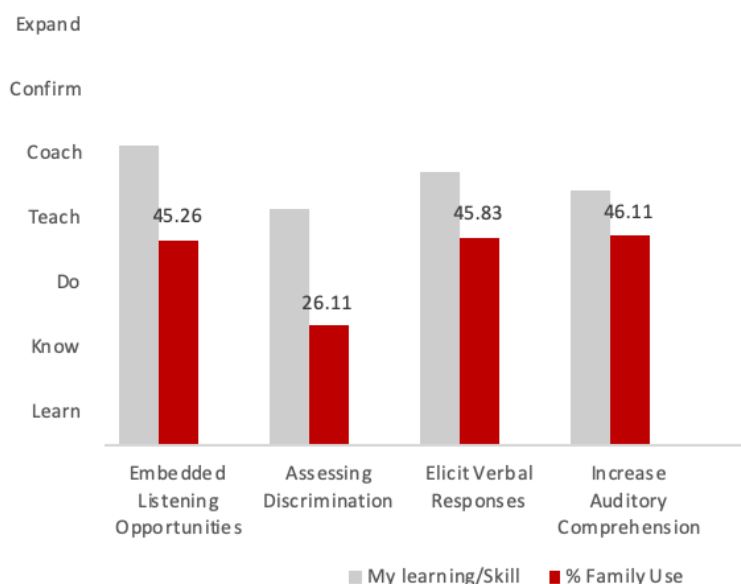


Figure 6. Auditory Skill Development

The four skills analyzed in the *Amplification/Auditory Access* section were: full-time use of hearing technology, troubleshooting hearing technology, describing hearing loss, and creating optimal acoustic environments. On average, providers reported that the skills used most frequently by caregivers were full-time use of hearing technology (with a mean of 56.31%, with a range of 25% to 90%) and describe hearing loss (with a mean of 50%, with a range of 25%-75%). However, providers estimated that only 34% of the families on their caseloads established an acoustically sound listening environment (with a range of 10%-75%) and technology troubleshooting skills (with a mean of 38.42 and 46.84, with range of 10% to 90%).

On average, the highest skills for providers were full-time use of hearing technology with a mean of 4.83%, with a range of 2-7, with a mode of 5 (n=10) and troubleshooting hearing technology with a mean of 4.68, with a range of 2-7, with a mode of 5 (n=6). The lowest skills were describing hearing loss with a mean of 32%, with a range of 2 to 7, with a mode of 5 (n=8) and creating an acoustic environment with a mean of 4.14, with a range of 1-7, with a mode of 5

(n=6). The mode scores placed providers in the *Coach* it level for full-time use, describe hearing loss, and acoustic environment and the *Teach* it level for troubleshooting skills. Table 8 provides the cumulative mean, range, and mode for provider confidence and caregiver performance of each skill. Figure 7 demonstrates the cumulative mean results for all 19 providers.

Table 9.
Amplification/Auditory Access

Skill	Provider Confidence (Mean)	Range	Mode	Percentage of Families Performing Skill (Mean)	Range
Full Time Use	4.83	2-7	5 (n=10)	56.31	25-90
Troubleshoot (a)	-	-	-	38.42	10-90
Troubleshoot (b)	-	-	-	46.84	10-90
Troubleshoot (a & b)	4.68	2-7	4 (n=6)	-	-
Describe Hearing Loss	3.94	1-7	5 (n=8)	50	25-75
Acoustic Environment	4.14	1-7	5 (n=6)	34.72	10-75

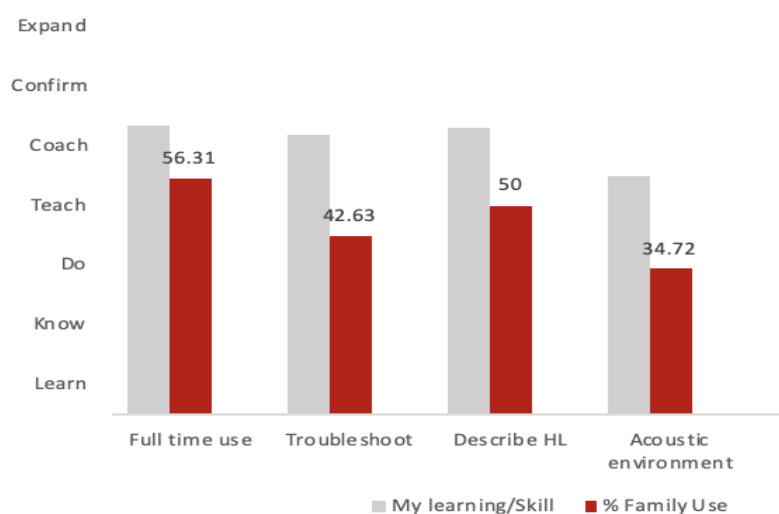


Figure 7. Amplification/Auditory Access

Correlational Analysis Between Provider Confidence and Auditory Skill Development

A Spearman's rank-order correlation was conducted to determine the relationship between outcomes on LittleEARS and caregiver use (Part A) of the L2L and the LittleEARS and provider confidence (Part B) of the L2L. The 3 statistically significant correlations were: weak negative correlation between LittleEARS outcomes and caregivers conducting listening checks ($r_s = -0.3351, p=.0244$), weak negative correlation between LittleEARS outcomes and the type of hearing technology worn ($r_s = -.301, p=.04$), and moderate positive correlation between LittleEARS outcomes and provider confidence assessing discrimination skills ($r_s = 0.4264, p=.0134$).

Discussion

LittleEARS Outcomes

Since the implementation of newborn hearing screenings, children who are DHH have received earlier access to services and are expected to have the same trajectory of development as peers who are typically hearing. Best practice requires services to be provided by competent

service providers; however, previous research has indicated a lack of confidence in service providers. The purpose of this research paper was to determine the auditory skill outcomes of children who are DHH and confidence of service providers within the state of Idaho.

The first objective of this paper was to determine the auditory skill outcomes of children who are DHH. The majority of children who participated in this study are not meeting auditory skill developmental milestones. This is problematic as auditory skills are foundational for the development of spoken language. Regions 3 and 4 were the only two regions with more than 50% of children meeting developmental milestones. These regions are highly populated regions and it may be possible that a higher metropolitan area may lead to a greater community of service providers and/or greater access to pediatric audiologists.

An item analysis revealed skills related to detection and localization of sound as a strength. In addition, the analysis revealed that shifting skills from localization and attention of sound to using and integrating sound, or auditory skills, as part of expressive language were more challenging. Meaning, when patterns in limitations of auditory skills were examined, most of the children in this sample did not go beyond attending or detecting sounds and appeared to demonstrate limited ability to connect sound to meaning or link sounds to vocalizations. Imitation skills, or the ability for a child to provide a vocal response to an auditory stimulus, was the most notable limitation. Imitation skills are a foundational first step for spoken language development and occur when the child realizes that verbal output is a part of the communication exchange. It appears that the challenge or a potential lack of focus in intervention is the transition from detection of sound to teaching that sound has meaning and how to use and integrate sound as a foundation for spoken language. Professionals and families should collaborate to establish activities that reinforce this transition from detection to comprehension.

Furthermore, many treatment approaches for speech and language therapy rely upon the ability of a child to imitate (DeThorne, Johnson, Walder, & Mahurin-Smith, 2009). Additionally, identification, sound-object relationships, and complex direction were error patterns noted for this group of participants. Service providers can more clearly provide effective intervention by determining patterns of errors. Further research and the creation of tools to categorize auditory skills on tools such as the LittleEARS may allow providers to more accurately determine areas of deficits. One potential explanation for the patterns of auditory skill development noted in this study could be impacted by the number of items per skill such as identification, imitation, and manipulation. The number of items per category could inflate or deflate the patterns of development.

Provider Confidence on the L2L

The second objective of this paper was to determine the confidence of service providers within the state of Idaho. The majority of service providers were TODHH. It is possible that these are the main providers for children who are DHH within the state. It is possible that participants receive therapy from speech-language pathologists for language and speech development outside of IESDB services. Future research should determine roles and responsibilities of service providers who participate in the team of providers for a child.

When analyzing provider responses, it was found that assessing discrimination skills was the weakest category for both provider performance and caregiver abilities. The areas of embedded listening opportunities, eliciting verbal responses, and increasing auditory responses were relative strengths for providers and caregivers. Based upon LittleEARS scores, imitation skills were the least developed for children. For all of the skills, the majority of providers reported the ability to *Coach it*, indicating that most providers do not consider themselves to

have advanced abilities in each skill to *Confirm* and *Expand* these skills. Demographic information indicated that the majority of service providers received few to no education on Listening and Spoken Language. The lack of education on auditory skills essential to development of spoken language may be due to a lack of formal education on auditory skills.

When comparing *Amplification/Auditory Access* and *Auditory Skill Development*, results indicated similar but slightly higher levels of provider confidence and caregivers use for *Amplification/Auditory Access* skills. This may result from the majority of participants being TODHH. Studies have indicated that SLPs feel less comfortable with hearing technology but TODHH have reported higher levels of confidence than SLPs in skills related to hearing loss (Compton et al., 2016; Kobylas 2016; Babeu 2016; Tomblin et al., 2015). Even though the mean scores indicate higher levels of skills for *Amplification/Auditory Access*, the mode scores were at a *coach it* level for both *Amplification/Auditory Access* and *Auditory Skill Development*. Troubleshooting skills were the only skill with a mode score of *teach it*, which is lower than *coach it*. Troubleshooting skills were part of the *Amplification/Auditory Access* chapter of the L2L. This lower score of troubleshooting is interesting as other research has indicated TODHH to report higher levels of confidence in hearing technology than auditory skills.

Demographic information reported by service providers revealed that approximately half of the service providers did not have a class that focused on Listening and Spoken Language. Educational courses and trainings specific to Listening and Spoken Language are important for developing the necessary skills to service children who are DHH. It may be possible that a lack of training is influencing these outcomes.

Correlation Between Provider Confidence and Auditory Skill Development

The third objective of this paper was to determine the relationship between LittleEARS and L2L outcomes. The results indicated a statistically significant but weak negative correlation between LittleEARS scores and provider reports of parent's conducting listening checks. Providers who reported only 25% of caregivers conducting listening checks had children with higher scores on the LittleEARS. Providers who reported higher frequency of caregivers conducting listening checks had children with lower LittleEARS scores. Listening checks have been established as being important to development of children who are DHH who wear hearing technology (Potts & Greenwood, 1983). There may be other variables influencing the correlation observed such as provider and caregiver demographics, motivation of the child, and years of experience. Language input and wear time of devices have been reported as influential for outcomes in children who are DHH. As this correlation is different than what would be expected, further analysis and confounding variables should be considered. Although the correlation was found to be significant, it should be highlighted that it was still a weak correlation. It may be possible that the LittleEARS is not sensitive to listening technology as there are no questions related to technology on the questionnaire.

A statistically significant negative correlation was found between LittleEARS scores and the type of hearing technology worn by the child. Children who wore cochlear implants performed better on auditory skill tasks than children who wore hearing aids or no devices at all.

A moderate statistically significant positive correlation was found between LittleEARS scores and provider confidence in assessing discrimination skills. Children scored higher on their LittleEARS when their providers reported higher level of confidence in assessing discrimination skills. The relationship between auditory skill development and provider confidence, specifically

LittleEARS scores, were positively correlated to provider confidence in discrimination skills. This may suggest that providers who have more experience with higher levels of auditory skill development may, in fact, have more skills in supporting auditory skills of young children who are DHH. It is likely that the ability of a provider to assess the performance of a child can lead to greater outcomes as it allows providers to make accurate recommendations and provide appropriate therapy. However, as the previous correlation may be impacted by extraneous variables, it is possible that the outcomes of this correlation are also impacted by environmental factors, intrinsic factors of the child, and provider and caregiver demographics.

Limitations and Future Directions

This is one of the first studies utilizing the L2L in a correlational analysis. Future researchers should continue to use the L2L in research statistical measures to further assess the sensitivity of this tool. This study uses a small sample size that is representative of participants who are involved with ICAP and IESDB. The use of this sample size limits the ability to generalize these findings to other participants within and out of the state of Idaho. While this is a smaller sample size of children and professionals, it gives insight into the outcomes of many children within our state, as well as, the practices of the providers who service these children. This allows for further education for providers on their skill sets and outcomes of their clients. Furthermore, this allows for training on general trends for IESDB providers and IESDB as an organization. This is one of the first studies focusing on the confidence of TODHH. Future research should continue to investigate the provider confidence and skills of TODHH.

Conclusion

The majority of children within the state of Idaho are not meeting their milestones in auditory skill development. Of the skills missed by the children on the LittleEARS, most of them are related to imitation, identification, sound-object association, and complex directions. Previous studies addressing provider confidence have researched SLPs and broader studies have included other early intervention (EI) providers. This is one of the first studies that have focused on TODHH as the main population for an investigation of provider confidence. This is important because TODHH are one of the main providers for children who are DHH. Therefore, it is important to understand the confidence of these providers in servicing these children. The findings indicate that the majority of providers feel they are able to *coach skills* but do not report greater levels of confidence of *confirming* and *expanding skills*. Providers in this sample appear to be more comfortable with skills related to *Access/Amplification* than *Auditory Skill Development*. Approximately half of the providers had educational courses in Listening and Spoken Language. The correlation analysis suggests that there is a negative relationship between LittleEARS outcomes and caregivers conducting listening checks. The correlation analysis suggests there is a positive relationship between LittleEARS outcomes and provider assessing discrimination skills.

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Appendix A

LittlEARS

Auditory Response	Example	Answer
1 Does your child respond to a familiar voice?	Smiles; looks towards source; talks animatedly	☐ Yes ☐ No
2 Does your child listen to somebody speaking?	Listens; waits and listens; looks at the speaker for a longer time.	☐ Yes ☐ No
3 When somebody is speaking, does your child turn his/her head towards the speaker?		☐ Yes ☐ No
4 Is your child interested in toys producing sounds or music?	Rattle, squeezing toy	☐ Yes ☐ No
5 Does your child look for a speaker he/she cannot see?		☐ Yes ☐ No
6 Does your child listen when the radio/CD/tape player is turned on?	Listening; turns towards the sound, is attentive, laughs or sings/talks "along."	☐ Yes ☐ No
7 Does your child respond to distant sounds?	When being called from another room.	☐ Yes ☐ No
8 Does your child stop crying when you speak to him/her without him/her seeing you?	You try to comfort the child with a soft voice or song without eye contact.	☐ Yes ☐ No
9 Does your child respond with alarm when hearing an angry voice?	The child becomes sad and starts crying.	☐ Yes ☐ No
10 Does your child "recognize" acoustic rituals?	Musical box by bed; lullaby; water running into the tub.	☐ Yes ☐ No
11 Does your child look for sound sources located at the left, right or back?	You call or say something, the dog barks, etc. and the child looks and finds the sources.	☐ Yes ☐ No
12 Does your child react to his/her name?		☐ Yes ☐ No
13 Does your child look for sound sources located above or below?	A clock on the wall, or something falling on the floor.	☐ Yes ☐ No
14 When your child is sad or moody, can he/she be calmed down or influenced by music?		☐ Yes ☐ No
15 Does your child listen on the telephone and does he/she seem to recognize that somebody is talking?	When grandma or daddy calls, the child takes the receiver and "tollens."	☐ Yes ☐ No
16 Does your child respond to music with rhythmical movements?	The child moves arms/legs to the music.	☐ Yes ☐ No
17 Does your child know that a certain sound is related to a certain object or event?	The child hears the sound of an aeroplane and looks towards the sky or hears a car and looks towards the street.	☐ Yes ☐ No

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Auditory Response	Example	Answer
18 Does your child appropriately respond to short and simple remarks?	"Stop!" "Tuck!" "Don't!"	☐ Yes ☐ No
19 Does your child respond to "No" by typically interrupting his/her current activity?	A strongly pronounced "no, no!" although the child does not see you (I) - is effective.	☐ Yes ☐ No
20 Does your child know family members' names?	Where is ... Daddy, Jane, Mark, ...	☐ Yes ☐ No
21 Does your child imitate sounds when asked?	"Aaa", "ooo", "ii"	☐ Yes ☐ No
22 Does your child follow simple commands?	"Come here!", "Take off your shoes!"	☐ Yes ☐ No
23 Does your child understand simple questions?	"Where is your tummy?", "Where is doody?"	☐ Yes ☐ No
24 Does your child bring items when asked?	"Bring me the ball!" etc.	☐ Yes ☐ No
25 Does your child imitate sound or words you say?	"Say: woof woof!", "Say: c-a-t"	☐ Yes ☐ No
26 Does your child produce the right sound to a toy?	"Murm" with cat, "moo" with cow	☐ Yes ☐ No
27 Does your child know that certain sounds go with certain animals?	Woof woof = dog; meow = cat; cock-a-doodle-do = cockerel/rooster	☐ Yes ☐ No
28 Does your child try to imitate environmental sounds?	Animal sounds; sounds of household appliances, police car siren.	☐ Yes ☐ No
29 Does your child correctly repeat a sequence of short and long syllables you have said?	"La-la-laaa"	☐ Yes ☐ No
30 Does your child select the right object from a number of objects when asked?	You are playing with toy animals and ask for the "horse"; you are playing with coloured balls and ask for the "red ball."	☐ Yes ☐ No
31 Does your child try to sing along when hearing a song?	Nursery rhymes	☐ Yes ☐ No
32 Does your child repeat certain words when asked?	"Say 'bye - bye' to grandma"	☐ Yes ☐ No
33 Does your child like being read to?	From book or picture book	☐ Yes ☐ No
34 Does your child follow complex commands?	"Take off your shoes and come here."	☐ Yes ☐ No
35 Does your child try to sing with familiar songs?	Lullaby	☐ Yes ☐ No

Total score = all questions checked with "yes" /

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To be filled out by the examiner



Clinic/Institution: Age:

For children with cochlear implants or hearing aids

First hearing aids fitting: side: R: side: L:

Date of 1st fitting: side: R / L

Date of 2nd fitting: side: R / L

Date of 2nd fitting: Hearing age*:

* Calculation of hearing age:
children with normal hearing: hearing age is equivalent to actual age
children with CI(s): time period since first fitting of processor;
if first fitting is not known: time period since implantation minus 1 month
children with HA(s): time period since hearing aid fitting

Additional questions of interest:

1. Have you observed any responses to sound or voices in your child that are not included in this questionnaire?

2. Have you noticed any surprising responses to sound or voices in your child recently or in the last 1-2 weeks (i.e. can he/she do this already?)

Thank you for completing the LittlEARS Auditory Questionnaire!

LittlEARS® **MED-EL**

Auditory Questionnaire 

Parents questionnaire to assess auditory behavior
F. Coninx, V. Weichbold, L. Tsiaigini

Code: Date:

Gender: F / M Date of birth:

This auditory questionnaire is designed to assess the auditory development in children with normal hearing and in children with hearing loss who have received a cochlear implant(s) (CI) or hearing aid(s) (HA). It covers auditory development in the first 2 years after CI or HA fitting (up to 2 years of hearing age) or in hearing children up to 2 years of age. The questionnaire includes age-dependent questions with increasing complexity of the auditory responses. Therefore, with a younger child, fewer questions will be answered "yes".

How to complete the questionnaire?
All questions are to be answered by checking either YES or NO.
Please mark:

yes: if you have already observed the behavior in your child at least once.

no: if you have never observed the behavior in your child, or if you are not sure how to answer the question.

If you answer 6 questions with "no" for children with normal hearing, you do not need to continue the questionnaire. Further questions will then be regarded as "no" answers.
For children fitted with a CI(s) or HA(s), all questions should be answered, since they may show auditory behavior covered by later questions.

BRIDGE
to better communication

Appendix B

L2L Portions Utilized

AMPLIFICATION/AUDITORY ACCESS: QUESTIONS 1-4

The first section takes an in depth look at a child's access to sound and a family's ability to thoroughly understand all aspects of their child's hearing loss. High quality access to the sounds of speech is critical to a child's success developing listening and spoken language skills.

- What percentage of children on your caseload are wearing hearing technology all waking hours, 8-10 hours/day?
- What percentage of families on your caseload conduct daily listening checks and demonstrate the ability to troubleshoot hearing technology?
- What percentage of families on your caseload can accurately describe their child's hearing loss to other people?
- What percentage of families on your caseload advocate for an optimal acoustically sound listening environment across setting?

CHILD'S HEARING TECHNOLOGY

1.A. What percentage of children on your caseload are wearing hearing technology all waking hours, 8-10 hours/day? (Circle one)

10%	25%	50%	75%	90%
-----	-----	-----	-----	-----

1.B Overall, for reinforcing full time use of hearing technology, I am at the level:

Level	Definition	Your Level
Learn It	I need to seek out more information on this topic and increase my knowledge in this area.	
Know It	I am knowledgeable in this skill but do not consistently use it in my sessions.	
Do It	I use this skill consistently in my sessions.	
Teach It	I teach families to use this skill in my sessions.	
Coach It	I support families using this skill, provide feedback to strengthen their ability, and provide opportunities for reflection and discussion.	
Confirm It	I confirm the families ability to independently demonstrate this skill in spontaneous interactions with their child.	

DAILY LISTENING CHECKS AND KNOWLEDGE TO TROUBLESHOOT

2.A1. What percentage of families on your caseload conduct daily listening checks? (Circle one)

10%	25%	50%	75%	90%
-----	-----	-----	-----	-----

2.A2. What percentage of families on your caseload demonstrate the ability to troubleshoot hearing technology?

10%	25%	50%	75%	90%
-----	-----	-----	-----	-----

2.8 Overall, for performing listening checks and troubleshooting hearing technology, I am at the level:

Level	Definition	Your Level
Learn It	I need to seek out more information on this topic and increase my knowledge in this area.	
Know It	I am knowledgeable in this skill but do not consistently use it in my sessions.	
Do It	I use this skill consistently in my sessions.	
Teach It	I teach families to use this skill in my sessions.	
Coach It	I support families using this skill, provide feedback to strengthen their ability, and provide opportunities for reflection and discussion.	
Confirm It	I confirm the families' ability to independently demonstrate this skill in spontaneous interactions with their child.	

UNDERSTANDING CHILD'S HEARING LOSS

3.A. What percentage of families on your caseload can accurately describe their child's hearing loss and can explain it to other people? (Circle one)

10%	25%	50%	75%	90%
-----	-----	-----	-----	-----

3.B Overall, for accurately describing the child's hearing loss, I am at the following level:

Level	Definition	Your Level
Learn It	I need to seek out more information on this topic and increase my knowledge in this area.	
Know It	I am knowledgeable in this skill but do not consistently use it in my sessions.	
Do It	I use this skill consistently in my sessions.	
Teach It	I teach families to use this skill in my sessions.	
Coach It	I support families using this skill, provide feedback to strengthen their ability, and provide opportunities for reflection and discussion.	
Confirm It	I confirm the families' ability to independently demonstrate this skill in spontaneous interactions with their child.	

LISTENING ENVIRONMENT

4.A What percentage of families on your caseload advocate for an optimal acoustically sound listening environment across settings? (Circle one)

10%	25%	50%	75%	90%
-----	-----	-----	-----	-----

4.B Overall, for creating an optimal acoustically sound listening environment, I am at the following level:

Level	Definition	Your Level
Learn It	I need to seek out more information on this topic and increase my knowledge in this area.	
Know It	I am knowledgeable in this skill but do not consistently use it in my sessions.	
Do It	I use this skill consistently in my sessions.	
Teach It	I teach families to use this skill in my sessions.	
Coach It	I support families using this skill, provide feedback to strengthen their ability, and provide opportunities for reflection and discussion.	
Confirm It	I confirm the families' ability to independently demonstrate this skill in spontaneous interactions with their child.	

AUDITORY SKILL DEVELOPMENT: QUESTIONS 5-8

Auditory skill development is the process a child moves through as he/she learns to use sound to develop listening and spoken language skills. Each stage in the auditory skill development hierarchy is unique yet intertwined and critical to a child's success building oral language.

- What percentage of families on your caseload embed listening opportunities into all aspects of their child's daily life?
- What percentage of families on your caseload assess their child's auditory discrimination skills consistently?
- What percentage of families on your caseload consistently elicit verbal responses from their child in most daily activities?
- What percentage of families on your caseload effectively use strategies to increase their child's auditory comprehension level across settings?

AUDITORY BOMBARDMENT

5.A. What percentage of families on your caseload embed listening opportunities into all aspects of their child's daily life? (Circle one)

10%	25%	50%	75%	90%
-----	-----	-----	-----	-----

5.B Overall, for embedding listening opportunities into all aspects of the child's daily life, I am at the following level:

Level	Definition	Your Level
Learn It	I need to seek out more information on this topic and increase my knowledge in this area.	
Know It	I am knowledgeable in this skill but do not consistently use it in my sessions.	
Do It	I use this skill consistently in my sessions.	
Teach It	I teach families to use this skill in my sessions.	
Coach It	I support families using this skill, provide feedback to strengthen their ability, and provide opportunities for reflection and discussion.	
Confirm It	I confirm the families' ability to independently demonstrate this skill in spontaneous interactions with their child.	

AUDITORY DISCRIMINATION

6.A.1. What percentage of families on your caseload assess their child's auditory discrimination skills consistently?(Circle one)

10%	25%	50%	75%	90%
-----	-----	-----	-----	-----

6.B Overall, for strengthening and assessing a child's discrimination skills, I am at the following level:

Level	Definition	Your Level
Learn It	I need to seek out more information on this topic and increase my knowledge in this area.	
Know It	I am knowledgeable in this skill but do not consistently use it in my sessions.	
Do It	I use this skill consistently in my sessions.	
Teach It	I teach families to use this skill in my sessions.	
Coach It	I support families using this skill, provide feedback to strengthen their ability, and provide opportunities for reflection and discussion.	
Confirm It	I confirm the families' ability to independently demonstrate this skill in spontaneous interactions with their child.	

AUDITORY FEEDBACK LOOP, AUDITORY SELF-MONITORING

7.A. What percentage of families on your caseload consistently elicit verbal responses from their child in most daily activities? (Circle one)

10%	25%	50%	75%	90%
-----	-----	-----	-----	-----

7.B. Overall, for consistently eliciting verbal responses from a child in most daily activities, I am at the following level:

Level	Definition	Your Level
Learn It	I need to seek out more information on this topic and increase my knowledge in this area.	
Know It	I am knowledgeable in this skill but do not consistently use it in my sessions.	
Do It	I use this skill consistently in my sessions.	
Teach It	I teach families to use this skill in my sessions.	
Coach It	I support families using this skill, provide feedback to strengthen their ability, and provide opportunities for reflection and discussion.	
Confirm It	I confirm the families' ability to independently demonstrate this skill in spontaneous interactions with their child.	

AUDITORY COMPREHENSION SKILLS

8.A. What percentage of families on your caseload effectively use strategies to increase their child's auditory comprehension level across settings? (Circle one)

10%	25%	50%	75%	90%
-----	-----	-----	-----	-----

8.B. Overall, for assessing and strengthening a child's auditory comprehension skills in daily activities, I am at the following level:

Level	Definition	Your Level
Learn It	I need to seek out more information on this topic and increase my knowledge in this area.	
Know It	I am knowledgeable in this skill but do not consistently use it in my sessions.	
Do It	I use this skill consistently in my sessions.	
Teach It	I teach families to use this skill in my sessions.	
Coach It	I support families using this skill, provide feedback to strengthen their ability, and provide opportunities for reflection and discussion.	
Confirm It	I confirm the families' ability to independently demonstrate this skill in spontaneous interactions with their child.	