

Beliefs and Self-Efficacy of Parents of Young Children with Hearing Loss

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Abstract

The purpose of this study was to learn more about the beliefs and self-efficacy of parents of young children with hearing loss. Seventy-two parents completed the Scale of Parental Involvement and Self-Efficacy–Revised (SPISE-R), which queries parents about their child’s hearing device use and their perceptions of their own beliefs, knowledge, confidence, and actions pertaining to supporting their child’s auditory access and spoken language development. Two beliefs were identified that related to parents’ action scores and one belief was identified that related to children’s hearing device use. Knowledge and confidence scores were significantly correlated with action scores and children’s hearing device use, whereas only confidence scores were related to scores on a measure of children’s spoken language abilities. Results indicate the SPISE-R is a promising tool for use in early intervention to better understand parents’ strengths and needs pertaining to supporting their young child’s auditory access and spoken language development.

Acronyms: ABR = auditory brainstem response; DP-3 = Developmental Profile 3; OCHL = Outcomes of Children with Hearing Loss; PSE = parental self-efficacy; SPISE = Scale of Parental Involvement and Self-Efficacy; SPISE-R = Scale of Parental Involvement and Self-Efficacy–Revised

Keywords: cochlear implants, early intervention, hearing aids, hearing loss, parental self-efficacy

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Acknowledgements: This work was supported by a grant from the National Institute of General Medical Sciences (NIGMS) of the National Institutes of Health (NIH) under award number P20GM109023 and a grant from the National Institute on Deafness and Other Communication Disorders (NIDCD) of the NIH under award number T35DC008757. The content of this project is solely the responsibility of the authors and does not necessarily represent the official views of the NIGMS, NIDCD, or the NIH.

The widespread implementation of universal newborn hearing screening has lowered the age at which children with hearing loss are identified and begin receiving intervention services (Durieux-Smith et al., 2008; Harrison et al., 2003). Younger ages at initiation of intervention services, including the fitting of hearing aids and receipt of cochlear implants, are associated with improved spoken language outcomes (Ching et al., 2013; Harrington et al., 2009; Moeller, 2000; Niparko et al., 2010; Yoshinaga-Itano et al., 1998). However, great variability in children’s spoken language abilities still exists within populations of children who are fit with hearing devices and enrolled in early intervention at young ages (Geers et al., 2009; Tomblin et al., 2015).

For young children with hearing loss, spoken language outcomes are best when children have optimal auditory access through the consistent use of appropriately fitted hearing devices and are exposed to high-quality linguistic input in their environments (Ambrose et al., 2014; Ambrose

et al., 2015; DesJardin & Eisenberg, 2007; Tomblin et al., 2015; Walker, Holte, et al., 2015). However, there is high variability for both these factors. For example, Walker and colleagues (2015) reported that, on average, infants in the Outcomes of Children with Hearing Loss (OCHL) study wore their hearing aids 4.36 hours per day, but device use ranged from less than 1 hour per day to almost 9 hours per day ($SD = 3.17$). Similarly, high variability was found in the quantity and quality of the linguistic input children in the OCHL study were exposed to, with some children engaged in fewer than 20 conversational turns an hour and others engaged in more than 100 (Ambrose et al., 2014).

Parental Self-Efficacy and Involvement

Parents can play a large role in facilitating their children’s use of hearing devices and supporting their language development. Grounded in social learning theory, parental self-efficacy (PSE) describes parents’ beliefs in their ability to perform a parenting task successfully (Bandura, 1977;

Wittkowski et al., 2017). PSE can also be defined as parents' estimations of their own competence in parental roles (Coleman & Karraker, 2003). Competent parents select goals, monitor their own and their child's needs and behaviors, implement strategies, and evaluate the effectiveness of their parenting behaviors (Sanders et al., 2003). PSE has been shown to be related to a wide range of parenting and child outcomes in young children with normal hearing (Albanese et al., 2019; Benedetto & Ingrassia, 2018; Jones & Prinz, 2005) and children with hearing loss (DesJardin & Eisenberg, 2007; DesJardin, 2017b; Joulaie et al., 2019). In this study, we examine PSE in parents of young children with hearing loss as it pertains to supporting their children's auditory access and spoken language development.

PSE is of special interest because it is malleable; experimental studies have indicated that interventions can successfully increase PSE (Benedetto & Ingrassia, 2018). The potential for interventions to alter PSE is important, given that PSE has been tied to parent characteristics that are, in turn, associated with child outcomes (Mouton et al., 2018). For example, parents with high PSE are more likely than parents with lower PSE to use a responsive, stimulating, and non-punitive care taking approach and to have positive maternal health (Kwok & Wong, 2000; Unger & Wandersman, 1985). In contrast, parents with lower PSE are more likely than parents with higher PSE to experience maternal depression and to report perceiving their child to be difficult to parent (Coleman & Karraker, 1997; Teti & Gelfand, 1991).

DesJardin and her colleagues were the first to examine PSE as it relates to parents of children with hearing loss (DesJardin, 2003, 2005, 2017b; DesJardin & Eisenberg, 2007). They used the Scale of Parental Involvement and Self-Efficacy (SPISE), which DesJardin designed specifically for use with families of children with hearing loss (2003). Findings from research using the SPISE have shown that parents of children with cochlear implants and parents of children with hearing aids differ significantly in terms of PSE, with parents of children with cochlear implants perceiving higher self-efficacy in the care of their children's hearing device and more involvement in developing their children's spoken language abilities than parents of children with hearing aids (DesJardin, 2005). Findings also indicate that, overall, parents report higher self-efficacy in managing their children's auditory device use than in supporting their children's language development (DesJardin, 2005; DesJardin & Eisenberg, 2007; Joulaie et al., 2019). Additionally, DesJardin (2003) found that parents' self-efficacy pertaining to supporting their child's speech and language development was positively related to the frequency with which parents reported they engaged in activities designed to support their child's speech and language development at home. In a more recent longitudinal study, parental self-efficacy and involvement in auditory device use when children were 12 months old was positively related to children's receptive language skills when children were 36 months old, whereas parent involvement in language development

when children were 12 months old was positively related to children's expressive language skills when children were 36 months old (DesJardin, 2017b).

Further support for the relationship between PSE and parental use of strategies to support speech and language development was found in a study in which the research group observed mothers and their children with hearing loss play and engage in a shared book reading (DesJardin & Eisenberg, 2007). Mothers who reported high self-efficacy pertaining to supporting their children's language development were observed to provide their children with higher-level language strategies than mothers who reported lower self-efficacy, and those same higher-level techniques were positively related to children's spoken language skills. Lastly, for mothers of children who used hearing aids, but not mothers of children with cochlear implants, their perceptions of their involvement and self-efficacy pertaining to their child's hearing device use were negatively related to age at receipt of the hearing device and age at enrollment in early intervention (DesJardin, 2005).

Supporting Parents

To ensure best outcomes for children, parental involvement is critical in facilitating auditory access and supporting language development (Moeller, 2000; Sarant et al., 2009; Yanbay et al., 2014). Today, early intervention providers increasingly coach and collaborate with caregivers, using a model that seeks to build PSE, which in turn supports children's development. The coaching model is a method of family-centered practices that embraces the parents and professionals as equal members of the team, whereby parents and professionals learn from each other and work together to support the child (DesJardin, 2017a). The coaching model also focuses on strengthening families' knowledge and interactions with their children to support children's language development and should include providing parents with information they can use as part of their everyday routines (Campbell & Sawyer, 2007; Division for Early Childhood, 2014; Friedman et al., 2012).

Although the goal of the coaching model is to provide parents with the necessary skills to support their child's development, there is limited research to show if parents of children with hearing loss perceive they possess adequate knowledge and confidence to carry out the necessary tasks within their home activities. Recently, through in-depth interviews, Decker and Vallotton (2016) examined parents' reports of information received from early intervention providers about ways to promote the language development of their children with hearing loss. Findings suggested that the parents obtained some knowledge about the importance of frequent communication with their children during everyday activities. However, in this same study, parents indicated they felt the need for additional specific information about how to promote their children's language skills during daily interactions. In the recent DesJardin (2017b) study, longitudinal findings indicated that parents' perceived self-efficacy in terms of supporting both their children's auditory and language

skills was relatively high when children were 12 months of age and increased over time between when children were 12 and 36 months of age. However, during this same time period, parents' levels of involvement in supporting their children's language development decreased. The magnitude of the decrease was influenced by children's language skill level and parents' perceived guidance or support from professionals during those early years. Given that parents' sense of involvement may change over time and parents may need additional and varied support as their children's development progresses, professionals working with families of very young children with hearing loss may need better ways to recognize the kinds of support parents require throughout their years in early intervention.

Scale of Parental Involvement and Self-Efficacy—Revised (SPISE-R)

Having a better understanding of parents' beliefs, knowledge, confidence, and actions can provide professionals in early intervention with information regarding parents' areas of strengths (areas in which they are most knowledgeable and confident) and areas in which to provide additional support or guidance. To obtain a clearer view of these specific constructs, a revised version of the SPISE was developed: the Scale of Parental Involvement and Self-Efficacy—Revised or SPISE-R (Ambrose et al., 2019). The SPISE-R queries parents about their child's hearing device use and their perceptions of their own beliefs, knowledge, confidence, and actions pertaining to supporting their child's auditory access and language development. (See Appendix for the complete questionnaire.)

Research Questions

The purpose of this study was to learn more about the beliefs and self-efficacy of parents of infants and toddlers with hearing loss who wear at least one cochlear implant or hearing aid. This study addressed three research questions.

1. What does the SPISE-R tell us about parents' beliefs and self-efficacy?
2. Are demographic characteristics (i.e., parent gender, parent education level, immediate family member with a hearing loss, child age, better-ear hearing category, age at hearing loss confirmation, and type of hearing device) associated with parents' beliefs, knowledge, or confidence?
3. Are parents' perceptions of their beliefs, knowledge, or confidence related to their perceptions of their actions, children's hearing device use, or children's spoken language abilities?

Method

Data were included from two sets of participants: (a) parents who participated in a local study about their child's

hearing device use and its relationship to self-efficacy and (b) parents who participated in an online survey study designed to examine the relationships between self-efficacy, hearing device use, and spoken language development. Both sets of participants completed the SPISE-R. Additionally, both sets of participants answered demographic questions. Audiologic data for children of participants in the local study, including the child's most recent audiogram or auditory brainstem response (ABR) results and other audiologic details, were retrieved from the child's medical records. Audiologic data for children of participants in the online study were collected from parents, who were asked to upload their child's latest audiogram or ABR results. Online participants also answered questions about their child's spoken language development.

Participants

Inclusion criteria required the participating adult to be the parent of a child who (a) was 36 months of age or younger, (b) wore at least one hearing aid or cochlear implant, (c) was learning spoken language, and (d) had no known conditions other than hearing loss that would affect language development. Additionally, all participants had to live in the United States. Data were available for 72 unique parents and children. Ten of the parents were participants in the local study. Sixty-two of the parents completed the online survey, with 49 of those parents submitting additional documentation regarding the child's hearing thresholds. See Tables 1 and 2 for demographic information.

Recruitment and Procedures

Local Study

Local participants were recruited by their audiologist at Boys Town National Research Hospital (Omaha, Nebraska) to participate in a longitudinal study on device use. Procedures included having parents complete a demographic questionnaire, a questionnaire about device use, and the SPISE-R at their child's first audiologic visit after enrollment in the study. Parents also consented for the research staff to access their child's medical records. At each subsequent audiologic appointment, parents completed another questionnaire about device use and, at 6-month intervals, completed the SPISE-R again and updated their demographic information. Parents were compensated for their time with a Target gift card at each visit. All 18 participants in the local study who met the inclusion criteria were invited either to complete the online study or have their existing data used in this study. Eight parents completed the online study. For the remaining 10 participants, data from the first SPISE-R they completed, along with information from the demographic questionnaire and their child's audiologic records, were included in this study.

Online Study

Online participants were recruited via a flyer that included information about the study and a link to the survey. The

Table 1*Demographic Characteristics for Responding Parents and Children's Environments*

Characteristic	<i>n</i>	% group	Mean	<i>SD</i>	Range
Gender					
Mother	63	87.50			
Father	9	12.50			
Age (years) ^a			32.62	4.91	23–50
Ethnicity					
Hispanic or Latino	12	16.67			
Not Hispanic or Latino	60	83.33			
Race					
Asian	1	1.39			
Black or African American	3	4.17			
White	66	91.67			
Other	2	2.78			
Education level					
Elementary, junior high, high school, GED	7	9.72			
Some college, technical school, associate's degree	13	18.06			
Bachelor's degree	27	37.50			
One or more years of graduate education	25	34.72			
Number of children in the home			2.25	1.20	1–6
Immediate family member with hearing loss					
Yes	14	19.44			
No	58	80.56			

^aParent age is missing for one parent due to a discrepancy in the parent's birthdate.

flyer was posted on social media sites geared toward parents of children with hearing loss and sent to parents who participated in previous studies in the Communication Development Lab at Boys Town National Research Hospital. The flyer was also posted on social media sites geared toward professionals in the field and sent to professional contacts (e.g., early interventionists, early intervention service coordinators, and audiologists) with a request that they share it with appropriate families on their caseloads. The survey was hosted by REDCap. Participants could stop taking the survey at any time and had the ability to access a partially completed survey via a unique URL and code by selecting the "save and exit" option on the survey. The survey took approximately 30 minutes to complete.

The first portion of the survey asked participants five questions to determine if they met the inclusion criteria. If the inclusion criteria were met, the participants were presented with consent information on the following screen. If they agreed to the consent statement, they were then directed to the full survey. The survey included a demographic questionnaire, the SPISE-R, and questions from the communication subscale of the Developmental Profile 3 (DP-3; Alpern, 2007). Additionally, after all the survey questions were completed, participants were

prompted to upload their child's most recent ABR report or audiogram or, if they did not have the document available to upload at that time, email the document to the lab. To increase the number of complete responses, reminder emails were sent to participants who had provided their email. Additionally, reminders were sent to participants who finished the survey, but had not uploaded or emailed their child's audiologic results. If a parent responded that they did not have access to an ABR report or audiogram, they were asked to explain their child's hearing loss in detail and given example descriptors. If the participant completed the entire survey and provided audiologic results and a mailing address, they were compensated with a \$15 Target gift card.

Measures

Demographic Questionnaire

Demographic questions queried a variety of information about the responding parent, their child, and the child's environment (e.g., parent gender [i.e., mother, father], parent education levels, whether the child had any immediate family members [parents or siblings] with hearing loss, race, ethnicity, and age). For the online study, this portion also queried information specific to the child's hearing loss, including questions about the age at hearing

Table 2*Demographic Characteristics for Children*

Characteristic	<i>n</i>	% group	Mean	<i>SD</i>	Range
Age (months)			21.52	9.74	4–36
Better-ear hearing threshold category					
Normal	4 (4 HA, 0 CI)	5.56			
Mild	16 (16 HA, 0 CI)	22.22			
Moderate	9 (7 HA, 2 CI)	12.50			
Moderate-severe	5 (5 HA, 0 CI)	6.94			
Severe	7 (4 HA, 3 CI)	9.72			
Profound	18 (2 HA, 16 CI)	25.00			
Device type					
Hearing aid only	48	66.76			
Cochlear implant ^a	24	33.33			
Age at confirmation of hearing loss (months)			3.56	5.00	0–25
Age at hearing aid fit (months)			5.74	5.05	1–28
Age at receipt of first cochlear implant (months)			12.88	4.12	5–25
Device use (percent of waking hours)			74.08	23.04	4–100
DP-3 Communication subscale (standard score)			97.00	21.20	50–130

Note. HA = hearing aid, CI = cochlear implant, DP-3 = Developmental Profile 3. Due to a discrepancy in reported birthdate, data is missing for one child for age, age at confirmation of hearing loss, age at hearing aid fit, and DP-3 Communication subscale score. One additional child did not have data for age at hearing aid fit due to the child not receiving a hearing aid and 10 additional children did not have data for DP-3 Communication subscale score because they were in the longitudinal study. Data are also missing for 13 children for better-ear hearing threshold category (10 HA, 3 CI) whose parents did not provide that data and one child for device use due to the parent providing incomplete data.

^aOne child used both a cochlear implant and a hearing aid and was included in the cochlear implant group for analyses of device type.

loss confirmation, age at which hearing devices were fit, and the early intervention services the child received. For the local study, this latter information was gathered from a review of the child's audiologic records. See Tables 1 and 2.

Scale of Parental Involvement and Self Efficacy–Revised (SPISE-R)

The SPISE-R (Ambrose et al., 2019) is the revised version of the SPISE (DesJardin, 2003). The SPISE-R comprises five sections. The first four use a 7-point Likert scale to query parents' beliefs, knowledge, confidence, and actions relevant to supporting their child's auditory access and spoken language development. The belief section does not yield a summary score. However, the knowledge, confidence, and action sections each yield three summary scores: average score for auditory access items, average score for language development items, and average score for the full section. In the final section, parents are asked about their child's hearing device use. See Appendix for the complete questionnaire.

Beliefs Section. The beliefs section consists of seven statements, which parents rate on a Likert scale ranging from 1 (*not at all*) to 7 (*a great deal*), with a midpoint of 4

(*somewhat*) to indicate how much they share the belief. Three items are positively-keyed, meaning that agreement is more optimal than disagreement: (a) if children are given the right supports, they can overcome the effects of hearing loss, (b) how my family talks to and interacts with my child will have a big impact on how my child develops, and (c) my child's hearing devices help him/her communicate. Four items are negatively-keyed, meaning that disagreement is more optimal than agreement: (d) no matter what we do as a family, my child's development will be delayed compared to children with normal hearing, (e) if people see my child wearing his/her hearing devices, they will judge my child or family, (f) if I keep my home too quiet, my child won't learn to listen in noise, and (g) if children wear their hearing devices all the time, they will become overly dependent on them. After parents complete the measure, the negatively-keyed items are reverse scored by recoding the responses (e.g., a 1 on the Likert scale is replaced with a score of 7 and a 7 on the Likert scale is replaced with a score of 1). The process of reverse scoring results in higher scores representing more optimal scores for all items in the section, thus allowing for comparisons between items.

Knowledge Section. The knowledge section asks parents to indicate how much they know about 10 topics: five topics related to facilitating their child's auditory access and five topics related to supporting their child's language development. The response format is a 7-point Likert scale ranging from 1 (*a little*) to 7 (*a great deal*) with a midpoint of 4 (*some*). Sample items include (a) how to manage my child's hearing devices, (b) how to share a book with my child in a way that helps him/her learn to communicate, and (c) strategies the interventionist recommends using to help my child learn to communicate.

Confidence Section. The confidence section asks parents to indicate how confident they feel in their ability to do ten tasks: five tasks related to facilitating their child's auditory access and five tasks related to supporting their child's language development. A 7-point Likert scale ranging from 1 (*not at all*) to 7 (*very*), with a midpoint of 4 (*somewhat*) is used for responses. Examples include (a) put and keep my child's hearing devices on him/her, (b) help my child hear by making changes in his/her environment, and (c) help my child learn to say new sounds, words, or sentences.

Actions Section. The instructions for the actions section ask parents to indicate how often they do fifteen tasks: seven tasks related to facilitating their child's auditory access, five tasks related to supporting their child's language development, and three tasks related to involvement in their child's intervention services. Responses were reported on a 7-point Likert scale ranging from 1 (*never*) to 7 (*always*), with a midpoint of 4 (*sometimes*), thus higher scores are more optimal. Examples from this section are (a) draw my child's attention to sounds in speech or the environment that he/she is still learning or might not have heard, (b) make sure other people caring for my child know how to help my child learn to communicate, and (c) advocate for my child's needs in intervention sessions and IFSP/IEP [Individualized Family Service Plan/Individualized Education Program] meetings.

Device Use Section. The device use section includes questions related to the child's use of his or her hearing devices. Questions query how much the child wears his or her hearing devices while sleeping, how many hours a day the child is awake, and how many hours the child wears his or her hearing devices in total. Although data logging information was not collected for this project, the first question is standardly included in the SPISE-R for situations in which a comparison is being made to objective data logging stored in the hearing devices, as data logging will capture time the devices were turned on while children are sleeping. The responses are used to calculate the percent of the day the child wears his or her hearing devices while awake, which is the value used in this study. The section also asks parents to use a scale ranging from *never* to *always* to report how often their child wears their hearing devices in different environments.

Developmental Profile 3 (DP-3)

The DP-3 is a general development screener with physical, adaptive behavior, social-emotional, cognitive, and

communication scales, the latter of which was used for this study. It was developed for ages birth to 12 years, 11 months (Alpern, 2007). It was not included in the methods for the longitudinal study, thus was only completed by parents in the online study. The communication scale asks whether the child has completed 29 language milestones ranging from "does your child usually look toward the source of a sound when it starts, such as a person beginning to talk?" to "does your child write or print from memory at least 20 words with correct spellings?" Responses were transferred to hard copies of the parent/caregiver checklist. Raw scores were used to calculate age-normed standard scores with a normative mean of 100 and standard deviation of 15.

Statistical Analysis

Prior to conducting the analyses for the three research questions, we examined whether the three sections of the SPISE-R that were designed to yield summary scores (knowledge, confidence, and actions) had sufficient internal consistency. Cronbach's alpha indicated acceptable levels of reliability with $\alpha = 0.89, 0.92,$ and 0.92 for the three sections, respectively (DeVellis, 2003). Most items resulted in a decrease in the alpha if deleted, which indicated they should be retained in the measure. For the small number of items that would result in an increase if deleted, the change would be minimal (in all cases, less than 0.01).

Our first research question queried what parents' responses on the SPISE-R tell us about their beliefs and self-efficacy. To answer this question, the data were summarized descriptively. In addition, paired-samples *t*-tests were used to examine whether there were differences between average scores for the knowledge and confidence sections and, within each section, whether there were differences between average scores for the auditory access and language development subsections. Additionally, Pearson correlations were calculated between the knowledge total mean score and the confidence total mean score.

Our second research question queried whether demographic characteristics (i.e., parent gender [mother, father], parent education level, immediate family member with a hearing loss [yes, no], child age, better-ear hearing category [normal, mild, moderate, severe, profound], age at hearing loss confirmation, and type of hearing device [hearing aid, cochlear implant]) were associated with parents' beliefs, knowledge, or confidence. For device type, the one child who used both a cochlear implant and a hearing aid was represented as a cochlear implant user. To address this question, we first examined relationships between the seven demographic characteristics. Device type was significantly related to better-ear hearing category ($r_s = 0.73, p < .01$), reflecting that the children with cochlear implants had more hearing loss than the children with hearing aids. Device type was also significantly related to child age ($r_{pb} = 0.27, p = .02$), reflecting that the children with cochlear implants were older than the children with hearing aids. Given these relationships and the limited

variability in better-ear hearing category for the children with cochlear implants, better-ear hearing category was only examined for the hearing aid users and child age was examined separately for hearing aid and cochlear implant users. No other demographic characteristics were significantly related to one another. Because the belief data were not designed to be summarized, analyses were conducted separately for each belief. Spearman correlations were used for the belief analyses, due to violations in the assumptions for parametric analyses. The knowledge and confidence sections were each represented by the respective section score. Pearson product moment correlations were calculated to examine the relationships between the section scores and the child's current age. Point-biserial correlations were calculated to examine the relationships between the section scores and the three binomial variables: parent gender, immediate family member with a hearing loss, and device type. Lastly, Spearman correlations were calculated to examine the relationships between the section scores and the three variables that did not meet the assumptions for use of parametric analyses (parent education level, better-ear hearing category, and age at hearing loss confirmation). Data were missing for one child with a hearing aid for the two age related variables due to a discrepancy in reported birthdate and for 10 children with hearing aids for better-ear hearing category due to parents not submitting audiologic information.

The third research question queried whether parents' perceptions of their beliefs, knowledge, or confidence were related to their perceived actions, children's hearing device use, or children's spoken language abilities. Spearman correlations were calculated to examine the relationship of each belief with action scores, language scores,

and device use. Pearson product moment correlations were calculated to determine whether knowledge and confidence scores were associated with action scores and language scores. Spearman rank order correlations were calculated to determine whether knowledge scores and confidence scores were associated with device use, due to the device use variable violating the assumption for parametric tests. Data was missing for one child for hearing device use (due to incomplete data) and 11 children for language abilities (10 children in the longitudinal study and one child for whom a discrepancy in the reported birthdate made it impossible to calculate a standard score on the DP-3). For the one child who wore both a hearing aid and a cochlear implant, the parent reported identical wear time for the two devices.

Results

Parents' Beliefs and Self-Efficacy

The first research question examined what the SPISE-R results indicated about the beliefs and self-efficacy of parents of infants and toddlers with hearing loss. The beliefs section consisted of seven items querying how strongly a parent agrees with the belief. See Table 3 for individual item data. After reverse scoring the four negatively-keyed items, low scores represent less desirable levels of agreement. For all seven items, the average scores were above the mid-point of four on the scale (range of 4.76 to 6.49). Although average scores for each belief were generally high, there was a wide range in parent responses, with five of the seven beliefs having scores ranging from 1–7 and the two remaining beliefs having scores ranging from 2–7.

The knowledge and confidence sections each consisted of 10 items: five related to auditory access and five related

Table 3
Agreement Level for Belief Items

Belief	Agreement Level		
	<i>M</i>	<i>SD</i>	Range
1. If children are given the right supports, they can overcome the effects of hearing loss.	5.83	1.52	1–7
2. How my family talks to and interacts with my child will have a big impact on how my child develops.	6.49	0.95	2–7
3. No matter what we do as a family, my child's development will be delayed compared to children with normal hearing. ^a	5.53	1.51	1–7
4. My child's hearing devices help him/her learn to communicate.	5.89	1.62	1–7
5. If people see my child wearing his/her hearing device(s), they will judge my child or family. ^a	4.76	1.66	1–7
6. If I keep my home too quiet, my child won't learn to listen in noise. ^a	4.97	1.66	1–7
7. If children wear their hearing device(s) all the time, they will become overly dependent on them. ^a	6.21	1.21	2–7

^aReverse scoring rules applied.

Table 4*Descriptive Data for the Knowledge and Confidence Sections and the Corresponding Subsections*

Score	Knowledge			Confidence		
	M	SD	Range	M	SD	Range
Auditory access subsection score	5.31	1.07	3.40–7	5.29	1.12	3.00–7
Language development subsection score	5.30	1.26	2.40–7	5.50	1.19	2.00–7
Total section score	5.30	1.08	3.00–7	5.40	1.08	2.50–7

to language development. See Table 4 for descriptive data for each section and subsection. Average scores were relatively high for both knowledge and confidence ($M = 5.30$, $SD = 1.08$ and $M = 5.40$, $SD = 1.08$, respectively), with no significant difference between average scores for the two sections ($t = -1.33$, $p = .19$). For the knowledge section, there was not a significant difference between average scores for the auditory access items and average scores for the language development items (auditory access $M = 5.31$, $SD = 1.07$ and language development $M = 5.30$, $SD = 1.26$; $t = 0.78$, $p = .94$). However, for the confidence section, average scores for the auditory access items were significantly lower than average scores for the language development items (auditory access $M = 5.29$, $SD = 1.12$ and language development $M = 5.50$, $SD = 1.19$; $t = -2.23$, $p = .03$). On both the knowledge and confidence scales, the item with the lowest score was the item pertaining to the Ling 6-Sound test (knowledge item #5 $M = 4.75$, $SD = 2.21$; confidence item #5 $M = 4.42$, $SD = 2.17$). Of the twenty total items on the knowledge and confidence scales, only one item had an average score above 6 (knowledge item #1 $M = 6.21$, $SD = 0.83$): “how to manage my child’s hearing device(s).”

The average knowledge and confidence scores were strongly correlated ($r = 0.85$, $p < .01$) indicating that parents who self-reported being highly knowledgeable were also likely to self-report being highly confident and vice versa. However, despite the strong correlation between knowledge and confidence for the full group, inspection of the individual data for each item indicated that some parents reported large differences between their perceived knowledge and confidence scores for individual skills, with differences as high as five points.

Associations with Demographic Characteristics

The second research question examined whether demographic characteristics (i.e., parent gender, parent education level, child having an immediate family member with a hearing loss, child age, better-ear hearing category, age at hearing loss confirmation, and type of hearing device) were associated with parents’ beliefs, knowledge, and confidence.

Beliefs

Spearman correlations indicated that scores for the belief that “how my family talks to and interacts with my child will have a big impact on how my child develops” were significantly correlated with parent gender ($r_s = -0.37$, p

$< .01$), indicating that mothers agreed more strongly with this statement than fathers. Scores for this belief were also negatively correlated with age at hearing loss confirmation ($r_s = -0.27$, $p = .03$), indicating that the earlier a child was identified with hearing loss, the more likely their parent was to strongly agree with this statement. Additionally, after reverse scoring, scores for the belief that “no matter what we do as a family, my child’s development will be delayed compared to children with normal hearing” were significantly correlated with parent gender ($r_s = -0.24$, $p = .04$), indicating that fathers agreed more strongly with this statement than mothers. Scores for this belief were also negatively correlated with better-ear hearing category for hearing aid users ($r_s = -0.52$, $p < .01$) and age at hearing loss confirmation ($r_s = -0.24$, $p = .04$), indicating that the later a child was identified with hearing loss and/or the greater the child’s hearing loss, the more likely the parent was to strongly agree with this statement. Finally, after reverse scoring, scores for the belief that “if children wear their hearing device(s) all the time, they will become overly dependent on them” were significantly correlated with parent gender ($r_s = -0.33$, $p < .01$) and the child having an immediate family member with hearing loss ($r_s = -0.24$, $p < .04$) indicating that fathers agreed more strongly with this statement than mothers and parents whose children had no immediate family members with a hearing loss agreed more strongly with this statement than parents whose children did have an immediate family member with hearing loss. No significant relationships were identified between the remaining beliefs and demographic characteristics (all $ps > .05$).

Knowledge and Confidence

Knowledge scores were significantly related to hearing device type ($r_{pb} = 0.30$, $p = .01$), with parents of children with cochlear implants reporting higher knowledge scores than parents of children with hearing aids. Confidence scores were significantly related to parent gender ($r_{pb} = -0.30$, $p = .01$), indicating mothers reported higher levels of confidence than fathers. No other significant relationships were identified between the demographic characteristics and knowledge or confidence (all $ps > .05$).

Relationships with Parents’ Perceived Actions, Children’s Hearing Device Use, and Children’s Spoken Language Abilities

The third research question queried whether parents’ perceptions of their beliefs, knowledge, or confidence were related to their perceived actions, children’s hearing

device use, or children's spoken language abilities. The belief that "how my family talks to and interacts with my child will have a big impact on how my child develops" was significantly related to action scores ($r_s = 0.40, p < .01$). The belief that "my child's hearing devices help him/her learn to communicate" was significantly related to both action scores ($r_s = 0.34, p < .01$) and hearing device use ($r_s = 0.33, p < .01$). No other belief scores were significantly correlated with action scores, hearing device use, or language scores (all $ps > .05$).

Both knowledge and confidence scores were significantly correlated with action scores (knowledge $r = 0.64, p < .01$; confidence $r = 0.69, p < .01$) and hearing device use (knowledge $r_s = 0.33, p < .01$; confidence $r_s = 0.25, p = .04$). Confidence scores were also significantly related to language scores ($r = 0.34, p = .01$), whereas knowledge scores were not ($r = 0.23, p = .08$).

Discussion

Recommended practices for early intervention include an intervention model that seeks to enhance the family's ability to meet the unique needs of their child (American Speech-Language-Hearing Association, 2008; Division for Early Childhood, 2014). For families of children with hearing loss who are learning spoken language through audition, this typically entails ensuring families have the skills necessary to support their child's auditory access and language development within daily activities and routines in their home (DesJardin, 2017a). However, we know little about whether families participating in early intervention hold beliefs and self-efficacy levels that are likely to facilitate their ability to carry out actions that facilitate their children's auditory access and spoken language development. To fully support families, it is imperative not only to monitor children's hearing device use and language development, but also to assess parents' perceptions of their beliefs, knowledge, confidence, and actions, all of which can affect how they facilitate their child's auditory access and language skills. When early intervention professionals obtain parents' perceptions of these constructs, professionals can identify parents' strengths and areas in which they may need additional support and guidance.

Results of this study indicate the SPISE-R has promise for use in early intervention to better understand parents' strengths and needs. The knowledge, confidence, and actions sections all had high levels of internal consistency, with item analyses indicating no items should be excluded. The items within each section were created to ensure professionals using the measure could collect meaningful information about the most relevant aspects of parents' roles in supporting their child's auditory access and language development. Although, on average, parents reported desirable agreement levels with the beliefs, as well as relatively high levels of knowledge and confidence, there was individual variability, with some families having several beliefs with undesirable agreement levels and low levels of knowledge or confidence for multiple items. Thus, the tool may be helpful in identifying families who need

additional educational counseling pertaining to their beliefs or additional support to feel knowledgeable and confident enough to carry out actions that will facilitate their child's auditory access and language development.

The tool may also be useful in identifying parents with gaps between their perceived knowledge and confidence levels. Overall, parents' knowledge and confidence scores were strongly correlated, indicating that parents who self-report being highly knowledgeable are also likely to self-report being highly confident. However, knowledge does not always translate to confidence, as some parents reported gaps between their perceived knowledge and confidence levels for individual skills. For example, a parent may indicate a high score in knowledge relating to strategies for keeping the child's hearing devices on, but a low score in his or her confidence in their ability to do so. When professionals note such gaps, it may be an indication that parents need more support to practice a skill, as suggested in an early intervention coaching model.

Beliefs

Results from this study indicate that parents may vary in terms of their beliefs about children's hearing device use and language development. Of the seven belief items, the two with the lowest scores were (a) that others judge the child or family when they see the child's hearing devices and (b) that if the child's home is too quiet, the child won't learn to listen in noise. Neither belief is concerning if it does not affect parents' behavior. In the former case, the concern would arise if a parent's belief that their family will be judged when others see the hearing device results in their having the child use the device less frequently in public settings. In the latter case, if the belief leads to parents not reducing background noise in their home, it may put the child at higher risk for spoken language delays than children whose parents attempt to provide them with an optimal listening environment (Erickson & Newman, 2017).

Findings regarding the relationships between the beliefs and demographic characteristics indicate that both the later a child was identified with hearing loss and the greater the hearing loss a child with hearing aids had, the more likely their parent was to strongly agree with the idea that their child's development would inevitably be delayed. Fathers also expressed a stronger agreement with this belief than mothers. If parents believe that their child's language development will be delayed regardless of their own efforts, parents may have little incentive to take actions that could positively impact their child's learning, including providing their child with high rates of quality linguistic input to further support their child's spoken language skills.

Agreement with the belief that how the family talks to and interacts with the child will impact the child's development was negatively related to the age at which the child's hearing loss was confirmed and was weaker for fathers than mothers. Similar to findings in the DesJardin 2017b study, it could be that the earlier children are identified with hearing loss, the more time they spend in early intervention where the importance of high-quality

interactions with their child is continuously emphasized. Additionally, multiple studies point to generally lower involvement of fathers in early intervention services (Erbasi et al., 2018; Ingber & Most, 2018), which if true for fathers in this study, could be a source of the differences between mothers' and fathers' beliefs.

Parents whose children did not have an immediate family member with hearing loss expressed stronger agreement than parents of children who had an immediate family member with hearing loss with the belief that children can become too dependent on their devices if they wear them all the time. Fathers also expressed a stronger agreement with this belief than mothers. The difference between mothers and fathers may be tied to potential differences in participation in early intervention services. The differences between parents whose children did and did not have an immediate family member with hearing loss might indicate that more extensive experience with hearing loss helps parents understand the benefits and lack of negative consequences presented by consistent hearing aid use.

There were two beliefs that were significantly associated with parents' perceived actions. First, scores for the belief regarding the potential positive impact of how the family talks to and interacts with the child were positively related to action scores. Thus, although it was uncommon for parents to disagree with this belief, when observed, it may warrant further educational counseling by early intervention providers. Additionally, scores for the belief that their child's hearing devices help their child learn to communicate were positively related to action scores and children's hearing device use. These relationships indicate the importance of families believing in the benefits of hearing device use, a belief that can be targeted through a variety of strategies, including simulations of the child's hearing loss (Ambrose et al., 2020). Although agreement with the remaining beliefs was not significantly related to actions, hearing device use, or spoken language scores, when providers find that parents hold a belief, they should monitor how that belief affects how the parent supports their child's auditory access and language development on a case-by-case basis.

Self-Efficacy

Parents generally reported high levels of knowledge and confidence pertaining to supporting their child's auditory access and language development. However, variability across parents and between skills was high, indicating these are important constructs to measure and monitor. Similar to prior research (DesJardin, 2005), parents of children with cochlear implants reported higher knowledge scores than parents of children with hearing aids. Fathers reported lower levels of confidence than mothers. Contrary to prior research using the SPISE (DesJardin, 2005; DesJardin & Eisenberg, 2007; Joulaie et al., 2019), confidence scores were slightly lower for supporting children's auditory access as compared to language development, indicating that families with young children may benefit from coaching strategies on topics pertaining to use of hearing devices and creating an optimal listening environment. In particular, given the relatively low levels of

knowledge and confidence parents reported for the items pertaining to the Ling 6-Sound test, families may especially benefit from coaching pertaining to conducting the test, which is a valuable tool for monitoring children's auditory access with their hearing devices (Ling, 1976).

Unlike prior research (DesJardin, 2005), knowledge and confidence were not associated with demographic characteristics, with the exception of parents of children with cochlear implants reporting significantly higher knowledge levels (but not confidence levels) than parents of children with hearing aids and fathers reporting lower confidence levels than mothers. The relationship of device type with knowledge levels may be a result of children with cochlear implants often receiving more intensive intervention services than children with hearing aids. However, if the differences in intervention lead to increased knowledge levels, but not confidence levels, the intervention efforts may need to be reexamined to ensure the efforts influence children's outcomes. The differences in confidence between mothers and fathers may be related to possible differences in the involvement of mothers versus fathers in early intervention.

Results also indicated that both perceived knowledge and confidence levels were positively associated with self-reported action levels and hearing device use. Additionally, perceived confidence levels were associated with children's spoken language scores. This aligns with findings from studies using the SPISE (DesJardin & Eisenberg, 2007; Stika et al., 2015), as well as more general findings indicating that levels of PSE are related to a range of parenting and child outcomes (Benedetto & Ingrassia, 2018; DesJardin, 2017b; Jones & Prinz, 2005; Joulaie et al., 2019). This finding also indicates that early intervention professionals should seek to boost parents' PSE as an intervention strategy that may ultimately affect children's outcomes.

Limitations and Future Research

Although the results of this study are promising, additional research is needed to further establish the validity of the SPISE-R, including the construct and content validity of the measure. Future investigations should also examine the predictive validity of the SPISE-R, as it is possible that beliefs and self-efficacy have bi-directional relationships with outcomes. One weakness of the current work was that the data were highly reliant on parent report, not only of parents' perceptions of their own knowledge and confidence, but also their actions, their child's device use, and their child's language skills. Although self-reports of how people perceive their knowledge and confidence may be reasonably valid, self-reports of action behaviors may have lower validity (Wittkowski et al., 2017) and parents are known to typically overestimate how much their children use their hearing devices (Walker, McCreery, et al., 2015). Future studies should use objective outcome measures when possible and, when not, also collect information on providers' perceptions of relevant outcomes. Additionally, early intervention characteristics (e.g., frequency, provider type, proportion of intervention

time spent coaching the parent, etc.) need to be explored to investigate the variability in beliefs and self-efficacy. Lastly, given that prior studies of families with children with typical hearing found PSE to be related to gender, socioeconomic status, and cultural variability (Coleman & Karraker, 2003; Dumka et al., 1996), it will be important for future studies investigating beliefs, PSE, and involvement of families of young children with hearing loss to include participants who are more culturally diverse, as well as more fathers as the sample of parents in this study were primarily mothers, Caucasian, and of relatively high socioeconomic status.

Summary

The revised SPISE-R is a promising tool for use in early intervention to better understand parents' beliefs and their areas of strength and needs pertaining to supporting their young child's auditory access and spoken language development. Early intervention professionals should ensure their intervention services use a coaching model that helps parents understand their potential to influence their child's outcomes, builds PSE, and supports parents' involvement in facilitating their child's development. Additionally, professionals should monitor how parents' beliefs and PSE change over time and how beliefs and PSE may relate to how parents are involved in their young children's early intervention.

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Appendix

SCALE OF PARENTAL INVOLVEMENT AND SELF-EFFICACY-REVISED (SPISE-R)

Directions: Circle a number to answer each question. The phrase “hearing devices” is used to refer to both hearing aids and cochlear implants. “Parents” is used to refer to children’s main caregivers.

A. BELIEFS: These items describe things that some parents of children with hearing loss may believe or be concerned about. Please indicate how much YOU share these beliefs or concerns.

	Not at all		Somewhat			A great deal	
1. “If children are given the right supports, they can overcome the effects of hearing loss.”	1	2	3	4	5	6	7
2. “How my family talks to and interacts with my child will have a big impact on how my child develops.”	1	2	3	4	5	6	7
3. “No matter what we do as a family, my child’s development will be delayed compared to children with normal hearing.”	1	2	3	4	5	6	7
4. “My child’s hearing device(s) help him/her learn to communicate.”	1	2	3	4	5	6	7
5. “If people see my child wearing his/her hearing device(s), they will judge my child or family.”	1	2	3	4	5	6	7
6. “If I keep my home too quiet, my child won’t learn to listen in noise.”	1	2	3	4	5	6	7
7. “If children wear their hearing device(s) all the time, they will become overly dependent on them.”	1	2	3	4	5	6	7

B. KNOWLEDGE: Parents must learn a lot of new information and skills when their child has a hearing loss. This process takes time. We are interested in how much you currently **know** about each topic.

	Not at all		Some			A great deal	
1. How to manage my child’s hearing device(s)	1	2	3	4	5	6	7
2. Strategies to use to keep my child’s hearing device(s) on him/her	1	2	3	4	5	6	7
3. What my child can and cannot hear <u>without</u> his/her hearing device(s)	1	2	3	4	5	6	7
4. What my child can and cannot hear <u>with</u> his/her hearing device(s)	1	2	3	4	5	6	7
5. How to do the Ling 6-Sound test (ah, ee, oo, m, sh, s)	1	2	3	4	5	6	7
6. The sounds, words, or sentence types my child should be learning to say	1	2	3	4	5	6	7
7. How to help my child learn to communicate	1	2	3	4	5	6	7
8. How my child’s learning is affected by his/her hearing loss	1	2	3	4	5	6	7
9. How to share a book with my child in a way that helps him/her learn to communicate	1	2	3	4	5	6	7
10. Strategies the interventionist recommends using to help my child learn to communicate	1	2	3	4	5	6	7

C. CONFIDENCE: Knowledge alone doesn't always make us confident or comfortable doing something. We may need more time or practice to build confidence. Please indicate how **confident** you are in your ability to do each thing.

	Not at all		Somewhat			Very	
1. Determine if my child's hearing device(s) are working okay	1	2	3	4	5	6	7
2. Put and keep my child's hearing device(s) on him/her	1	2	3	4	5	6	7
3. Help my child hear by making changes in his/her environment	1	2	3	4	5	6	7
4. Help my child hear and understand new speech sounds or sounds in his/her environment	1	2	3	4	5	6	7
5. Find out if my child is hearing okay by using the Ling 6-Sound test (ah, ee, oo, m, sh, s)	1	2	3	4	5	6	7
6. Help my child learn to say new sounds, words, or sentences	1	2	3	4	5	6	7
7. Help my child communicate what he/she wants and needs	1	2	3	4	5	6	7
8. Communicate with my child in a way that is appropriate to address his/her hearing needs	1	2	3	4	5	6	7
9. Share books with my child in a way that helps him/her learn to communicate	1	2	3	4	5	6	7
10. Do the things I learned during intervention sessions when the professional is not there to help me	1	2	3	4	5	6	7

D. ACTIONS: We know daily lives are busy. There are many responsibilities that parents have. It is not possible to always do everything we would like to do each day. Given other responsibilities, we are interested in how often you are able to **do** the following things.

	Never		Sometimes			Always	
1. Daily listening checks on my child's hearing device(s)	1	2	3	4	5	6	7
2. Make sure other people caring for my child know how to manage my child's hearing device(s)	1	2	3	4	5	6	7
3. Make sure I, or someone else, puts my child's hearing device(s) on immediately <u>after he/she wakes up</u>	1	2	3	4	5	6	7
4. Make sure I, or someone else, puts my child's hearing device(s) on immediately <u>if they fall off or my child takes them off</u>	1	2	3	4	5	6	7
5. Make sure my child's environment makes it as easy as possible for him/her to hear	1	2	3	4	5	6	7
6. Draw my child's attention to sounds in speech or the environment that he/she is still learning or might not have heard	1	2	3	4	5	6	7
7. Daily check of my child's listening with the Ling 6-Sound test (ah, ee, oo, m, sh, s)	1	2	3	4	5	6	7
8. Use strategies during our daily activities to help my child learn to say new sounds, words, or sentences	1	2	3	4	5	6	7
9. Use strategies to help my child communicate his/her wants and needs	1	2	3	4	5	6	7
10. Make sure other people caring for my child know how to help my child learn to communicate	1	2	3	4	5	6	7
11. Share books with my child at least one time a day	1	2	3	4	5	6	7
12. Use the strategies I learned during intervention sessions to help my child learn to communicate.	1	2	3	4	5	6	7
13. Advocate for my child's needs in intervention sessions and IFSP/IEP	1	2	3	4	5	6	7

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|--|---|---|---|---|---|---|---|
| 14. Get my child to the audiologist as soon as a visit is needed | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 15. Attend and be involved in my child's intervention sessions (instead of having to do other things during that time, such as prepare meals or take care of siblings) | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

E. DEVICE USE: We are interested in how much your child wears his/her hearing device(s) when he/she is awake on an average day. If your child has one hearing aid and one cochlear implant and there are differences in how you would answer the questions for each device, please answer separately for each device. (In the table, please use "CI" and "HA" if needed.)

1. How many hours a day is your child usually awake? _____
2. How many hours a day does your child usually wear his/her hearing device(s) while awake? _____
3. If your child ever wears his/her hearing devices (turned on) while sleeping, please indicate the average number of hours per day this occurs. _____
4. How often does your child usually wear his/her hearing device(s) when he/she is awake in these situations?

	Never	Rarely	Sometimes	Often	Always	Doesn't Apply to us
a) At home						
b) In the car						
c) In daycare or school						
d) When cared for by family or friends outside the home						
e) Playing outside						
f) On outings (e.g., store, zoo, children's museum)						

Note. Please cite instrument as: Ambrose, S. E., Appenzeller, M., & DesJardin, J. L. (2019). Scale of Parental Involvement and Self-Efficacy – Revised [Assessment Instrument]. Boys Town National Research Hospital.