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Self-Reported Listening Abilities in Educational Settings of Typically Hearing Children and Those Who Are Deaf/Hard-of-Hearing

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Abstract

Children who are deaf or hard-of-hearing (D/HH) learning in inclusive educational settings must be aware of how well they hear and understand spoken language to advocate for themselves. This study explored elementary-age children's self-reported listening abilities using thematic analysis of brief interviews. Participants were 16 D/HH and 16 typically hearing (TH) 7- to 12-year-old monolingual English speakers in Canada. Children were asked about their ability to hear and understand the teacher, other students, and people in different environments. Findings showed surprising similarities across groups in terms of numbers of "no difficulty" responses and awareness of listening barriers related to speaker and environmental characteristics. Unsurprisingly, children who are D/HH were more likely to discuss hearing technologies and to attribute difficulties to their hearing abilities. Findings suggest that children who are D/HH with poor speech discrimination in noise abilities require support in developing awareness of and expressing difficulties with listening abilities.

Keywords

elementary school, age, hearing, assessment, deaf/hard of hearing, exceptionalities, qualitative, designs, research

For decades, students who are d/Deaf or hard-of-hearing (D/HH; i.e., with a hearing difference who use any combination of signed and spoken language) have been identified as a population at risk of poor academic achievement (Antia et al., 2020; Qi & Mitchell, 2012). Children with a hearing difference who use only spoken language (i.e., do not use a manual system or signed language, hereafter referred to as D/HH) must be aware of when they are not able to hear or understand what is spoken and advocate for accommodations. Despite the recognized importance of self-awareness and self-advocacy for this unique population (Michael & Zidan, 2018; Smith, 2013), no research has asked children in the elementary grades what they can and cannot hear in educational environments. Such research could provide a starting point for identifying issues most children can work through without intervention versus issues where they may need guidance in developing awareness and self-advocacy.

Classrooms typically have poor acoustic environments for learning for both typically hearing (TH; Shield & Dockrell, 2003) and D/HH children (Anderson, 2004). Children who are D/HH cannot understand spoken communication in background noise as well as TH children even when their hearing difficulties are relatively mild (Alasim, 2018; Goldsworthy & Markle, 2019). The Classroom Participation Questionnaire–Revised (Stinson et al., 2006) measures children's self-reported ability to understand and be understood in the classroom and was designed to be completed by students who are D/HH and use spoken or signed language. It correlates strongly with measures of reading, math, language, and social skills (Antia et al., 2011, 2009, 2007). This suggests that effective listening in inclusive learning environments is crucial to the academic success of students who are D/HH and who access education through spoken language. To ensure success, appropriate accommodations must be provided. Educators need to know when a child is experiencing difficulties listening and understanding and in which contexts to provide accommodations.

Children of all hearing abilities appear to be aware of a variety of barriers to listening and understanding in learning environments. Through research using questionnaires and surveys, TH children report challenges hearing when there is a substantial amount of background noise, especially

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from other students (Brännström et al., 2017; Nelson et al., 2020). Nelson et al. (2020) retrospectively analyzed survey responses by 3,584 children and youth who were D/HH and TH in Grades 3 to 12. They found that students who were D/HH reported greater listening difficulty overall than TH peers and that challenges were greater for all children in Grades 3 to 6 than in higher grades. The most challenging listening contexts reported by children who were D/HH and TH (according to responses solicited through Likert-type scales) were other students making noise and large rooms or assemblies where no microphone was used. The least challenging context by far was listening to the teacher speaking at the front of a quiet room.

Qualitative research using interviews with school-age children has been limited. Reed and colleagues (2008) interviewed 22 students who were D/HH in Grades 3 to 8, along with their parents, teachers, and various associated educational staff about facilitators and detractors to student success. Although interviews with the adult participants were analyzed thematically, children's responses were not reported as they were "brief and yielded no significant information" (p. 491). Interviews with the adult participants revealed that the top two facilitators of student success were student attentiveness in class and motivation to succeed, and the primary detractor was children's inconsistent use of hearing devices at school. Kent and Smith (2006) found that the central theme that guided 12- to 17-year-old youth's willingness to wear their hearing aids was the perception of whether hearing aid use was "normal." Therefore, real or perceived social stigma is an additional barrier to listening and understanding at school.

Other qualitative analyses of interviews with children who were D/HH have reported challenges listening and learning in noisy environments and in classrooms where teachers did not facilitate effective communication accommodations. Mather and colleagues (2011) interviewed 15 youth ages 10 to 18 years old who had recently acquired a second cochlear implant and found that noisy environments remained challenging with the second implant. Noisy environments and the constant need to advocate for themselves were also reported to cause challenges for 16 youth who were D/HH and ages 12 to 17 years old interviewed by Kent and Smith (2006). Zaidman-Zait and Dotan (2017) interviewed 30 students who were D/HH in Grades 7 to 12 about everyday stressors. Participants reported challenges following teachers' explanations, difficulties with teachers who did not understand and/or respect their communication needs, and poor acoustics and background noise leading to difficulties participating in classroom communications. No studies were found on the self-reported awareness of listening abilities in TH children only or comparisons of TH children and those who are D/HH.

In sum, classrooms typically present with poor acoustics for learning and educators need to know when students cannot hear and understand what is being said. The literature suggests that students who are D/HH from 10 to 18 years of age experience challenges learning in noisy environments, in locations with poor acoustics, when teachers did not facilitate the necessary accommodations, and with the frequent need to self-advocate. Self-reported listening abilities and challenges have not been investigated with younger school-age children nor compared across students who are D/HH and TH peers, which would clarify issues unique to younger students who are D/HH. To address these gaps, this study used brief interviews to address the following research questions:

1. What do elementary-age children say about their ability to hear and understand people at school?
2. How do children who are D/HH and TH differ in their self-reports?

Method

Scripted questions about classroom communication were embedded within a larger conversation, as part of a study investigating morphology and reading abilities of children who were D/HH and TH.

Researcher Positioning

To clarify researcher positioning for this qualitative study (American Psychological Association, 2019), the first author acknowledges her personal and professional background in relation to children who are D/HH. She is a TH researcher and certified speech-language pathologist who has 20 years of experience working with and alongside adults and children who are d/Deaf and hard of hearing as a tutor, ASL/English interpreter, captioner, and research assistant. As an ally with typical hearing, she holds a neutral position on issues of language modality (i.e., spoken and/or signed language) with children who are D/HH.

Participants

Sixteen children who were D/HH and 16 TH children ages 7 to 12 years old (Grades 2–7) participated in this study. There were five girls and 11 boys in each group. There were no significant differences ($p > 0.05$) between groups in age, grade, nonverbal reasoning standard scores, expressive vocabulary standard scores, or number of years of mother's education (see Table 1 for group descriptive statistics). Mothers were generally well-educated with at least a high school education. All participants were Caucasian except for two children who were D/HH of Chinese heritage, adopted from China at 2 and 3 years of age. All children who were D/HH were tested in the Maritime Provinces of Canada, while 11 TH children were tested in the Maritimes

Table 1. Descriptive Statistics by Group (D/HH, TH) for Participant Characteristics and Corpus Measures of the Children's Transcripts.

	D/HH (n = 16)		TH (n = 16)	
Characteristics and measures	*Mean (SD)*	*Minimum—Maximum*	*Mean (SD)*	*Minimum—Maximum*
Participant characteristics				
Age (years)	10.2 (1.4)	7.9–12.3	9.5 (1.1)	7.3–11.0
Grade	4.5 (1.5)	2–7	4.1 (1.1)	2–6
Nonverbal reasoning (SS)	9.0 (3.6)	2–15	9.2 (3.0)	5–16
Expressive vocabulary (SS)	99.7 (11.5)	78–122	104.8 (10.3)	91–136
Mother's education (years)	15.1 (1.5)	12–18	16.7 (2.7)	13–22
Speech discrimination in noise thresholds (dB)	3.9 (3.4)	–1.5 to 11.0	n/a	n/a
Corpus measures				
Number of utterances	19.0 (9.8)	4–49	16.7 (11.3)	3–52
Total number of words	108.4 (73.2)	9–318	90.9 (69.5)	3–270
Duration (minutes)	1.46 (0.46)	0.27–3.09	1.24 (0.33)	0.27–2.56

Note. D/HH = deaf or hard of hearing; TH = typically hearing; SS = standard scores.

and five in British Columbia. Fifteen children in each group were educated in public school settings and one child in each group was homeschooled. The two homeschooled children were included in the study because they were able to report and reflect on settings where they were with TH peers and an adult was teaching them. Thus, their input was similar to and supportive of the reports of their peers. Also, one homeschooled child was included in each group which balanced out their impact. The children who were D/HH were all on the caseload of an itinerant teacher of the Atlantic Provinces Special Education Authority (APSEA). APSEA supports over 900 children identified as D/HH in K-12 public schools across Nova Scotia and New Brunswick. APSEA itinerant teachers provide direct in-person teaching and/or hearing technology support using a pull-out model and/or consultative support to classroom teachers with students who are D/HH. APSEA also provides psychological assessment when children are first identified as D/HH and ongoing audiological support to these students.

Participant Recruitment

Children were eligible for inclusion if they were 7 to 12 years of age, spoke English only in the home, did not attend French immersion prior to Grade 3, had no diagnosis of cognitive impairment (e.g., autism spectrum disorders), and had been asked the scripted interview questions and had responded directly to the questions. Children who were D/HH with diagnoses of attention-deficit/hyperactivity disorder, language impairment, and/or literacy impairment were included, as these diagnoses are based on child behaviors (i.e., attending to directions and responding to language prompts) that may be directly related to the experience of being D/HH.

Children who were D/HH were recruited initially with APSEA's facilitation. APSEA was given a list of criteria and conducted a database search to identify children that matched the larger study's criteria. Next, the children's families were mailed a recruitment package containing a summary of the study, a consent form, a questionnaire, and a prepaid return envelope. Children who were D/HH were also recruited via Facebook posts and word of mouth. TH children were recruited by emailing families of previous research participants and by posting on Facebook, university news channels, the local children's hospital network, and word-of-mouth. Seventeen children who were D/HH and 23 TH children were tested for the larger study; 16 children in each group participated in this study. Although there were initially 19 TH children who met this study's criteria and therefore provided responses to the scripted questions, the three youngest TH children were excluded to match the groups in number and age. The participants who were D/HH all accessed inclusive learning environments using spoken language and did not use signed language.

Procedures

Parents signed consent forms and completed language and hearing questionnaires prior to testing. Children were seen for one testing session with the first author that lasted up to 75 minutes. Hearing tests (hearing thresholds, speech discrimination for words in quiet and sentences in noise) were administered first, followed by nonverbal reasoning; expressive vocabulary tests were administered last. Blocks of language measures (phonological and morphological awareness, language sample) and reading measures (real word reading, nonword reading, and passage comprehension) were completed in between, counterbalanced. For the purposes of this study, only the parent questionnaires, speech discrimination in noise

thresholds, language sample, expressive vocabulary test, and nonverbal reasoning test are considered further.

Language and hearing questionnaire. A parent/guardian completed a questionnaire that collected information about child age, gender, presence of any diagnosed cognitive, language or reading impairments, home language exposure, and socioeconomic status. Questionnaires were adapted from language background questionnaires regularly used by child language researchers (e.g., Kay-Raining Bird et al., 2016). The questionnaire for children who were D/HH also requested hearing-related information (i.e., age of diagnosis, change of hearing abilities over time, etiology, types of hearing technologies, and age of technology acquisition), exposure and use of different language modalities (i.e., spoken and signed language), educational supports, and parent report of child's listening challenges at school. For this study, this information was only used to verify study inclusion; therefore, details are not reported in this paper.

Speech in noise thresholds. Children who were D/HH completed the *Bamford-Kowal-Bench Speech in Noise* test, List 1 (BKB-SIN) (Etymōtic Research, 2005) using an audio-recording played from a MacBook Air laptop computer. A portable speaker was calibrated at approximately 65 decibels measured at 1-meter distance from the speaker to the child's head. The test includes two lists of 10 sentences spoken by a man's voice in background speaker babble. The signal-to-noise ratio (SNR) of speaker to background noise starts at +21 dB and decreases to −6 dB for each list. The BKB-SIN score is the average SNR for the two lists. The score represents the SNR that the child requires to accurately discriminate speech in background noise. The typical range for the SNR score of a TH child ages 7 to 11 years old is −0.6 to +2.0 dB (Etymōtic Research, 2005a).

Nonverbal reasoning. The *Fluid Reasoning* subtest from the Stanford Binet Intelligence Scales, 5th edition (Roid, 2003) tested nonverbal reasoning skills. The subtest presents patterns of increasingly complex shapes and sequences, and the child selects a shape from five options to complete the pattern. The mean standard score of the normative sample is 10 and one standard deviation is 3. The test seemed to generate an unexpectedly low standard score in the present participants, given that several TH children who were reported not to have any intellectual disability scored lower than one standard deviation below the normative mean. Consequently, standard scores are shared only for the purpose of comparison across groups.

Language sample. A conversational language sample was collected, initiated by the prompt: "Now we are going to have a conversation together for a few minutes. All we need to do is talk. We can talk about anything you like. What would you like to talk about?" During the conversation, the examiner followed a standardized protocol (Miller, 1981) that involves following the child's lead on topics that interest the child and introduced the topics *family, hobbies,* and *vacations* as needed. The three scripted questions that explored the communication experiences of the child and are of interest here were introduced partway through the conversational sample. Thus, the children were already comfortable conversing with the examiner by the time the questions were asked. The examiner introduced the questions by saying for example, "Now I'm going to ask you some questions that I ask all the children, ok?" The three questions were (1) Do you find it hard sometimes to hear or understand the teacher in class? (2) Do you find it hard sometimes to hear or understand other students in class? and (3) Do you find it harder to hear or understand people in different areas or rooms at school? The questions were presented as yes/no questions and if the child responded in the affirmative they were asked to elaborate with, for example, "What do you mean by that?" or "Can you tell me more about that?" If a child said "no" or indicated they did not wish to elaborate further after gentle prompting, the next question was asked. For the two homeschooled children, the questions were adapted to remove the reference to school. The child was first asked to think of their experiences in a group learning context where an adult and other children communicated. Then the questions were adapted to fit the context offered by the child (i.e., "teacher" was replaced with "your dad" for one child and "your coach" for the other child).

Analysis

Transcription. The conversation directly related to the scripted questions was transcribed and later reviewed with audio to verify the accuracy of the transcription by the first author. *Systematic Analysis of Language Transcript* (SALT; Miller & Chapman, 2012) software and transcription conventions were used. The child's total utterances (i.e., "communication units" defined as one main clause with all dependent clauses attached to it; Miller & Chapman, 2012), total words, and duration in minutes and seconds of only the conversation prompted by the scripted questions were generated by SALT. There were no significant differences between groups on any of these measures (see Table 1).

"No difficulty" responses. The number of children who reported that they experienced no difficulty in response to each scripted question were tallied and compared across groups.

Analysis of responses acknowledging difficulty. Inductive thematic analysis (Braun & Clarke, 2006) was used to identify

themes and subthemes in the children's positive responses that, yes, they experienced difficulty. This form of analysis involves a dynamic, iterative process where themes and subthemes are identified and refined through discussion and review of the data. For each group, a table was constructed containing themes and sub-themes along with transcript excerpts that were representative of each. To address the dependability and confirmability of the thematic analysis, the first and second authors discussed and revised the thematic structure and representative excerpts repeatedly until consensus was reached.

Results

"No Difficulty" Responses

Children frequently reported having no difficulties in response to one or more of the scripted questions. Specifically, children in the D/HH group reported having "no difficulty" in response to 35.4% (17 of 48) of the scripted questions and TH children in response to 41.7% (20 of 48) of the questions. One child in each group reported "no difficulty" in response to all three questions. Contrary to what may seem intuitive, children with "poorer" speech in noise thresholds (i.e., scored +4.0 dB to +11.0 dB on the BKB-SIN test; $n = 8$) reported "no difficulty" more often (12 out of 24 responses) than children with "good" speech in noise thresholds (i.e., scored up to +3.0 dB on the BKB-SIN test; $n = 8$; 5 out of 24 responses). The one child in the D/HH group who reported "no difficulty" for all three questions had "poorer" speech in noise thresholds.

Thematic Analysis

Four themes and 13 subthemes were identified in the analysis (see Figure 1 for the number of children per group who contributed to each subtheme). The four identified themes were Child Characteristics, Hearing Technology, Speaker Characteristics, and Environmental Characteristics.

Child characteristics. Children discussed how personal abilities and difficulties impacted their ability to function in the classroom and other contexts. Five subthemes were identified: hearing ability, cognitive state, knowledge of the topic, emotional reaction to others, and listening strategies.

Hearing ability. Four children who were D/HH discussed that they did not hear as well as their TH peers. One child attributed her hearing challenges to the limitations of her hearing aids: "Even if they're just across the table or beside me, I can't hear what they're saying very good . . . cuz the hearing aids, they take in not just the person you're talking to but everybody's voice!" Three TH children also expressed hearing difficulties that they couldn't explain, as in the following quote:

> It's kinda hard to understand. It's like they're like "dralalala!" and I'm like, "what did you say?" And then they're like "yeah!" and then I'm like "I can't hear you!" And then they think I'm like saying like sarcastically but I'm actually not. I'm like, "I actually can't hear you right now!"

In contrast, three other TH children explicitly stated that they are good at hearing while no children who were D/HH said this. For example, one TH child said, "I can hear them perfectly . . . like I can hear my teacher and my c-, in my class perfectly" and another confidently asserted, "I'm really good at that . . . I'm always hearing and understanding."

Cognitive state. Some children expressed an awareness of how their cognitive state could impact their ability to hear or understand at a particular point in time. One child who was D/HH for example admitted they don't hear well "sometimes, when I'm not really paying attention . . . other times I can hear good." Three TH children also mentioned that not paying attention or being distracted impacted their ability to hear and understand, as in: "Like sometimes she'll be talking, and I just miss a part . . . Like, maybe I'm just not listening. I try to listen."

Knowledge of topic. Four TH children but no children in the D/HH group discussed how their knowledge of the subject matter affected their ability to understand what was being discussed. For example, one TH child said: "Sometimes I just don't know what the um, they, I don't know what they mean . . . So I don't, my work doesn't turn out that good."

Emotional reaction to others. A few children expressed emotional reactions related to other people's responses to their ability to hear or understand. Two children who were D/HH talked about being teased by classmates and how hurtful that could be, as in this example: "Snacktime, everybody being mean . . . First it kind of hurts my feelings, makes my hearing aids suck." One TH child expressed a need to hide the fact that she could not hear what her peers were saying, stating, "And I just pretend like I heard them because I don't wanna, like, annoy them anymore."

Listening strategies. Five children in each group talked about strategies they used to help them hear and understand what a person was saying. Children who were D/HH were more likely than TH children to change their own behavior to manage the situation by turning off their hearing aids or moving closer to the speaker, as in: "Usually I sit up in the front and I can just hear her normally . . . They're, some

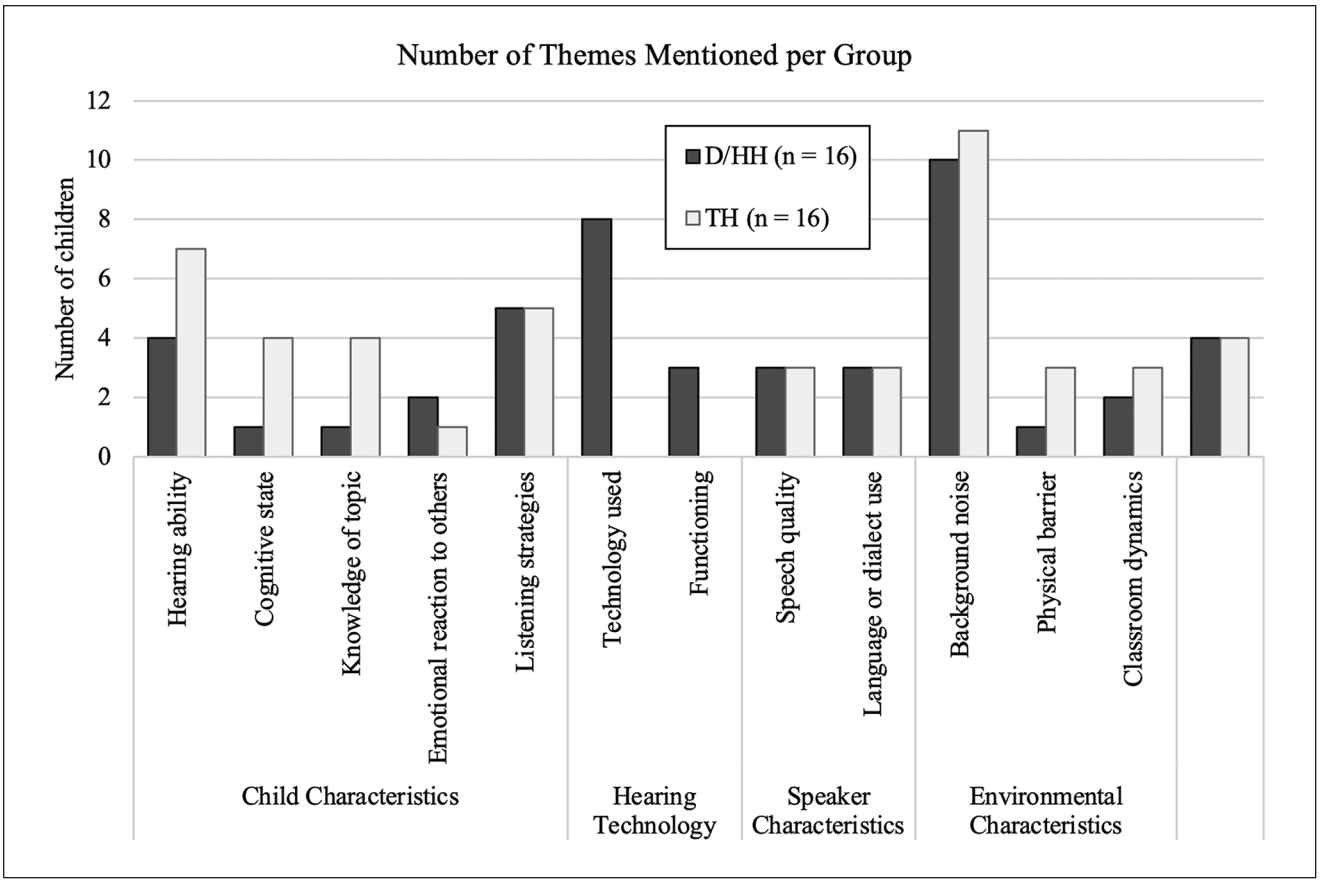

Figure 1. The number of children in each of the deaf or hard-of-hearing (D/HH) and typically hearing (TH) groups who mentioned each of the sixteen subthemes that fit within four categories.

of them [teachers], I sit in the back but I can still hear perfectly fine." In contrast, TH children stated that they would walk away from a situation when they did not understand or tell the speaker that they could not hear them, as with the child who said, "I'm always telling them to like lower their volume so that I can understand. If they don't wanna hear things, they don't want to, they can make that decision. But I wanna hear."

Hearing technology. Nine children who were D/HH talked about the type of hearing technology they used and how it functioned. Not surprisingly, no TH children discussed these subthemes.

Technology used. Children who were D/HH talked about their hearing aids, frequency modulation (FM) or digital modulation (DM) systems, pass-around microphones, and soundfield speakers. The children tended to be knowledgeable about how the technology worked and when each was useful, for example: Child: "I, uh, we rarely use the FM stuff." Examiner: "So if they're not using the FM . . . " Child: "Well {makes thinking mouth sounds} well it's easy to hear her."

Functioning. Three children discussed how technology did not always work or was not consistently used by the teacher. For example: Examiner: "So the teacher speaks into this little microphone?" Child: "Yeah, but it doesn't work." Examiner: "Oh, what do you mean?" Child: "They have to get it fixed." Examiner: "Oh, yeah. That happens too." Child: "A long time."

Speaker characteristics. Several children talked about how speech and the language characteristics of the speaker led to difficulties hearing and understanding.

Speech quality. Many children were aware that the speaker's speech quality could impact the child's ability to hear and understand what was said. Four children who were D/HH specifically mentioned voice volume as a factor. For example, one child who was D/HH said, "And when people talk very, like, quietly, I don't hear them as much. But for the most part, I can hear most kids." Two TH children discussed volume as well, as when this child discussed not hearing well: "If [students are] talking like {whispering noises}. If they're talking like that but not if they're, like,

talking louder." One child who was D/HH mentioned that children with "retainers and stuff on their teeth" are harder to understand and one TH child mentioned that her teacher was harder to understand when "she's like talking fast."

Language or dialect use. Children also talked about the impact a speaker's choice of words, the language spoken, or accented English had on hearing and understanding what was said. Two children who were D/HH and one TH child talked about not understanding when teachers spoke in French. One child who was D/HH and two TH children mentioned accents negatively influencing understandability. For example, the child who was D/HH stated, "It depends on the person. Like, I probably find it harder when someone has an accent than other people." One TH child seemed aware that the choice of vocabulary used could impact his comprehension when he said, "Well understanding what [other students are] saying is kind of understandable since we're in school and we don't know re-, really words that fit the description."

Environmental characteristics. Children also recognized that their ability to hear or understand was influenced by background noise, physical barriers, classroom dynamics, and room acoustics.

Background noise. The impact of background noise was the most frequently discussed environmental factor. Ten children in each group explained that it is harder to hear or understand when there is speech and/or nonspeech background noise as illustrated in the following excerpts: "When, if there, if there's a lot of talking in the background, yeah. But normally if there, if there was just us, no (D/HH child)" and "I can't, if there's a bunch of sounds going on at once, I can't pick out a certain sound. But I can, if there's just one person talking, I can understand what they're saying (TH child)." Children in both groups mentioned similar types of non-speech background noise as factors. Three children who were D/HH mentioned loud stomping in the gym, noise from a nearby workout room, or "playing [instruments], like if they're not supposed to" in music class while three TH children mentioned loud music in the gym, noisy "*pots and pans*" from the nearby music room, or a garbage truck that passes outside daily. One TH child alluded to the combination of distance from the speaker and nearby noise impacting the ability to understand, "I do hear [the teacher] most of the time unless the people beside me are talking."

Physical barriers. Three TH children and one child who was D/HH discussed how physical barriers sometimes prevented them from hearing or understanding. The child who was D/HH discussed how having the flu caused his ears to become blocked. The TH children talked about not hearing when they were wearing headphones, not looking when someone was speaking, or had their head underwater.

Classroom dynamics. Participants recognized that the influence of dynamics between individuals affects how well students hear or understand others at school. One TH child mentioned that it is noisier in music class because the students do not like the teacher. Two children in each group mentioned that rules about noise levels existed. They suggested that it was harder to hear or understand when the rules were not followed.

Room acoustics. Children were aware that the physical characteristics of rooms impacted their acoustics. Two children who were D/HH, and three TH children discussed how big rooms make it harder to hear and understand. For example, "It, like, there's like, it's so, it's big and it's open so that it echoes. Their ceilings are pretty high and they all open up into the, they're all open so, so it's pretty hard to hear (D/HH child)" or "I mean, some rooms have a weird echo, like the gymnasium has a bi- . . . it's the biggest room in the school, so it has an echo (TH child)." Others talked about how large rooms also often meant the speaker was farther away from the child, making hearing more difficult.

Several spaces were identified as especially problematic listening areas. The gymnasium was by far the most problematic room, mentioned by 10 children who were D/HH and five TH children. In addition, the music room, the cafeteria, the hallway, outside on the playground, and any large room were each mentioned by between one to three children in both groups.

Discussion

This study briefly interviewed children who were D/HH (communicate using only spoken English) and TH ages 7 to 12 years old. Children's responses to three questions about how well they heard and understood others in educational settings were quantitatively and qualitatively analyzed. Multiple similarities and some group differences were documented.

Reported Hearing Difficulty

First, a similar number of children in each group stated that they did not have difficulty hearing or understanding in school. This is surprising, given that other research has shown elementary-age children who are D/HH tend to have more difficulties following class-wide verbal prompts based on classroom observations (Borders et al., 2011) and adolescents who are D/HH report difficulties understanding the teacher based on questionnaires (Zheng et al., 2001). Even children who are D/HH with appropriately fitted hearing devices experience more challenges listening in

background noise than TH children (Goldsworthy & Markle, 2019). Perhaps these younger elementary-age children who were D/HH in this study who claimed they had no difficulty were not reliably reporting their experience, although no evidence in the literature was found to confirm this possibility. In Nelson et al. (2020), children selected from a list of actions they would do if they could not hear others speaking. The option to "do nothing" was reported by 12% to 29% of children in Grades 3–6 when the child could not hear the teacher or another student's voice. They also reported taking proactive steps such as asking the speaker to repeat themselves or modifying the environment, although proactive steps were slightly more commonly reported by youth in Grades 6 and up than children in Grades 3 to 6. No significant differences were found between children who were D/HH and TH in the actions children reported taking if they could not hear. This suggests that in this study, the children in Grades 2 to 6 who reported "no difficulty" were also likely not to take action, which is concerning for their linguistic, social, and academic development.

Strangely enough, the poorer the child's speech in noise discrimination thresholds, the more likely the child was to state they experienced no difficulties. This finding was not consistent with findings by Nelson et al. (2020) that children with poorer pure-tone hearing thresholds reported greater listening difficulties. That may be because pure-tone hearing thresholds are a measure of hearing abilities when the individual is not wearing any hearing devices (i.e., unaided). Children's personal hearing devices provide varying degrees of audibility, which may be more accurately measured by aided speech discrimination scores as in this study. This suggests that either some young children who were D/HH with poor speech discrimination in noise were less aware of what they did not hear or they were unwilling to share their experiences with the adult examiner. Children with speech discrimination difficulties are likely to have experienced stigma and/or negative responses when they did not hear or understand what was said by others, so they would understandably be reluctant to disclose their difficulties to a stranger. It is also possible that when a child who is D/HH is better able to discriminate speech in noise they are more able to identify specific situations in which they do not hear well because their difficulties are less pervasive. Consequently, they are more able to reflect on and share their difficulties when asked. The examiner did not notice any particular differences in children's behaviors that would support this hypothesis and supportive evidence could not be found in the literature. Consequently, further research is warranted to identify child factors that may be associated with a lack of awareness of hearing challenges or a greater reluctance to report difficulties.

In learning environments, it is important to understand why a student may claim they hear and understand what others say (when academic performance and/or behavior in class suggest they may struggle to do so) so that appropriate supports are put in place. As well, all students who are d/Dhh would benefit from role models with a similar hearing status who can validate and support the fact that they also often have difficulty understanding what other people say. D/HH and TH role models of all ages may be recruited to model self-advocacy skills, which will help to normalize the expression of listening challenges.

Qualitative Themes

The qualitative analysis of responses to three scripted questions revealed several differences between children in the two groups. Children who were D/HH were more likely to attribute difficulties to their hearing abilities than TH children, who were more likely to attribute difficulties to other factors such as a physical barrier, not paying attention, or poor comprehension of the subject material. This is likely an accurate reflection of the different experiences of children in the two groups. Furthermore, when children were not able to hear or understand, TH children seemed more likely to tell others that they could not hear, whereas children who were D/HH seemed more likely to change their own behavior to improve their ability to hear the speaker. The observed differences in strategies may result from children who are D/HH more frequently experiencing difficulties hearing and tiring of self-advocating and/or not wanting to draw attention to themselves, as found by Kent and Smith (2006). In their study, 10- to 17-year-old youth were unwilling to wear their hearing aids if they perceived them as "not normal." Comparably, the older children in this study may have also been concerned with fitting in. In addition, it is possible that children who are D/HH may see themselves as the problem when a communication failure arises and therefore focus upon modifying their own behavior more than TH children would.

The children who were D/HH were often willing to discuss the hearing technology they used. They also reported that some technologies, such as DM systems, were available but not being used or were dysfunctional. Teachers' knowledge of classroom hearing technologies has been found to be the greatest facilitator to their use (Miranda et al., 2018). Therefore, classroom teachers should be properly trained and encouraged to check regularly to ensure technological supports are working adequately. Given that children who are D/HH are likely to be knowledgeable about the hearing technologies in use and aware of their functioning, this presents an opportunity to encourage children who are D/HH to educate other students or teachers about the hearing technologies and to encourage their use in the classroom.

Children in both groups spoke similarly about speaker and environmental factors that negatively impacted their

ability to hear and understand. Although it might be expected that children who were D/HH would be aware of the impact that a speaker's accent or speech quality or the room acoustics have upon listening and understanding, this is the first study using interview data to report that TH children have a similar awareness, consistent with findings suggested by survey data (Nelson et al., 2020). Consistent with previous literature (Kent & Smith, 2006; Mather et al., 2011; Nelson et al., 2020; Zaidman-Zait & Dotan, 2017), the majority of children who were D/HH mentioned background noise, including other students talking, as a common barrier to hearing and understanding. The next most commonly mentioned barrier in the present sample was room acoustics, especially rooms that were particularly large. These findings are directly in line with those by Nelson et al. (2020), where the most challenging listening contexts rated on a questionnaire were other students making noise and large rooms or assemblies where no microphone was used, in that order. There is a known link between poor classroom acoustics and listening fatigue (Bess & Hornsby, 2014). The present findings emphasize the need to control noise levels and classroom acoustics, for the benefit of all children. Strategies that have been shown to be efficacious include providing teachers with working FM/DM systems and training on their appropriate use in the classrooms (Miranda et al., 2018) and ensuring schools have the funds and capacity to support hearing technology. In addition, school acoustics could be improved through the use of, for example, sound-dampening materials in ceilings and extraneous noise reduced by implementing preventive measures such as putting tennis balls on the bottoms of chair legs (Speech-Language & Audiology Canada, 2019). Such strategies need to be prioritized when both building new schools and retrofitting existing structures.

Limitations

Several limitations to this study need to be acknowledged. First, the participants provided relatively brief responses to the scripted questions (ranging from three to 52 utterances across children). This may be characteristic of the responses that can be expected from elementary-age children up to approximately Grade 6 (i.e., 12 years of age and younger); interviews were previously attempted by Reed et al. (2008) with children in Grades 3 to 8 but it was reported that the children's responses were too brief for analysis. Other qualitative studies of children who were D/HH (ranging in age from 10 to 18 years) reviewed in the present article did not report the number of utterances or words produced in the participants' responses, so no direct comparisons can be made. The examiner could have chosen to probe further when children responded "no difficulties" to the questions asked, which may have led to deeper discussion of the topic. Finally, children in the present study came from quite educated homes, suggesting that findings are generalizable to children of middle- to upper-class socioeconomic backgrounds. Further research with children with more diverse demographic characteristics is warranted to support and elaborate on present findings.

Conclusions

The most intriguing and novel finding of the present study may be that TH students ages 7 to 12 years old (Grades 2–7) reported barriers to effective listening that were quite similar to those encountered by students who were D/HH. It appears that many issues around effective listening are identifiable by children with and without a hearing difference, without receiving any focused intervention in this area. Most children who were D/HH in this study were aware of their own hearing limitations in an inclusive learning environment and ways in which they could modify their own behaviors to mitigate these limitations. However, findings suggest that students with poor speech discrimination in noise abilities will need support to improve their awareness of what they do not hear and to build the confidence to disclose difficulties. Children who are D/HH in general may benefit from considering how their hearing abilities *interact* with other factors such as distance from the speaker, background noise, their knowledge of the topic, and attentiveness. Future research on how the factors identified in this study may interact to cause listening difficulties in educational settings could be helpful for developing interventions designed to deepen children's understanding of their own hearing-related strengths and limitations. As well, further investigation of student reflections on listening abilities in elementary school is warranted to identify areas in which all students, but particularly students who are D/HH, are encouraged to advocate for improved listening contexts to maximize their individual hearing abilities.

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