**INTRODUCTION**

Parents and teachers of children with hearing loss (CHL) have anxiously reported that these children put forth greater effort to listen compared to peers with no hearing loss. Recent findings suggest that CHL are at risk for fatigue due to listening difficulties. These findings have significant educational implications for CHL. It is hypothesized that a child’s ability to concentrate will be negatively affected by the additional cognitive load associated with difficulty listening and understanding in the classroom. Because fatigue is a subjective experience, it is often difficult for a patient to quantify and describe. In addition to physical symptoms (e.g. sluggishness, sleepiness), anecdotal reports suggest that CHL also experience cognitive and emotional fatigue as a result of difficulty listening. Although various pediatric fatigue scales exist, none, to our knowledge, include items weighted for listening-related fatigue and its probable negative effects.

**PURPOSE**

The overall study goal was to conduct and validate a clinical measure of listening-related fatigue in children in clinical and schools. In phase one, we sought to obtain subjective data from participants of modified focus groups to provide a framework for a clinical measure of listening-related fatigue.

**METHODS**

Data were obtained in focus groups and one-on-one interviews with CHL and their parents, teachers, and school service providers. Additional disabilities included reading disability, speech-language delay, and attention deficit disorder. Children were included in the study with the following criteria: (1) bilateral moderate or greater hearing loss and (2) ability to speak in 5-6 word sentences per parent report. Focus groups consisted of 4-8 participants within the same participant-type group (e.g. parents, teachers, CHL, CHL-AD) were more relaxed and more likely to respond in a one-on-one interview than within a group of peers, therefore, the majority of child participants were interviewed by an examiner.

Parent and child participants were recruited through the Vanderbilt Audiology clinic and school providers were recruited through local school districts. All participants received monetary compensation for their time and participation.

Although initial recruitment included children ages 7-17, CHL under the age of 10 typically struggled to communicate about the concept of fatigue, especially as it related to difficult listening situations. As a result, thirty one of the 41 child participants were 10 years or older.

**PARENT QUOTES**

*She struggles with her math class each period each day. Usually she has some type of video game in it, so when she will come home with more of a headache, she will say it's just too hard to draw out everything else and listen to the video.*

-Parent of a middle-schooler with bilateral cochlear implant

*"Yesterday we went to field trip -- explored a museum. The gentleman was great, but he spoke on flat voice and it's not really exciting stuff. To a very hectic environment, and it turns out, it's really, really good for her. Her mouth is really good for her. She has to make what and it's a lot of work.*

-Parent of a 10-year-old with bilateral hearing loss

*The does not have those internal relationships, and I think it's just because it's three-dimensional; within a window of opportunity for learning and growing and talking with people, and then once he becomes tired, um, he stops trying to figure things out or noisy environment.*

-Parent of a preschooler with bilateral hearing loss

**CHILD REPORTS**

Younger child participants struggled to communicate their experiences with listening-related fatigue. It appears that the CHL is often unable to recognize that he or she does not understand all of what is being said and how much they are struggling to listen in difficult listening situations.

**SCHOOL PROVIDER QUOTES**

*"But the fatigue, I think it's a real killer on motivation! And so they start feeling more and more down on themselves, you know, like this is too hard to do.*

-General education teacher

*I have to really go in and try to listen to them, and have to try, put my focus on them to zoom everything out just to hear what they’re saying, and it's kind of a lot of work for me.*

-Child with hearing loss on listening all day at school

**METHODS**

Each focus group and interview was moderated by a trained audiologist or psychologist familiar with qualitative research design and data collection. A moderator’s guide was created for each group-type aimed at examining the following themes:

1. characteristics of difficult listening situations that may result in fatigue
2. physical, cognitive, and emotional manifestations of listening-related fatigue
3. coping strategies following the experience of fatigue
4. temporal characteristics of the fatigue and coping time following fatigue

Additional visual tools, games, and activities were used to further guide the discussion with them and how to frame questions, negative checklist items, and generated interview prompts. Members of the research team reviewed the transcriptions to determine common themes related to listening effort and fatigue reported by each group type.

**SUMMARY THEMES**

This section provides a review of commonly reported strategies noted in CHL following demanding listening tasks. These behaviors may be indicative of listening-related fatigue in CHL.

**BEHAVIORS AT SCHOOL**

- Excessive zoning out
- Lack of motivation for auditory tasks
- Increased anxiety/irritability

**BEHAVIORS AT HOME**

- Taking a nap on the car ride home or immediately after school
- Feelings of anger or frustration after being left out in a noisy listening situation
- Asking to remove hearing assistive technology for a “listening break”
- Complain of fatigue
- Need for quiet time to recover from difficult listening situations

**NEXT STEPS AND YOUR ROLE**

**VANDERBILT FATIGUE SCALE**

In order to best serve students with listening-related fatigue, the next phase of this research project is to create and validate a measure that is sensitive to the situations and fatigue manifestations experienced by CHL. The subjective experiences gathered by group participants will be used to create items for the measure.

**CLINICAL RECOMMENDATIONS**

- Discuss listening-related fatigue with your patients and their families.
- Probe further than a simple query: “Are you tired?” The observable behaviors associated with listening-related fatigue may not be captured by this question.
- Implore audiologists or other clincians who work with CHL to comprehend the child’s behavior and make appropriate accommodations as needed.

Although evidenced-based fatigue intervention methods are not yet available from school professionals, consider that the following strategies may be helpful for a CHL who is struggling with fatigue in the educational setting.

- Provide notes in advance of class
- Encourage preferential seating
- Encourage consistent amplification and FM system use
- Provide alternatives to standard seating arrangements
- Provide scheduled listening or movement breaks

See our website for additional information on listening-related fatigue in CHL: https://www.vanderbilt.edu/vanderbiltresearch/.

**KEY REFERENCES**

- Bess, F.H. & Hornsby, B.Y. (2014). Commentary: Listening can be exhausting... “Fatigue Sounds Like Phantom, So Maybe a Squid?”
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