Using the Vanderbilt Fatigue Scales to explore the effects of hearing loss and device use on listening-related fatigue in adults and children with hearing loss

Introduction

- Mounting evidence suggests that adults and children with hearing loss are at increased risk for greater listening effort and long-term, listening-related fatigue.2,3,4 Severe, long-term, fatigue can have significant negative effects on quality of life.5 However, there are no measures designed specifically to assess listening-related fatigue. Such measures are essential for improving our understanding of, and developing interventions to reduce, listening-related fatigue and its consequences.

- To address this need we continue to refine a package of patient-reported outcome measures designed to reliably assess listening-related fatigue— the Vanderbilt Fatigue Scales for adults (VFS-AHL) and children (VFS-CHL) with hearing loss.6

- The VFS-AHL has 10-item (unidimensional) and a 40-item (unidimensional) versions.

- The 40-item self-report version is more sensitive and allows for assessment of cognitive, social, emotional and physical fatigue (10-items/domain). However, across domains, item scores are well described by a unidimensional model.

- The VFS-CHL is still being validated.

- Currently we are assessing child, parent-proxy, and teacher-proxy versions.

- The child and teacher versions are unidimensional.

- The parent version loads on two distinct factors—cognitive and physical fatigue (See Table 1)

- All scales will allow for Item Response Theory (IRT) scoring as well as using summed (on a 0-4 point Likert scale) scores.

- Purpose: In this poster we utilize data obtained in a validation study using the VFS-AHL-10 item scale and data obtained using a preliminary version of the VFS-CHL to describe the effects of hearing loss, and hearing aid/cochlear implant use, on listening-related fatigue.

Methods

- Data were collected from multiple sources using online and in person versions of the VFS-AHL and VFS-CHL.

- Respondents self-reported their hearing loss as unilateral or bilateral and degree of loss as mild/slight, moderate, severe, or profound based on their perceived speech understanding difficulties.

- Participants Characteristics: N=1458

  - Adults: n=511 (385/221/5=385/221/5=174/433/174/433) with no hearing aid/cochlear implant use, on listening-related fatigue.

  - Children: n=124 (152/49/0=152/49/0)

    - Parent respondents: n=201 (152/49/0=152/49/0)

    - Child respondents: n=201 (152/49/0=152/49/0)

- **Table 1:** Sample items from the VFS-AHL and the VFS-CHL scales.

- **Figure 1:** Quinulta histograms of IRT scale scores for those with (Blue bars) and without hearing loss (Orange bars) as self-reported by adults and children and via proxy-report for CHL by parents and teachers. Solid and dashed lines show estimate a normal distribution. Black bars show significant differences between HL and no HL groups (Chi-Square > 3.84, p<0.05). Inset panel shows frequency of scores >0.5 (reflecting more moderate-severe complaints of fatigue) for each group. Notes how across respondent groups, hearing loss increases risk for reporting more moderate-severe listening-related fatigue (IRT scores >0.5).

- **Figure 2:** Box Plots showing IRT scale scores as a function of degree of self-reported hearing loss. The box defines the 25th and 75th percentiles, a line within the box shows the median and error bars show the 10th and 90th percentiles. Stars show significant differences (Independent Sample T-tests, p<0.05) between adjacent samples. Note wide variability, however, for adults fatige increases systematically up to a severe loss and then decreases significantly for those with profound losses. No such pattern is observed for the child data (self or parent proxy report).

- **Figure 3:** Mean IRT scale scores as a function of device type for adult bilateral hearing aid users and CI users. Error bars reflect 1 standard error. The number of respondents in each sample is shown below the bars. There is a trend towards lower fatigue ratings for the bilateral CI users but the difference was not statistically significant (p > 0.05) for bilateral CI users potentially due to the small sample size and large within group variability.

Primary Conclusions

- Listening-related fatigue in adults and CHL varies widely but can be reliably measured.

- However, substantial overlap in scores of child respondents with and without HL, particularly compared to adult data, suggests children may be less able to reliably identify and describe their fatigue.

- Moderate-severe fatigue (IRT scores >0.5) is much more common in adults and CHL (via self-report and parent/teacher proxy) than in those without hearing loss.

- In contrast to prior work using generic fatigue scales2, listening-related fatigue in adults increased with degree of HL up to the severe range then decreased for respondents with profound HL (see Figure 2).

- This may reflect decreased engagement in listening-related tasks or benefit from CI use for those with adult with profound losses.

- For children, fatigue ratings were unaffected by degree of loss until reaching the profound range.

- Highlighting the impact of unilateral HL, only minimal differences in fatigue ratings were observed between those with UHL & bilateral HL.

- Additional data are needed to evaluate the effect of unilateral versus bilateral device use.

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**Primary References**


**Key References**

