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# Do Additional Disabilities Impact Listening-Related Fatigue in Children with Hearing Loss?

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## Introduction:

- Growing evidence suggests that children with hearing loss (CHL) experience greater listening effort and listening-related fatigue than children with no hearing loss (CNHL)<sup>1,2</sup>, yet there are no validated measures designed specifically to assess listening-related fatigue in children
  - To address this need, we continue to construct a psychometrically sound measure of listening-related fatigue for CHL: The Vanderbilt Fatigue Scale for Children with Hearing Loss (VFS-CHL)
  - The VFS-CHL is still being validated, but currently we are assessing child, parent-proxy, and teacher-proxy versions
- Additional disabilities, beyond hearing loss, also impact academic performance in children. However, the impact of additional disabilities on listening-related fatigue has not been explored
- Purpose:** We examined the effects of hearing loss and additional disabilities on listening-related fatigue in children using preliminary versions of the different VFS-CHL scales

## Methods:

- Listening-related fatigue was measured using three versions of the VFS-CHL:
  - a 12-item, two-factor, parent-proxy version, assessing general and physical fatigue
  - an 8-item, unidimensional, teacher-proxy version
  - a 10-item, unidimensional, child version
- All versions use a 5-point Likert scale to assess the frequency (Never= 0 to Almost Always= 4) of fatigue-related complaints and allow for Item Response Theory (IRT) scoring (See Table 1)
- Data were collected from multiple sources, using both online and in-person versions of the VFS-CHL
- Data were collected from multiple respondent groups (See Table 2), including:
  - Parents of children with and without hearing loss (aged 6-17)
  - Children with and without hearing loss (aged 10-17)
  - Teachers of students with and without hearing loss (aged 6-17)

## Additional Disabilities:

- Additional disability categories (See Table 3) included:
  - Cognitive Disability (e.g., developmental delay, learning disability, intellectual deficits, etc.)
  - Visual Impairment (not corrected by glasses)
  - Behavioral/Emotional Problem (e.g. autism spectrum disorder, attention deficit hyperactivity disorder, depression, etc.)
  - Physical Disability (e.g. cerebral palsy)
  - Speech-Language Impairment
  - Genetic/Chromosomal Syndrome (e.g. Down Syndrome)
  - Other

Item	Response Options				
	Never	Rarely	Sometimes	Often	Almost Always
<b>Child</b>					
I use a lot of energy trying to listen in class.	0	1	2	3	4
<b>Parent-Proxy</b>					
My child "gives up" in difficult listening situations.	0	1	2	3	4
<b>Teacher-Proxy</b>					
The student needs listening breaks in order to stay on task.	0	1	2	3	4

Table 1: Sample items from the VFS-CHL scale-child, parent-proxy, and teacher-proxy.

	Child		Parent-Proxy		Teacher-Proxy	
	CNHL	CHL	CNHL	CHL	CNHL	CHL
<b>No AD</b>	34 (79%)	56 (56%)	106 (78%)	151 (57%)	22 (31%)	192 (66%)
<b>1 AD</b>	5 (12%)	32 (32%)	22 (16%)	74 (28%)	30 (43%)	64 (22%)
<b>More than 1 AD</b>	4 (9%)	12 (12%)	8 (6%)	38 (14%)	18 (26%)	33 (11%)
<b>TOTAL</b>	<b>43</b>	<b>100</b>	<b>136</b>	<b>263</b>	<b>70</b>	<b>289</b>
	<b>143</b>		<b>399</b>		<b>359</b>	

\*AD: Additional Disability

Table 2: Demographic characteristics of child, parent-proxy, and teacher-proxy versions of the VFS-CHL. Percentages represent the total number of participants in each additional disability group in relation to report of hearing loss or no hearing loss.

	Child		Parent-Proxy		Teacher-Proxy	
	CNHL	CHL	CNHL	CHL	CNHL	CHL
<b>Cognitive Disability</b>	13% (2)	16% (10)	11% (5)	20% (34)	32% (23)	25% (36)
<b>Visual Impairment</b>	7% (1)	5% (3)	7% (3)	4% (7)	1% (1)	6% (9)
<b>Behavioral/Emotional Problem</b>	40% (6)	36% (22)	47% (21)	29% (51)	29% (21)	16% (23)
<b>Physical Disability</b>	20% (3)	5% (3)	9% (4)	5% (8)	0% (0)	9% (13)
<b>Speech-Language Impairment</b>	0% (0)	13% (8)	9% (4)	19% (33)	33% (24)	27% (38)
<b>Genetic/Chromosomal Syndrome</b>	7% (1)	8% (5)	7% (3)	7% (12)	4% (3)	6% (8)
<b>Other</b>	13% (2)	16% (10)	11% (5)	16% (28)	1% (1)	11% (16)
<b>TOTAL</b>	<b>15</b>	<b>61</b>	<b>45</b>	<b>173</b>	<b>73</b>	<b>143</b>

Table 3: Percentage of cases a child was reported to have a given disability. Note that a child could (and many do-See Table 2) have more than one disability. Numbers in parentheses represent the number of times a disability was reported. Data are shown for child, parent-proxy, and teacher-proxy versions of the VFS-CHL.

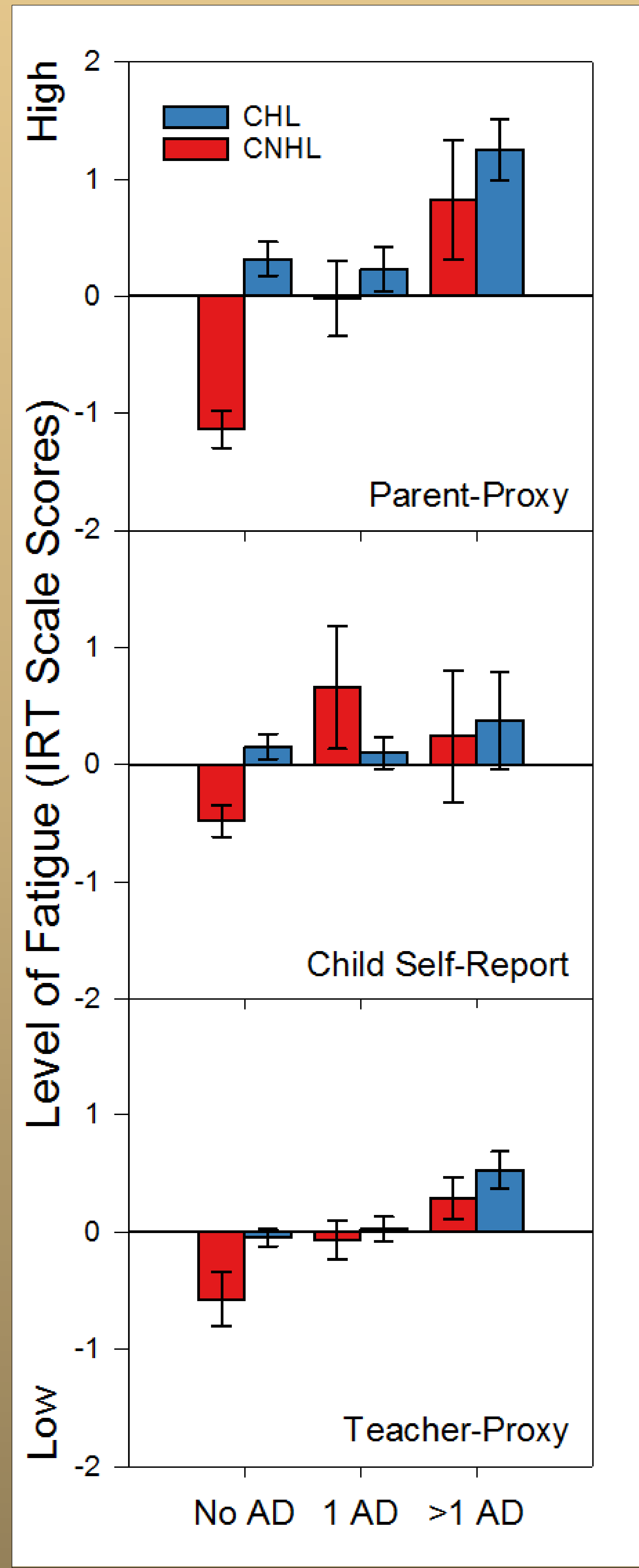


Figure 1: Mean IRT scale (fatigue) scores as a function of number of additional disabilities for children with (blue bars) and without (red bars) hearing loss. Higher numbers reflect more fatigue. Error bars = 1 standard error.

## Results:

- Analyses of all three versions, child, parent-proxy, and teacher-proxy reveal more listening-related fatigue (larger IRT scale scores) for CHL and no additional disabilities compared to CNHL and no additional disabilities (See Figure 1)
  - This reinforces the need for intervention for CHL, even in the absence of additional disabilities
  - Analyses of parent and teacher data suggest additional disabilities are associated with higher listening-related fatigue in both CHL and CNHL (See Figure 1)
  - Parent and teacher reports suggest that listening-related fatigue may be greatest among children with more than one additional disability
- The substantial overlap in scores of child respondents regardless of HL or disability, particularly in comparison to both parent and teacher data, suggests children may be less able to reliably identify and describe their fatigue (See Figure 1)
- Behavioral/emotional problems, speech-language impairments, and cognitive disabilities were the most common additional disabilities reported for CHL and CNHL (See Table 3)

## Next Steps:

- The high levels of listening-related fatigue seen in CHL and children with additional disabilities, highlight the need for targeted intervention services. Hence, systematic intervention studies are needed
- Further data are needed to examine the impact of specific additional disabilities on listening-related fatigue
- Data collection examining other additional disabilities (learning disabilities, stuttering, and specific language impairment) is on-going
- Validation of the various versions of the VFS-CHL is on-going

## Clinical Implications:

- Intervention studies are needed, potential interventions may include:
  - Listening breaks
  - Preferential seating
  - Providing more visual information in addition to auditory directions in the classroom
  - Use of additional technologies: remote microphones, CART services
- Be on the lookout for the VFS-CHL!

## Key References:

- Bess, FH, & Hornsby, BWY. (2014). Commentary: Listening can be exhausting—Fatigue in children and adults with hearing loss. *Ear and hearing*, 35(6), 592-599.
- Hornsby, B., Gustafson, S., Lancaster, H., Cho, S., Camarata, S., Bess, F., & Bess, F. (2017). Subjective Fatigue in Children with Hearing Loss Assessed Using Self- and Parent-Proxy Report. *American Journal of Audiology*, 26, 393-407.

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