

Identification and Management of Listening-Related Fatigue in Students with Hearing Loss

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SELF-ASSESSMENT:   
A Journey of Change

Disclaimer

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Today's Goals

- Review of listening-related fatigue in children with hearing loss (CHL)
- Round-table discussions
- Subjective reports of listening-related fatigue
 - Previous uses of PEDS-QL and HRFS
 - Vanderbilt Fatigue Scale-CHL
- Management techniques in the educational setting



What is Fatigue?



- Affects several areas of life including *physical*, *emotional*, and *cognitive or mental* domains
- **Physical fatigue:** reduced ability or desire to perform some physical task
- **Cognitive/mental fatigue:** feeling of tiredness, exhaustion, or lack of energy due to cognitive or emotional demands

“When you are hard of hearing you struggle to hear; when you struggle to hear you get tired; when you get tired you get frustrated; when you get frustrated you get bored; when you get bored you quit.” (Pichora-Fuller, 2003)



Fatigue in Children with Chronic Illnesses

- Cancer
- Chronic fatigue syndrome
- Sleep deprivation
- Rheumatic diseases

(Curcio, Ferrara, & De Gennaro, 2006; Hockenberry-Eaton et al., 1999; Nagane, 2004; Ravid, Afek, Suraiya, Shahrar, & Pillar, 2009a, 2009b; Stoff, Bacon, & White, 1989)

Why do we care?

Consequences of Fatigue

ADULTS

Report stress, inattention,
concentration difficulties

Reduced mental processing and
decision-making capabilities

Less productive and more prone to
accidents at work

Less active and more isolated

CHILDREN

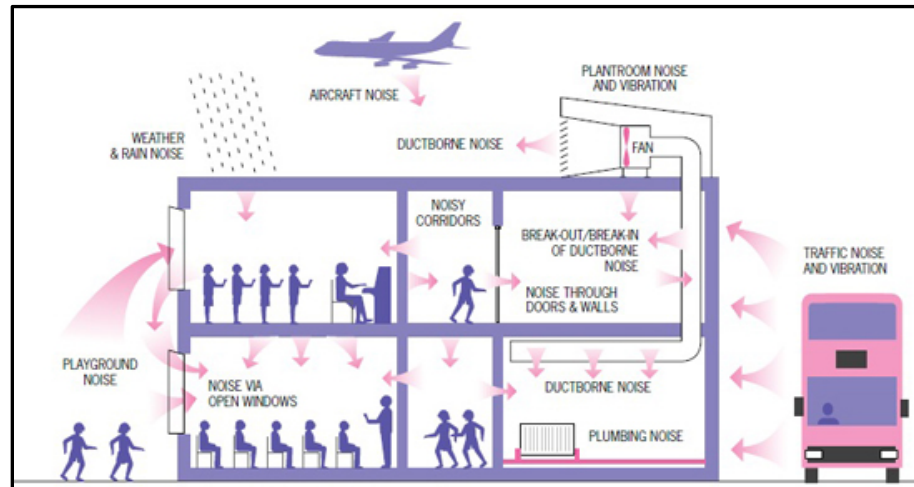
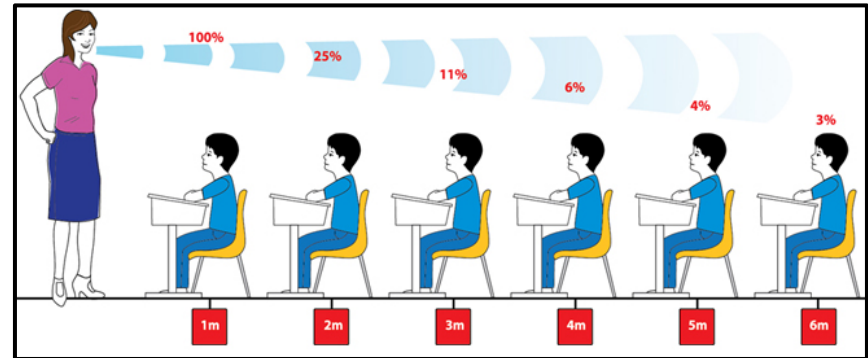
Higher rates of absenteeism at
school

Poorer school achievement

Difficulties with attention,
concentration, and distractibility

More likely to fail a grade

Listening in the Classroom



Listening Effort

- Allocation of attentional and cognitive resources toward auditory tasks.

CHL and AHL must increase mental effort compared to those without HL when attempting to detect, process, and respond to auditory stimuli (Hicks and Tharpe, 2002; McCoy et al., 2005)

- Increase in LISTENING EFFORT (Hornsby, 2013)

Behavioral/Objective Measures

- CHL experience increased listening effort and fatigue.
 - Cortisol
 - ERP
 - Vigilance tasks

Subjective Measures of Fatigue

- Fatigue is a common complaint among individuals with chronic health conditions (e.g. asthma, cancer)
 - Transient fatigue common in healthy populations
 - Concern: chronic, severe fatigue
- Several scales exist to measure multiple domains of fatigue, but none are validated measures specific for hearing loss
 - Query child, parent/guardian or service provider

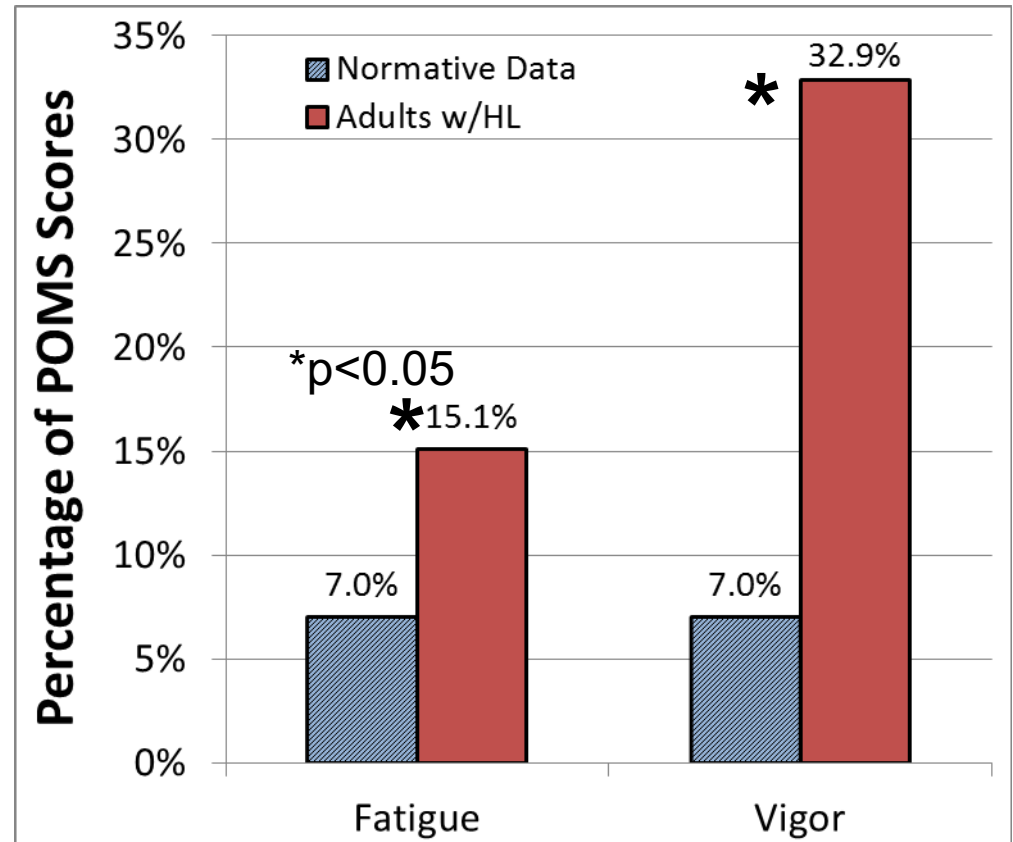
Study Questions

- Is subjective fatigue a problem for children with hearing loss?
- If yes, what factors affect their levels of fatigue?

AHL and POMS

- More than 2 times as likely to report severe fatigue and
- More than 4 times as likely to report severe vigor deficits!
- Severe = >1.5 st. dev. above mean

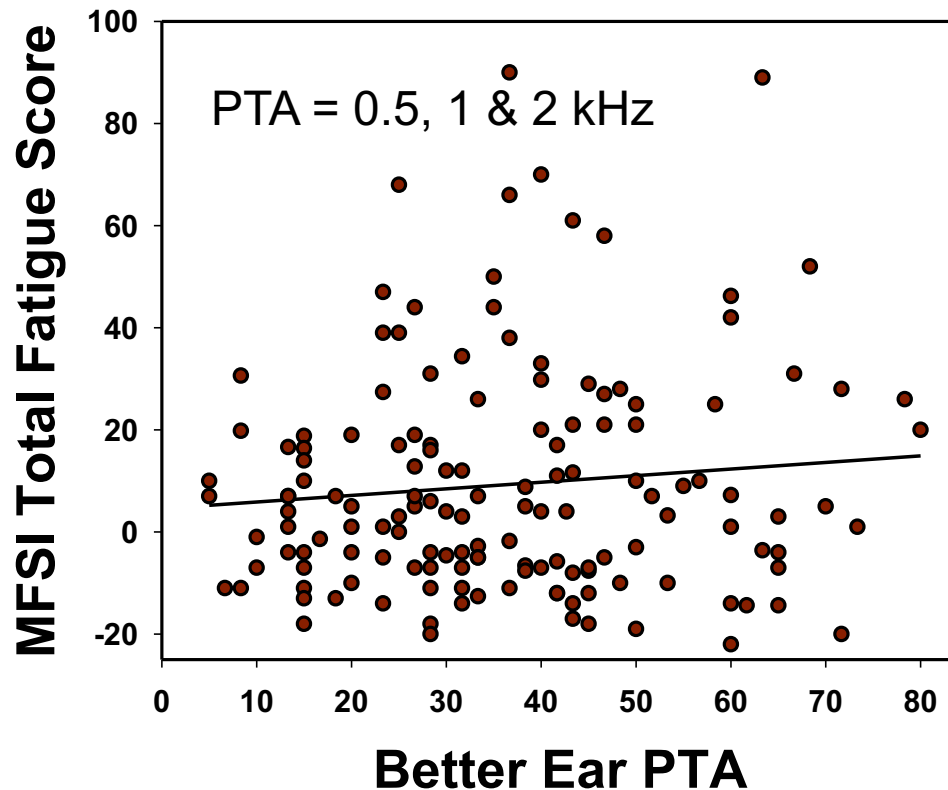
Percentage of adults subjectively reporting severe fatigue and vigor deficits



Hornsby, B. & Kipp, A. (2016)

Degree of hearing loss and fatigue

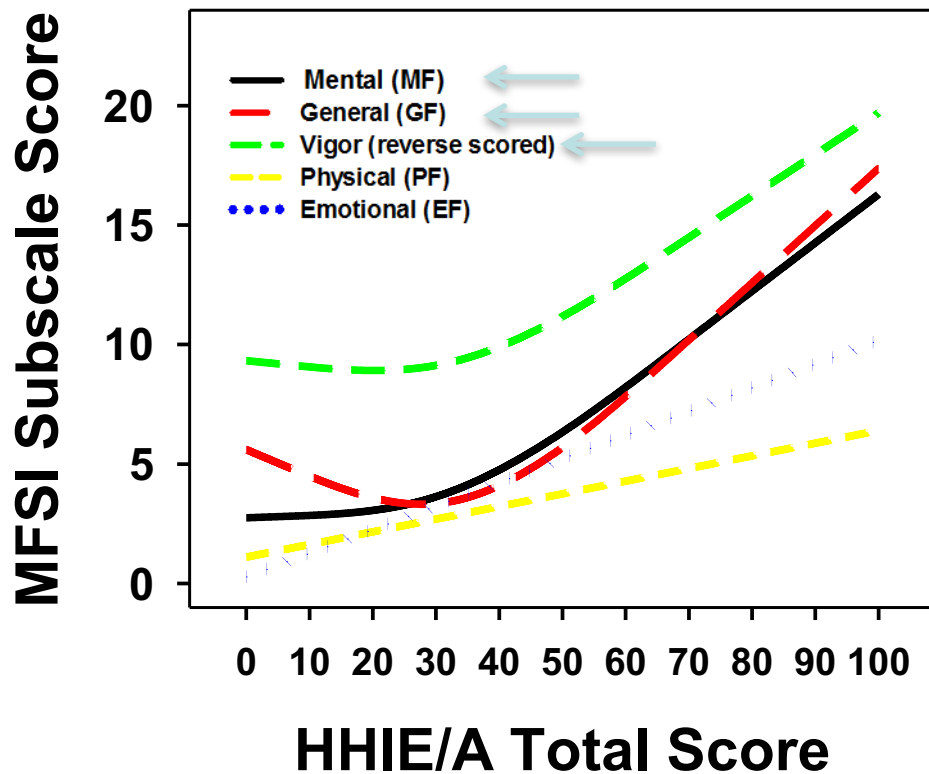
Hornsby, B. & Kipp, A. (2016)



MFSI= Multidimensional fatigue symptom inventory- short form

- Surprisingly, no association bw degree of loss and any fatigue/vigor domain
 - Similar result for POMS data as well
- N= 143
- Age range: 22-94 years
- PTAs: 5-80 dB (Median: 33 dB)

Hearing handicap and fatigue



Hornsby, B. & Kipp, A. (2016)

- Fatigue increases with increases in hearing handicap
- Esp. for “significant” handicap scores (HHIE/A scores >42)
 - Limited association for lower handicap scores

- Strong relationship between high levels of hearing handicap and subjective fatigue

Take Home Points- Adults

- Generic fatigue measures suggest, in everyday settings
 - Fatigue and vigor deficits are increased in at least a subset of adults with HL,
 - Especially risk for more severe fatigue and vigor deficits
- This increased risk is not associated with PTA
 - But is associated with perceived hearing difficulties (i.e., psychosocial consequences of hearing loss-HHIE/A scores)

Pediatric Subjective Measures

- Vanderbilt LRE Study
 - PEDS QL
 - Vanderbilt HRFS

Scale #1: PedsQL MFS (Varni et al.)

- 18 questions
- Parent and child versions
- Standardized for children age 5-18

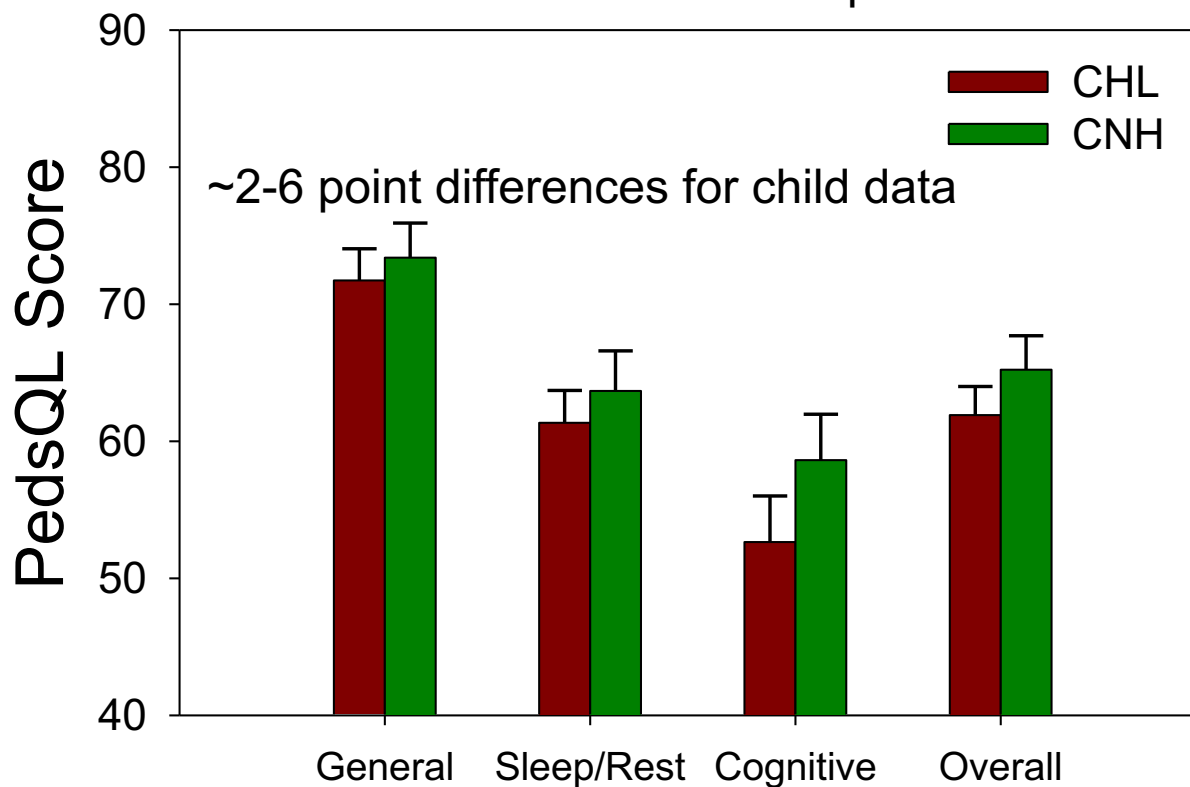
In the past ONE month, how much of a problem has this been for you...

Fatigue Subscale	Item	Never	Almost Never	Sometimes	Often	Almost Always
General	I feel tired	0	1	2	3	4
Sleep/Rest	I sleep a lot	0	1	2	3	4
Cognitive	It is hard for me to keep my attention on things	0	1	2	3	4

Effect of Hearing Loss

More Fatigue
↓

Mean child report- Full data set



Small effect size: CNH report more fatigue than normal.

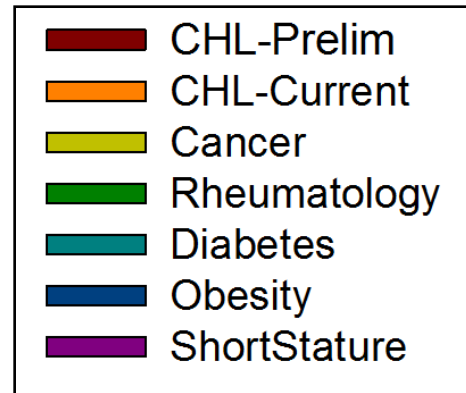
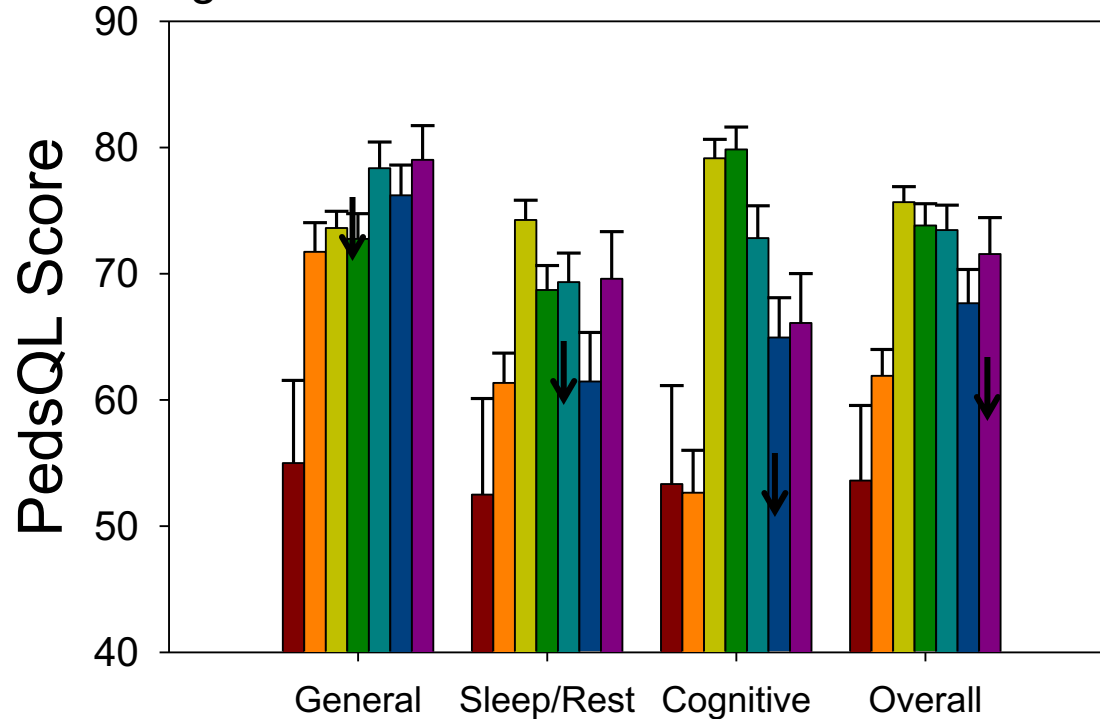
- Current data shows main effect of HL

Hornsby, 2016 presentation

CHL vs. Other Chronic Health Conditions

Children with hearing loss/chronic health conditions
only

More Fatigue
↓



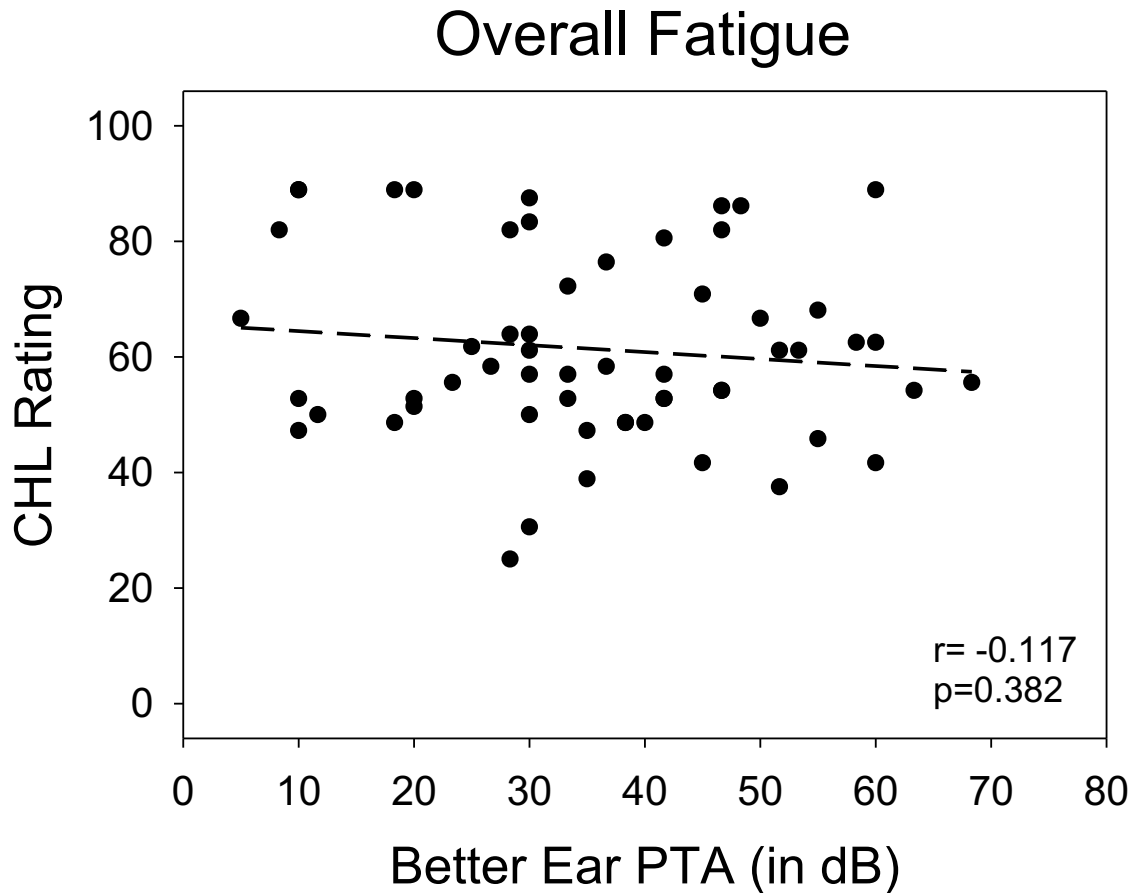
↓ = current data

Our current group reports similar, or more, fatigue compared to other chronic conditions

Factors influencing fatigue in CHL

- What factors modulate fatigue in CHL?
 - Degree of hearing loss (PTA)?
 - Intelligence, language or receptive vocabulary?
 - TONI, CELF, PPVT

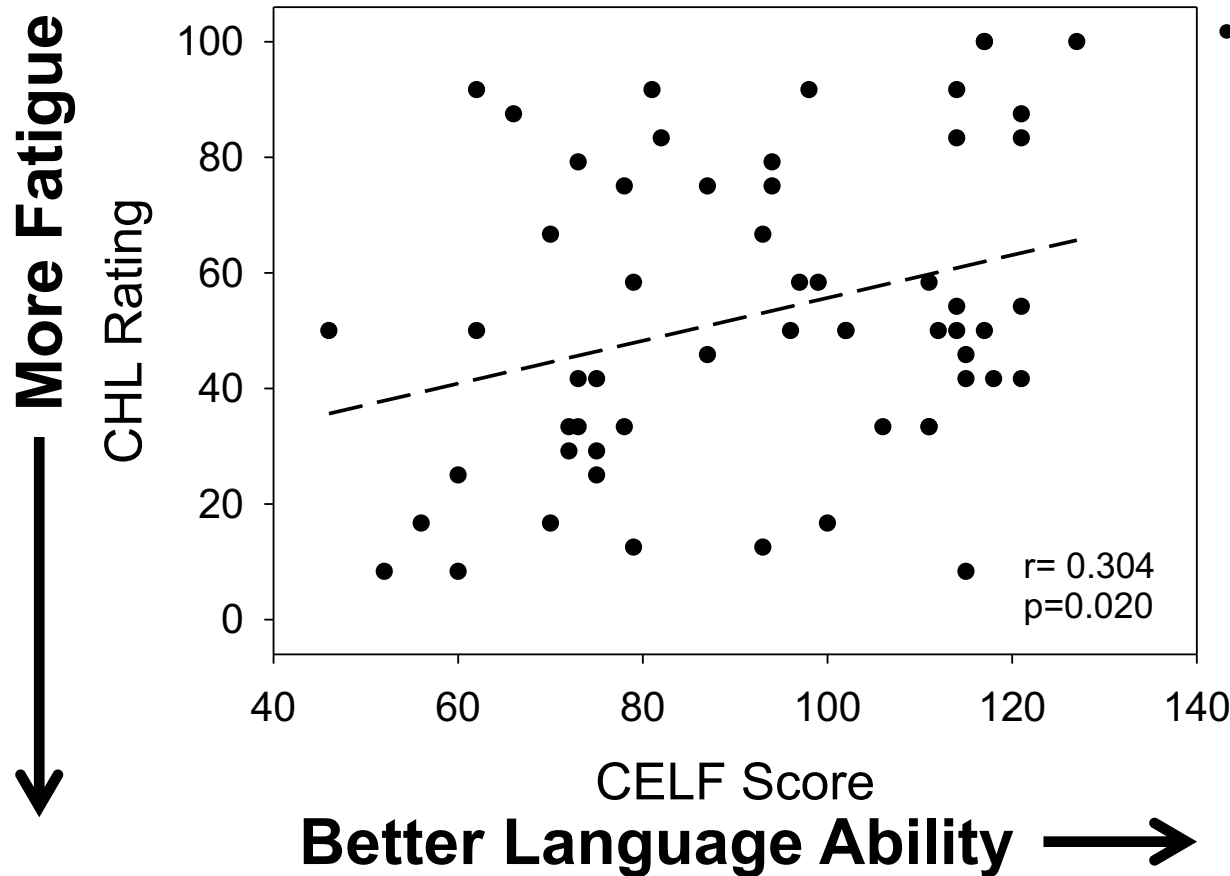
Degree of HL Predict Fatigue?



Hornsby, 2016

Cognitive fatigue ratings ARE associated with language ability

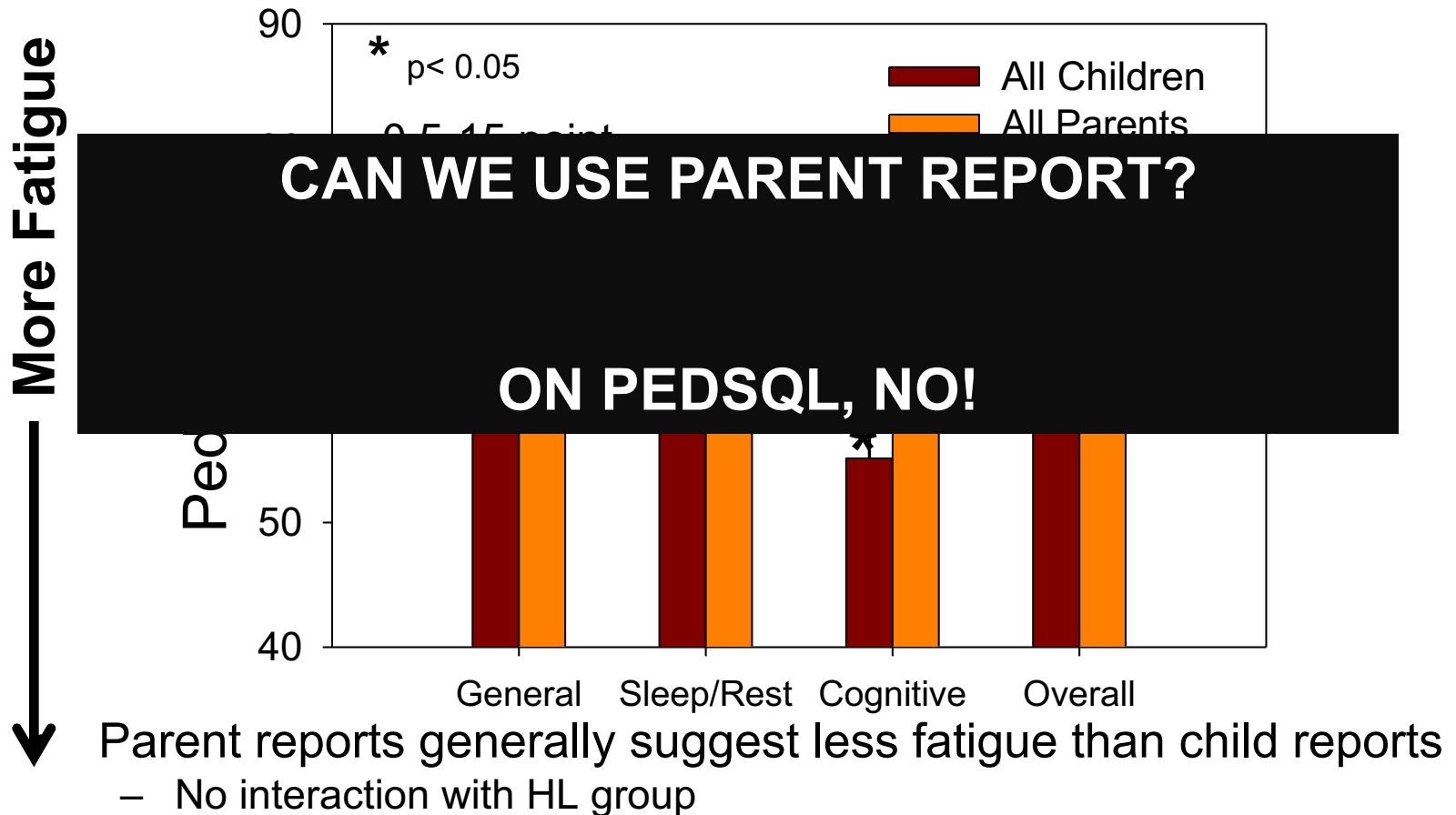
Cognitive Fatigue



- Similar, but weaker, correlations seen for
 - CELF and Overall fatigue ($r=0.271$, $p=0.04$)
 - PPVT and Cognitive fatigue ($r=0.270$, $p=0.038$)
- Similar association b/w CELF and Cognitive Fatigue seen in CNH ($r=0.371$, $p=0.016$)

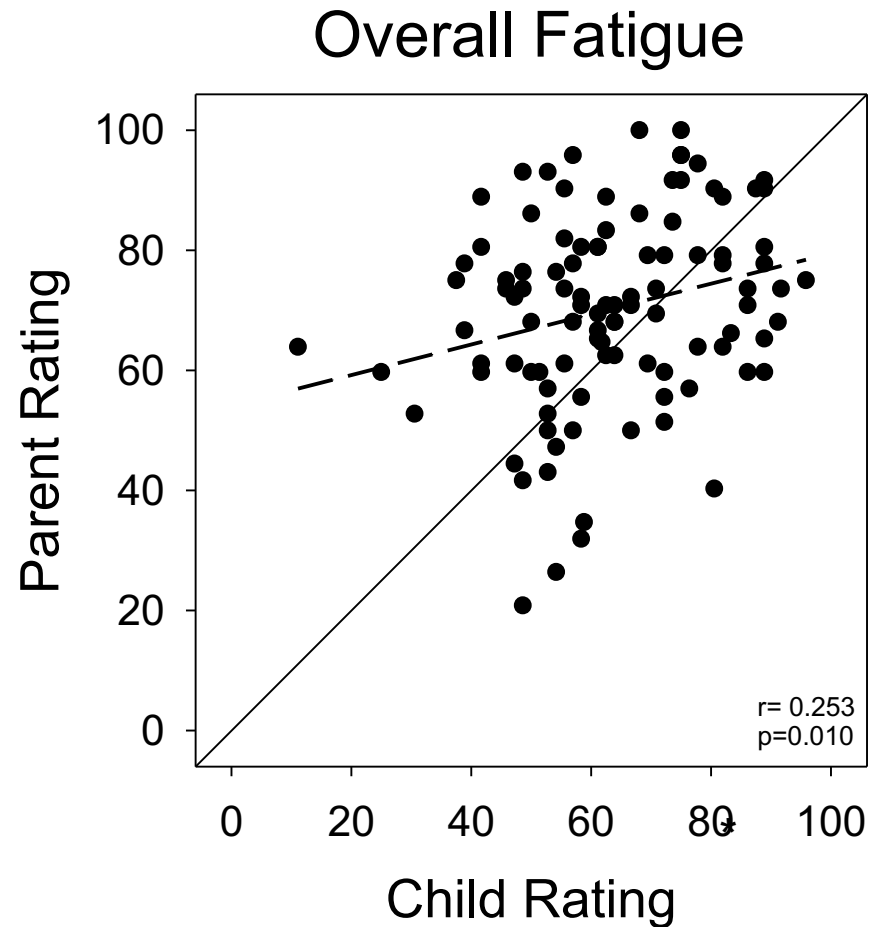
Parent versus Child Report

Mean data collapsed across HL/NH groups



Parent-Child Correlations

- Correlations between parent and child ratings were weak (general, cognitive, overall), or not significant (Sleep/Rest)
 - Consistent with prior work in this area



*Similar, or poorer, correlations observed across all domains

Take Home Points- CHL



- School-age children with mild-moderately severe HL
 - Report more fatigue, especially cognitive fatigue, compared to control groups
 - Their fatigue is comparable, or greater, than that reported by children with other chronic health conditions
- Higher fatigue ratings are
 - Are not modulated by degree of hearing loss
 - But are associated with poor language abilities (CELF scores), in both CHL and CNH
- Parent and child reports provide distinct information

Scale #2: Vanderbilt Hearing Related Fatigue Scale (VRFS)

- 10 questions about listening and fatigue
 - Cartoon illustrations
 - Answer based on experiences in the last three months

VRFS

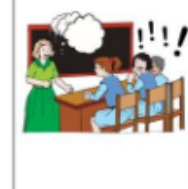

How much is this statement like your classroom?

	<p>7. My classroom is so noisy, it's hard to hear what my teachers says.</p>	
--	--	---

Please circle one for each statement.

Never	Almost Never	Sometimes	Often (A lot)	Almost Always
0	1	2	3	

How much is this statement like your classroom?

	<p>3. My classroom is so noisy, I feel tired.</p>	
---	---	--

Please circle one for each statement.

Never	Almost Never	Sometimes	Often (A lot)	Almost Always
0	1	2	3	4

Need for Hearing Loss Specific Fatigue Scale

- No differences noted between CHL and CNH on overall scores for PedsQL MFS and total scores for VHRFS.
 - Fatigue is a subjective, multi-dimensional experience
 - Inter-subject and inter-group variability
- Strong (significant) correlation between PedsQL MFS and VHRFS total score
- What were the scales measuring?
- How do you quantify fatigue?



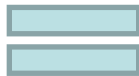
Data from Gustafson et al., 2015 poster presentation

Vanderbilt Fatigue Scale-Children with Hearing Loss (VFS-CHL)

- Goal: create and validate a measure of fatigue in CHL with specific listening-related questions.
- Themes:
 - Difficult listening situations
 - Physical, cognitive/mental, and emotional manifestations of fatigue
 - Coping mechanisms to ameliorate ‘symptoms’ of fatigue
 - Temporal characteristics of fatigue and coping mechanisms

What is fatigue?

“Fatigue sounds like phantom, so maybe a squid?”



VFS-CHL: Phase 1

- Focus groups and individual interviews with parents, teachers, and children with hearing loss
- Transcribed and reviewed the focus group discussions
- Items written directly from quotes

SCHOOL SERVICE PROVIDER MODERATOR'S GUIDE

Does your student seem to exert more energy to participate in certain activities?

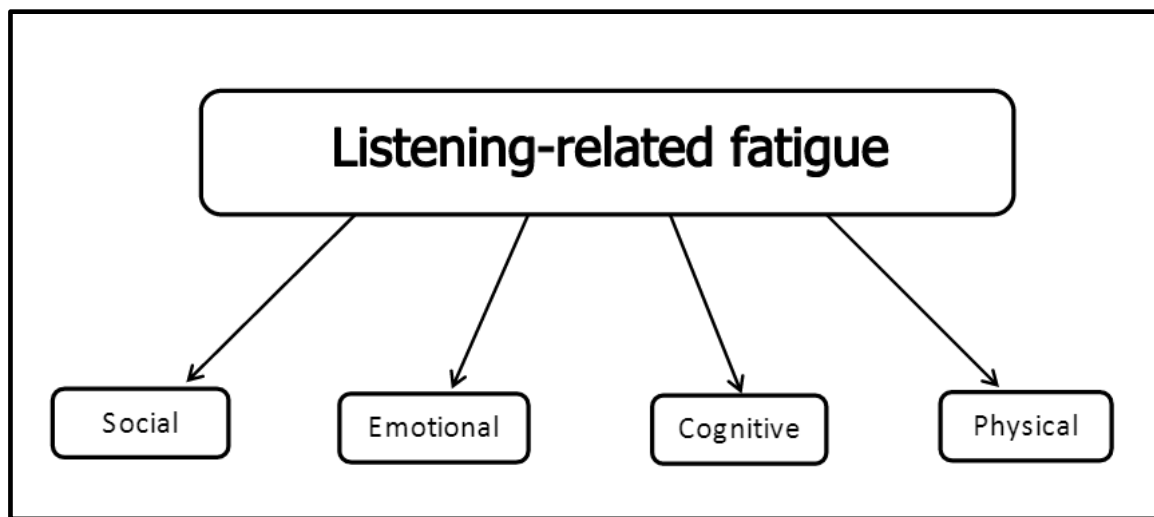
What behaviors/emotions do you note in your student that alert you that he/she may be fatigued?

What coping strategies do you/the student use to recover from fatigue?

Is fatigue from listening a problem for your student?

Roundtable Discussion

- Do you note listening-related fatigue in your students with hearing loss?
 - If so, what physical, emotional, or cognitive symptoms are observed?



Subjective Fatigue Reports: CHL

??

It is a lot of work for me to focus on others when they are talking.

It takes a lot of work to focus on listening.

I have to try hard to focus on what others are saying.

I get tired trying to keep up with group conversations.

I have to focus hard to understand group conversations.

I get tired trying to process and understand in a group conversation.

I want to give up when I have difficulty understanding what someone is saying.

I have to focus all of my energy on listening to understand what others are saying.

Subjective Fatigue Observations: Parents

My child complains of frequent headaches.

My child struggles to understand audio from computers.

It is difficult for my child to focus with competing background noise.

My child struggles to keep up with fast-paced conversation.

My child puts a lot of effort into keeping up with conversation.

My child must make an effort to keep up with fast-paced conversation.

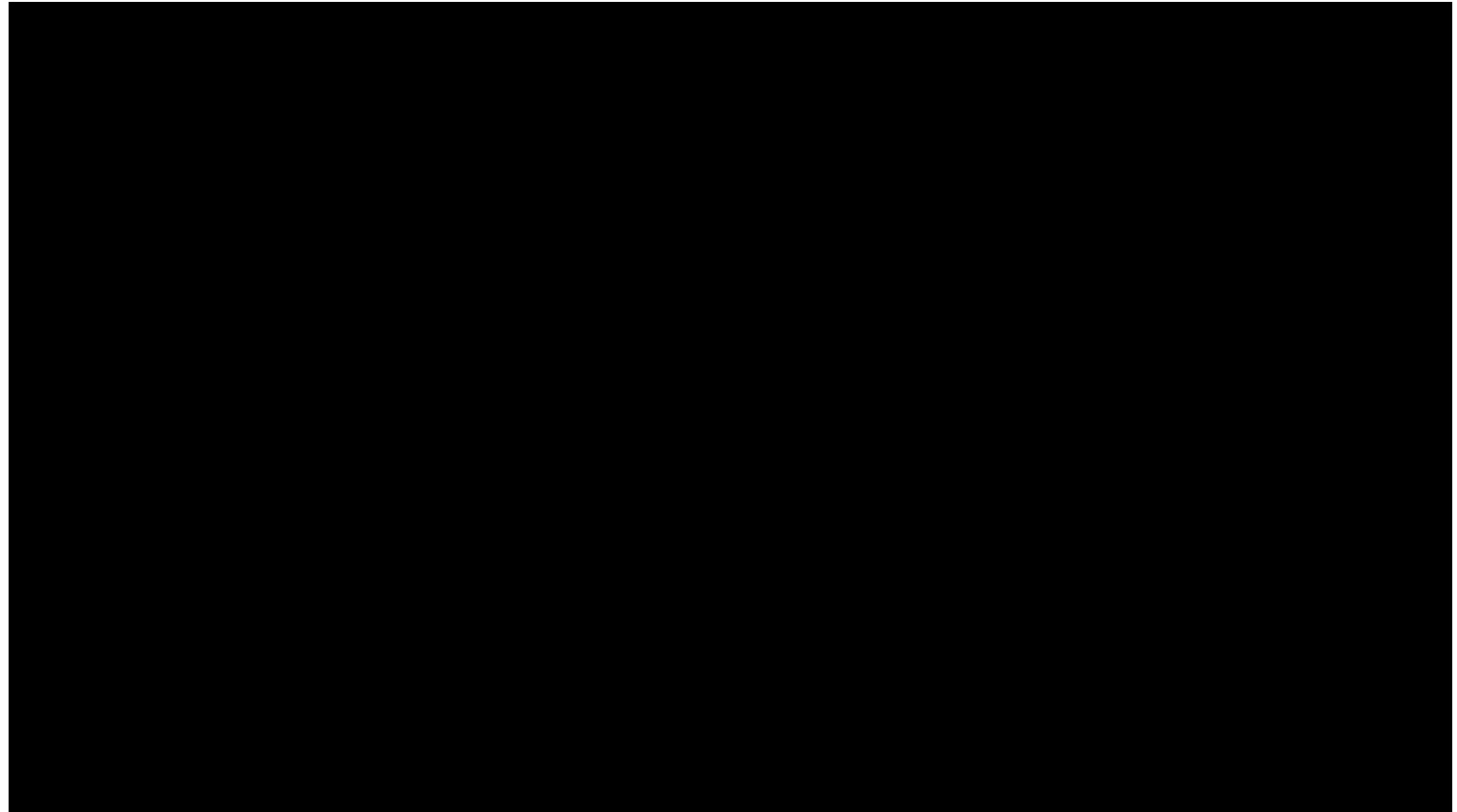
My child gets worn out from the effort of keeping up with conversation.

My child's hearing difficulties impact his ability to interact with others.

My child becomes tired in noisy situations.

My child gives up trying to listen in noisy places.

Subjective Fatigue Observations: School Professional Perspective



VFS: School Provider Version

- My student stops participating in difficult listening situations.
- My student will give up trying to listen when it is difficult to hear.
- My student can focus on listening tasks better in the morning.
- My student is less motivated after a long day of listening.
- Scaled from “always” to “never”

VFS: Parent Version

- My child loses interest in conversation when he/she falls behind.
- Listening takes a lot of effort for my child.
- My child has difficulty concentrating after listening for a long time.
- Trying to keep up in a conversation exhausts my child.
- My child gets frustrated when it is difficult to hear.

VFS: Child Version

- I use a lot of energy trying to understand what others are saying.
- I get annoyed when I have to listen in a noisy place.
- I get stressed when I have difficulty understanding others.
- I get sleepy after listening for a long time.
- I need a break after listening in a noisy place.

VFS: Next Steps

- Cognitive interviews
 - Determine strength of questions
- Pre-test to reduce number of items
- Pilot testing to create normative values and an instructional manual
- Be on the lookout for the scales!

Roundtable Discussion

- What does your student do to cope with listening-related fatigue?
- What are strategies the classroom teacher, SLP, deaf educator, educational audiologist, etc. can use to help the student with hearing loss dealing with fatigue in the educational setting?



Suggestions for IEPs

ACCOMMODATIONS/MODIFICATIONS

Provide notes ahead of class time to reduce need to multi-task during lecture/discussion

Provide a space and/or scheduled break time for listening/quiet breaks

Consider schedule of day and timing of auditory tasks, including therapies or other pull-out sessions

Consistent personal amplification and FM system use

Preferential seating to reduce listening effort

Visual information available in the classroom

Classroom acoustic modifications

Listening Effort and Amplification

- HA Use and LE and Mental Fatigue (Hornsby, 2013)
 - Sixteen adult participants with bilateral hearing loss
 - Visual reaction time and dual-task paradigm tasks
 - Subjective reports of fatigue
 - Results:
 - Individual fatigue variability
 - Fewer participants showed substantial increases in dual-task RTs during testing when in the aided condition
- Directionality and DNR (Sarampalis et al, 2009)
- FM Use (Picou et al., in prep)

Implications for Practice

There are several “good practice” suggestions for management of fatigue in children with hearing loss.

- Monitor use of amplification
 - Evidence in adults suggests that properly fitted hearing aids can reduce listening effort and cognitive fatigue (Hornsby, 2013)
 - Children with lesser degrees of hearing loss and those who are in grades 5-7 are at increased risk for reduced hearing aid use (Gustafson et al., 2015)
- Classroom Strategies
 - Improving classroom acoustics should be an initial step in efforts to reduce listening effort in the classroom
 - Preferential seating can minimize environmental distractors
 - Slowing the pace of a lesson and utilizing breaks between activities can allow for additional processing time
 - Daily content can be rearranged so demanding listening tasks occur earlier when the child has more available cognitive resources

Questions? Thoughts?



Visit the Listening and Learning Lab's website at
<http://my.vanderbilt.edu/listeninglearninglab>
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