LISTENING IS EXHAUSTING!

FATIGUE ASSOCIATED WITH HEARING LOSS

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VANDERBILT HEALTH

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Agenda

- What is fatigue?
- What is listening-related fatigue? Listening effort?
- Measurement of listening-related fatigue
  - *Behavioral*
  - *Physiological*
  - *Subjective*
- Classroom applications
- Intervention
- Future directions

WHAT IS FATIGUE?

What is fatigue?

Having no energy

Lack of energy

Tiredness

Exhaustion

Difficult to describe

Lethargic

Lack of strength

May be physical, mental, or emotional

EXTREME TIREDNESS

Wearieness

Worn out

Listless

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What is fatigue?

- Complex and multidimensional
- No universal definition
- Depends on the person describing and the context
- Can be considered a symptom or a consequence

"Fatigue is a lingering tiredness that is constant and limiting." –WebMD

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Aren't we all fatigued?

Fatigue is one of the most common complaints reported in primary care settings

Cullen et al. (2002)
- 1,428 participants in GP offices
- 25% reported fatigue
- 6.5% primary; 19% secondary
- 62% female

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Who is at risk for fatigue?

- 18-38% of adults
- 4% of children and adolescents
- Higher rates following puberty
- More common in females
- More common in lower socioeconomic groups
- More severe in those with **chronic conditions**

Engberg et al., 2017; Cullen et al., 2002; Gordijn et al., 2011

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Acute Fatigue

- Protective physiological process in healthy individuals
  - *Has a cause*
  - *Normal consequence following task*
  - *Short in duration*
  - *Alleviated with intervention (rest, stress management)*

Hornsby et al., 2016

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Severe Fatigue is the Problem!!

Recurrent, severe fatigue

- **Uncommon** in healthy populations, but common in many chronic health conditions
  - *Previous reports in individuals with cancer, HIV/AIDs, Parkinson's, Multiple Sclerosis*
  - *Very little work looking at fatigue and hearing loss, especially for children*
- Persists over time
- Not relieved by common strategies
- Significant negative effects on quality of life

Hornsby et al., 2016

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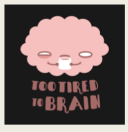
Can we define fatigue?

- **Physical fatigue**: reduced ability or desire to perform some physical task
- **Cognitive/mental fatigue:** state of decreased optimal performance due to sustained cognitive demands
- **Emotional fatigue:** consequence of emotional demands, results in feeling "overwhelmed, drained"



Boksem & Tops, 2008; Lieberman, 2007; Chalder et al., 1993; Hornsby et al., 2016

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Negative Consequences of Fatigue in Adults

- Reduced efficiency at work
- Accidents in the workplace
- Decline in attention
- Impaired judgement
- Slowed reaction time
- Decline in motivation
- Association with depression
- Mental distress

NEGATIVE EFFECTS ON QUALITY OF LIFE

Kramer et al., 2006; Nachtegaal et al., 2012

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Negative Consequences of Fatigue

- Children with Chronic Conditions
  - *Difficulties with concentration and memory*
  - *Inattention*
  - *High distractibility*
  - *Poorer school achievement*
  - *Higher absenteeism*
  - *Social effects*

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What are "symptoms" of fatigue?

- Chronic tiredness or sleepiness
- Headache
- Dizziness
- Sore or aching muscles
- Muscle weakness

PHYSICAL

- Impaired decision-making and judgement
- Moodiness, such as irritability
- Short-term memory problems
- Poor concentration
- Low motivation

COGNITIVE

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LISTENING-RELATED FATIGUE AND EFFORT

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Fatigue in Adults with HL

- Difficulty understanding
- Increased attention, concentration and effort at work
- Increased stress, tension and fatigue
  - **"too tired for normal activities"**
- Rate of sick leave for AHL four times greater due to burnout
- Self-rating of productivity decreased

Hetu et al., 1988; Kramer et al., 2008

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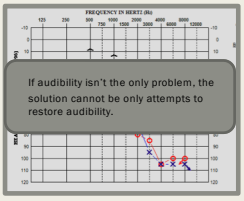
The Big Picture for Children with HL

Self-determination

Academic progress

Language development

Hobbies/Extra-curriculars



Social relationships

Family members

Technology

Listening-Related Fatigue

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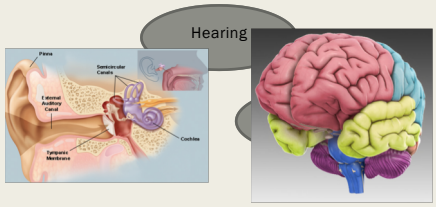
What is listening?



Pichora-Fuller et al., 2016

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What is listening effort?

The allocation of attentional and cognitive resources toward auditory tasks.

Alhanbani et al., 2017; Hicks & Tharpe, 2002; McGarrigle et al., 2014)

- CHL and AHL must increase mental effort compared to those without HL when attempting to detect, process, and respond to auditory stimuli
  - *Increase in **LISTENING EFFORT***
  - *Increase in **FATIGUE?***

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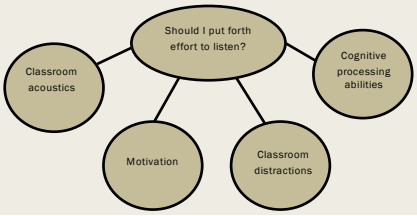
Factors Influencing Listening Effort



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It's like doing **jigsaws, Sudoku, and Scrabble** all at the same time."

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Is everyone impacted by listening-related fatigue to the same degree?

Apply mental effort

Unwilling/unable to sustain effort

Fatigue **Quit**

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- Task specific factors
- Subject-specific factors
  - ***time** on task*
  - *mental **workload***
  - *mental **effort** allocated to the task*
  - *task **importance***
  - ***motivation***
- These factors can impact how quickly (if at all) fatigue will develop

Ackerman, 2011

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Framework for Understanding Effortful Listening

- Motivati… fort, if the perform…
- High eff…

- Challenging… that require…
- Maintaining… difficult or n…

…nt conditions …dividual is …d to succeed …ave a …ence for poor …ance

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Capacity Theory of Attention

- Cognitive resources are finite, individual allocates them to multiple tasks as needed
- Cognitive resources can be influenced by outside factors (like fatigue)
- Some tasks are cognitively harder than others (like language-based tasks)
- Strategies are often used to allocate cognitive resources

Inefficient "brain power" = elevated fatigue
= decreased academic performance

Werfel & Hendricks, 2016; Kahneman, 1973

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Does effortful listening affect CHL?

"Effortfulness Hypothesis"

COGNITIVE RESOURCES

EFFORTFUL LISTENING IN DIFFICULT SITUATION

RESOURCES LEFT FOR OTHER PROCESSING NEEDS (memorization, comprehension)

Classroom learning skills!

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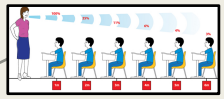
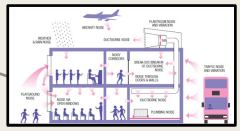
Listening in the Classroom





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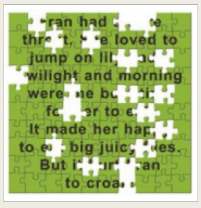
Classroom Listening



Fran had a sore throat. She loved to jump on lily pads and twilight and morning were the best times for her to eat. It made her happy to get big juicy flies. But it hurt Fran to croak.

Karen Anderson, Success for Children with Hearing Loss

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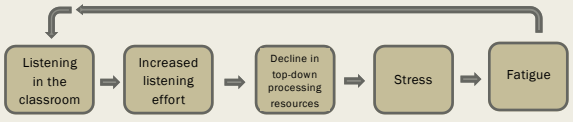
What contributes to listening-related fatigue?



Bess & Hornsby, 2013

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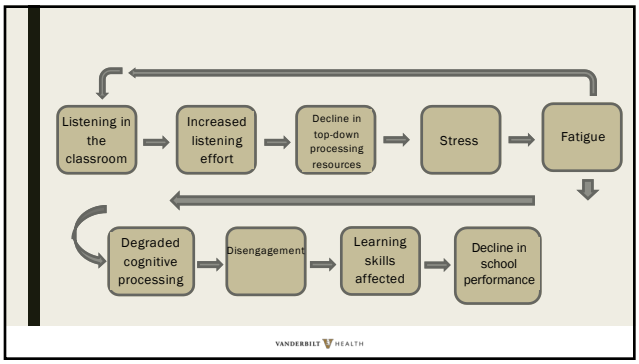
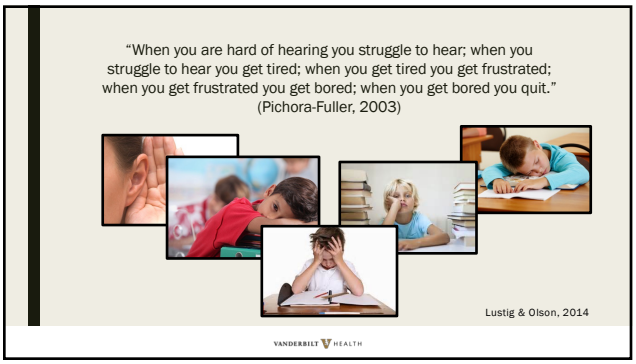




DISCUSSION QUESTION

Do you see signs of listening-related fatigue in the classroom?
What do you notice?
What do general educators say about your students' ability to pay attention?

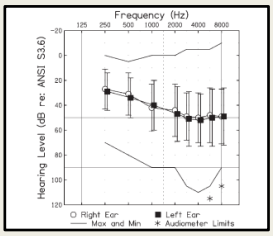
MEASURING LISTENING-RELATED FATIGUE

Measuring Fatigue

- Physiological: Physical Changes
  - *Changes in the body that can be used as an indirect marker of subjective and behavioral fatigue*
- Behavioral Fatigue: Performance Decline
  - *Decrements in physical or cognitive performance as the result of a taxing task*
- Subjective Fatigue: Feelings
  - *Describing fatigue as a feeling of weariness, tiredness, lack of energy, decreased motivation*
  - *Measured with questionnaires, rating scales*

1. Physiological Measures of Fatigue

- Cortisol measures
  - *Hicks and Tharpe, 2002*
  - *Tops et al., 2006*
- EEG measures
  - *Murata et al., 2005*
  - *Trejo et al., 2004*
- Skin Conductance
  - *Darrow and Solomon, 1934*
  - *Segerstrom and Nes, 2007*
- fMRI measures
  - *Caseras et al., 2006*
  - *Caldwell et al., 2010*
- Pupillometry measures
  - *McGarrigle et al., 2017*
  - *Zekveld et al., 2011*



- 60 CHL (59 HA users)
- 43 CNHL
- Age 6-12
- Self and parent report

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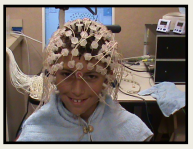
Measuring ERP

Event-related potentials (ERP) are changes in ongoing EEG activity that are time-locked to the onset of the auditory event

- *Reflects change in brain activity associated with the processing of that stimulus*

Centro-parietal P300 response

- Sensitive to fatigue due to cognitive processing (Murata, Uetake, & Takasawa, 2005; Uetake & Murata, 2000)



Gustafson, 2015

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Assessing Fatigue in the Lab

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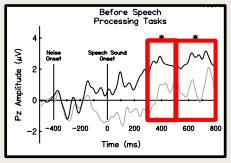
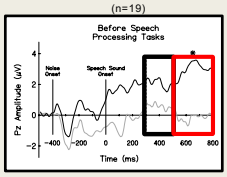
Change in Processing Resources:
Comparing children with and without hearing loss

No Hearing Loss (n=18)



Children with hearing loss show delays in cognitive processing when compared to children with no hearing loss.

Unaided Hearing Loss (n=19)



Gustafson et al., 2017

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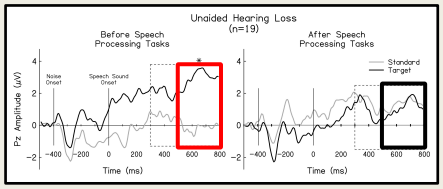
Change in Processing Resources:
Children with Hearing Loss

Trend for cognitive processing to be reduced following sustained speech-processing tasks *(p=.078)*.



Gustafson et al., 2017

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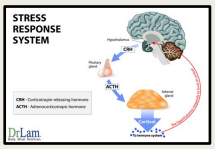
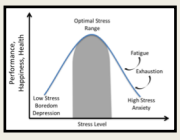
Stress, Cortisol, and Fatigue

- Stress is the body's reaction to change that requires a physical, mental, or emotional response
  - *Stress is caused by good and bad experiences*
- **Cortisol** levels provide a physiologic measure of stress
  - Regulated by the hypothalamic-pituitary-adrenal (HPA) axis
  - Related to sugar levels in the blood that fluctuate based on the need to mobilize energy





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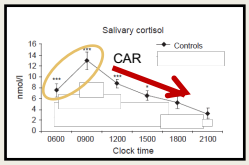
"Typical" Cortisol Patterns

In non-fatigued individuals, cortisol levels have a typical diurnal pattern

- Build-up of cortisol during sleep
- Rapid rise upon awakening
  - Cortisol Awakening Response; CAR
- Slow decline in cortisol throughout the day

Jerjes, et al., (2005).



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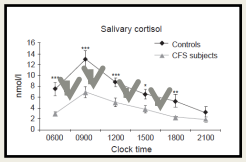
"Atypical" Cortisol Patterns

- Sustained stress or fatigue can lead to abnormal diurnal cortisol patterns
  - Reduced response with "Chronic Fatigue Syndrome"
    - Jerjes, et al., (2005).



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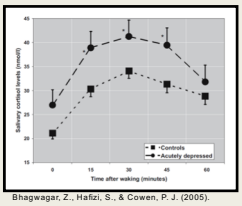
"Atypical" Cortisol Patterns

- Sustained stress or fatigue can lead to abnormal diurnal cortisol patterns
  - "Elevated" CAR in patients with depression



Bhagwagar, Z., Hafizi, S., & Cowen, P. J. (2005).

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- Participants
  - *Children with hearing Loss (n=32)*
  - *Control group (n=28)*
- Six samples per day
  1. Awakening*
  2. 30 min post-wake up*
  3. 60 min post-wake up*
  4. 10:00 am
  5. 2:00 pm
  6. 8:00 pm*
- Sampled on two separate school days

*Samples taken by parents at home

Bess et al., 2015

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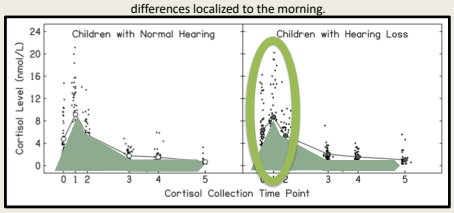
Comparing Measured Cortisol Levels

Modeling analysis revealed significant differences between group slopes – differences localized to the morning.



Bess et al., 2015

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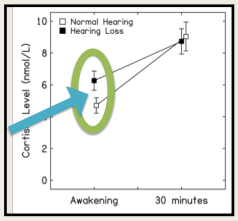
Comparing Measured Cortisol Levels



- Children with hearing loss have higher cortisol levels at awakening than controls
- Children with hearing loss have a reduced CAR compared to controls
- Suggests children with hearing loss are experiencing perceived stress and an increased burden of worrying about the upcoming day

High workload, job strain, and burnout symptoms

Physiologic Measures of Fatigue in CHL

Physiologic markers of stress can be reliably measured in children with hearing loss.

- Cortisol patterns in children with hearing loss are not "typical" and suggest increased stress.

Fatigue due to effortful listening can be induced in the laboratory and its effect on cognitive processing can be measured using auditory-evoked ERP.

- Children with and without hearing loss show reductions in cognitive processing secondary to speech-processing related fatigue.

Listening and Learning Lab Website:
https://my.vanderbilt.edu/listeninglearninglab/

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2. Behavioral Measures of Fatigue

- Psychomotor Vigilance Task (PVT): Visual reaction time
  - *Attend to a computer monitor with a timer*
  - *Completed three times during research session (before and after speech processing tasks)*
- Increased lapses in attention
  - *(almost twofold)*
- Longer reaction times

Key et al., 2017

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Noise! Noise! Noise!

- Research has shown classrooms to be noisy and for noise to have a detrimental effect on learning for all children.
- Signal-to-noise ratios (-7 dB to + 5 dB)
- CNHL: +15 dB SNR; CHL: +20 dB SNR

- Noise affects children more than adults
- Those with hearing loss
- Language difficulties
- Learning difficulties
- Those not being taught in their first language

Howard et al., 2010

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Multitasking: The Classroom Is Busy

- Dual-task paradigm
  - *Performance on a single task*
  - *Performance on the same task when performed in combination with a secondary task*
  - *Primary task demanding? Requires more effort?*
    - Performance on the second task (or both) will plummet.

- Listen and take notes
- Listen to directions and look up something on the computer
- Listen to class discussion and think of their own answer
- Discuss information with a classmate and write down answers

Howard et al., 2010

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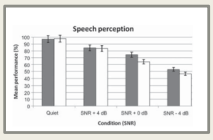
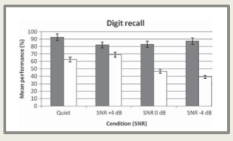
Listening Effort in Noise

- 31 children without hearing loss
- Primary task
  - *Repeat monosyllabic words in +4, 0 and -4 dB SNR*
- Secondary task
  - *Rehearsing digits and reciting them back later*





In order to keep repeating words, greater effort was needed. This came at the expense of poorer scores on the digit recall task.

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3. Subjective Measures of Fatigue

- Numerous measures looking at fatigue and energy in various clinical populations
  - *The Fatigue Questionnaire*
  - *Fatigue Assessment Scale*
  - *Chalder Fatigue Scale*
  - *POMS*

	NEVER	SOMETIMES	REGULARLY	OFTEN	ALWAYS
I am bothered by fatigue					
I get tired very quickly					

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Fatigue and Vigor in AHL

- n=149 (59% males)
- Mean age of 66.1 years (range: 22 to 94 years)
- 92% SNHL

- **Profile of Mood States (POMS; McNair et al., 1971)**

	Not at all	A little	Moderately	Quite a bit	Extremely
Worn out					
On-edge					

- **Multidimensional Fatigue Symptom Inventory-Short Form (MFSI-SF; Stein et al. 2004)**

	Not at all	A little	Moderately	Quite a bit	Extremely
I feel refreshed					
My head feels heavy					

Hornsby & Kipp, 2016

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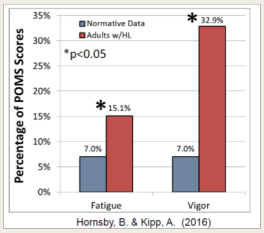
Fatigue and Vigor in AHL



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

- AHL were more than **twice as likely to report severe fatigue**
- AHL were more than **four times as likely to report severe problems with vigor**
- No association with degree of HL, but did see association with self-perceived hearing handicap (HHIE)

Hornsby & Kipp, 2016

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Fatigue and Effort Reports in AHL

- *Fatigue Assessment Scale (generic fatigue scale)*
- *Effort Assessment Scale (three effort-related questions from the SSQ)*
- *HHIE*
- *Significant correlation between self-reported fatigue and hearing handicap*
  - FAS and HHIE
  - **No correlation between self-reported fatigue and hearing thresholds**
  - Correlations may have been stronger if the questions were specifically related to listening instead of general fatigue questions

Alhanbali et al. 2017

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AHL Self-Report of Fatigue

- AHL reported more listening effort and fatigue compared to controls.
- Extreme fatigue
  - 22% HA
  - 10% CI
  - 22% SSD

- Extreme listening effort
  - 46% HA
  - 54% CI
  - 52% SSD
- No difference in reports between HA, CI, and SSD

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Subjective Fatigue in CHL

PedsQL
Multidimensional Fatigue Scale

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

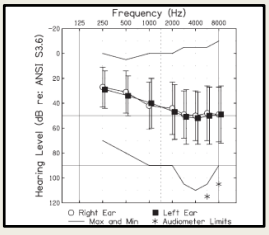
Subscale	Item	Never	Almost Never	Sometimes	Often	Almost Always
General	I feel tired	0	1	2	3	4
Sleep/Rest	I sleep a lot	0	1	2	3	4
Cognitive	It is hard for me to keep my attention on things	0	1	2	3	4

8-12 year old version

SCORES: General, Sleep/Rest, Cognitive and Overall

Varni et al., 2002

VANDERBILT HEALTH



- 60 CHL (59 HA users)
- 43 CNHL
- Age 6-12
- Self and parent report

VANDERBILT HEALTH

Subjective Fatigue in CHL

More Fatigue

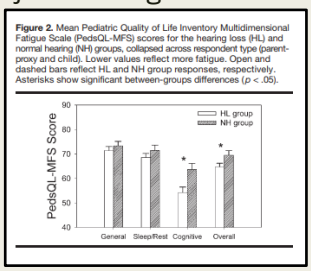


Figure 2. Mean Pediatric Quality of Life Inventory Multidimensional Fatigue Scale (PedsQL-MFS) scores for the hearing loss (HL) and normal hearing (NH) groups, collapsed across respondent type (parent-proxy and child). Lower values reflect more fatigue. Open and dashed bars reflect HL and NH group responses, respectively. Asterisks show significant between-groups differences ($p < .05$).

Significant association between COGNITIVE fatigue score and:

- Language abilities
- Poorer language = higher levels of fatigue
  - See Werfel and Hendricks, 2016 (children with CI)

Hornsby, 2016; Hornsby et al., 2017

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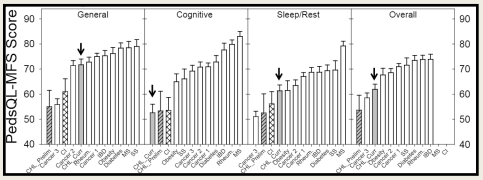
More Fatigue



CHL reported more, or similar, fatigue across multiple domains when compared to other control groups AND children with other chronic conditions

Hornsby et al., 2017

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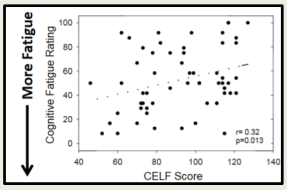
Peds QL and Standardized Scores

More Fatigue



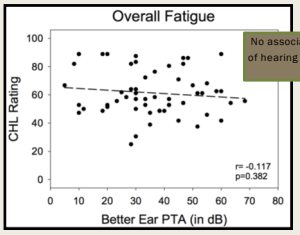
- Significant association with CELF (language) and PPVT (receptive vocabulary scores) and **COGNITIVE** fatigue.
- Similar, but weaker correlations for CELF and general fatigue
- And PPVT and Cognitive fatigue

Hornsby et al., 2017

VANDERBILT HEALTH

More HL = More Fatigue?

More Fatigue



No association between degree of hearing loss and self-reported fatigue

Hornsby, 2016

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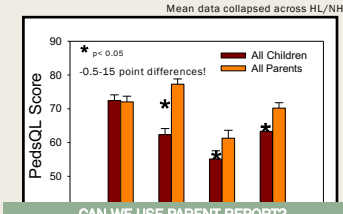
Parent versus Child Fatigue Report

Mean data collapsed across HL/NH groups

More Fatigue



CAN WE USE PARENT REPORT?

ON PEDSQL, NOI

...orts

Children with CI & Fatigue Reports

- Children report significantly more fatigue in 2/3 categories
- Language and literacy scores
  - TOWRE-2
  - CELF-5
  - TWS-5
- Correlations between child report of fatigue and speech perception and language abilities.

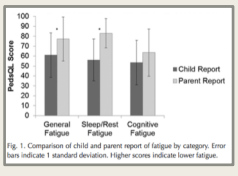


Fig. 1. Comparison of child and parent report of fatigue by category. Error bars indicate 1 standard deviation. Higher scores indicate lower fatigue.

Werfel & Hendricks, 2016

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Self and Proxy Report

- In healthy populations, parents need **to underestimate** problems child is experiencing
- For children with chronic health conditions, parents tend to **overestimate** problems
- There are larger disagreements when responding to internal, subjective feelings (pain, sadness, fatigue) versus externalized behaviors (walking, aggression, running).

VANDERBILT HEALTH

Listening-Related Fatigue Scales

- Vanderbilt Fatigue Scale-AHL (Adults with Hearing Loss)
- Vanderbilt Fatigue Scale-CHL (Children with Hearing Loss)
  - *Pediatric Version*
  - *Caregiver Version*
  - *Teacher/Service Provider Version*

GOAL: create and validate a measure of fatigue in individuals with hearing loss and other communication difficulties with specific listening-related questions.

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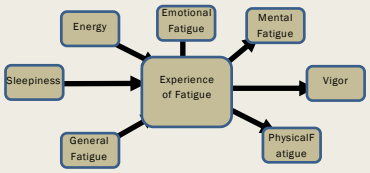
Dimensions of Subjective Fatigue



VANDERBILT HEALTH

Phase 1: Focus Groups

PARTICIPANT TYPE	NUMBER
Adults with hearing loss (AHL)	42
Children with hearing loss (CHL)	39
Parents of CHL	17
Teachers of CHL	28

How often do you feel physically or emotionally tired due to difficulty listening?

Is fatigue from listening a problem for your student/child?

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

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"Yesterday, we took a field trip to a museum. The gentleman was great, but he spoke so fast—she was still missing stuff. In a very hectic environment…, I can tell it's a lot for her. She has to make an effort, and it wears her out."

-parent of 10 year old with bilateral hearing loss

*"Yeah, **you wanna give up**. You just don't want to try anymore because you know you won't actually get what they're trying to say or sometimes you think it's just you. Maybe I need to try a little harder to listen but when you do try, you **put all of your focus on what they're trying to say and you still can't hear them**."*

-teen with bilateral hearing loss and hearing aids

Phase 1: Defining the Issues-CHL

"Fatigue sou aybe a squid?"

and/or parent proxy reports?

VANDERBILT HEALTH

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*"Yeah, **you wanna give up**. You just don't want to try anymore because you know you won't actually get what they're trying to say or sometimes you think it's just you. Maybe I need to try a little harder to listen but when you do try, you **put all of your focus on what they're trying to say and you still can't hear them**."*

-teen with bilateral hearing loss and hearing aids

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

Phase 2: Item Development

Level	D1: Social-Emotional	D2: Cognitive	D3: Physical
3-Severe Fatigue	Behaviors: Becomes extremely sad, upset, angered, stressed and/or emotionally exhausted by listening difficulties /fatigue. May throw tantrums and exhibit aggression. Social life is severely impacted by listening fatigue. Exhibits avoidance behaviors isolates oneself from social gatherings to cope with listening fatigue. Situations: Across a wide range of easy-challenging listening situations	Behaviors: Becomes unwilling /unable to maintain effort and attention when completing even routine mental activities. Becomes very unfocused and/or consciously decides to disengage (e.g., shuts down, gives up). Situations: Across a wide range of easy-challenging listening situations	Behaviors: Feels exhausted, drained and/or worn out from listening. Requires naps, additional sleep, and/or silent time to recover from listening fatigue. Regular breaks need to be scheduled into school day. Reports of significant sleep problems. Reports significant headache problems. Reports need to remove hearing device. Situations: Across a wide range of easy-challenging listening situations.
2-Moderate Fatigue	Behaviors: Becomes stressed, sad, frustrated, upset and/or emotionally tired by listening difficulties/fatigue. Social life is moderately impacted by listening fatigue. May avoid and/or withdraw from certain social gatherings. Situations: Moderately-challenging listening situations or worse	Behaviors: Must apply substantial mental effort to overcome difficulties remaining attentive when listening and following conversations. May tune/zone out. May need prompting. Situations: Moderately-challenging listening situations or worse	Behaviors: Feels tired after listening. May take listening breaks to recover. May get headaches from listening. May show abnormal sleep habits/patterns. May turn down hearing device. Situations: Moderately-challenging listening situations or worse
1-Mild Fatigue	Behaviors: Becomes irritated, embarrassed or anxious from listening difficulties/fatigue. Social life is mildly impacted by listening fatigue. May avoid and/or withdraw from certain social gatherings. Situations: Very challenging listening situations only	Behaviors: Some difficulty following fast-paced conversations and remaining attentive. Situations: Very challenging listening situations only	Behaviors: May exhibit mild tiredness after listening. Would enjoy a short rest or a listening break (not a requirement). Situations: Very challenging listening situations only

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Vanderbilt Fatigue Scale Questions

TEACHER

Never	Rarely	Sometimes	Often	Almost Always

My student stops participating in difficult listening situations.

PARENT

Never	Rarely	Sometimes	Often	Almost Always

Trying to keep up in a conversation exhausts my child.

CHILD

Never	Rarely	Sometimes	Often	Almost Always

I use a lot of energy trying to understand what others are saying.

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Who reports listening–related fatigue on the VFS-CHL?

N= 399 parents, 363 teachers, 151 children

- Gender
- Age
- Hearing loss status
- Degree of hearing loss
- Amplification
- Additional disability
- Maternal education
- Type of intervention at school (504, IEP)

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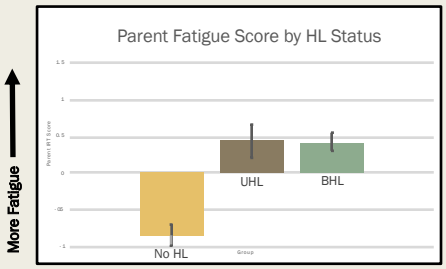
NO DIFFERENCES

- Child gender
- Child age
- Maternal education
- Degree of HL

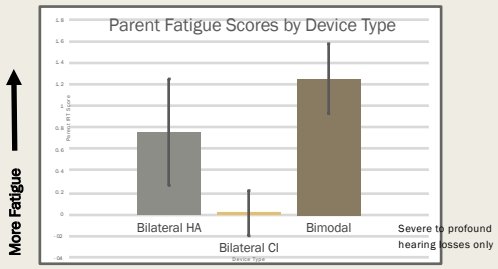
TAKE AWAY

- Boys and girls
- Elementary through high school
- Children of all SES
- Children with all degrees of HL

Parent Responses (VFS-CHL)



Parent Responses (VFS-CHL)



Additional Disabilities

- Cognitive Disability
- Visual Impairment
- Behavioral/Emotional Problem ★
- Physical disability
- Speech-Language Impairment ★
- Genetic/Chromosomal Syndrome

Trend toward differences between 0, 1, or more than 1 additional disabilities resulting in higher levels of subjective fatigue.

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NO DIFFERENCES

- Hearing loss status (child)
- Hearing loss status (teacher)

FUTURE WORK

- Child bad reporter? Understand concept?
- Teacher type? Teacher comparing to other peers with HL or typical hearing peers?

Highlights of VFS-CHL Data

- Subjective listening related fatigue not impacted by:
  - *Age*
  - *Gender*
  - *Degree of hearing loss*
  - *Maternal education*
- Differences noted for:
  - *Additional disabilities*
  - *Amplification (severe to profound HL)*

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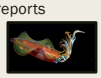
Highlights of VFS-CHL Data

- No systematic differences in child reports
  - *Children bad reporters?*
  - *Children understand concept?*



- Teacher reports
  - *Type of teacher*
  - *Frequency of observation*
- Proxy reports
  - *Previous literature shows that proxy reports are not always accurate for internalized behaviors/feelings*

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Is fatigue a problem for **children with hearing loss**?

- Taxonomy of Fatigue Concepts and Their Relationship to HL (Hornsby et al., 2016)
- CHL have **elevated levels of cortisol upon awakening**, indicating a possible dysregulation in HPA axis activity. This pattern is associated with **burnout** in adults. (Bess et al., 2015)
- CHL demonstrate **reductions in attentional processing of SIN following sustained speech-processing tasks** measured by auditory P300 responses, subjective reports, and behavioral indices. (Gustafson et al., 2018)
- Those with **poor reading skills** reported significantly **higher levels of subjective fatigue** compared to other children with HL in the study. (Camarata et al., 2018)

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INTERVENTION FOR FATIGUE

DISCUSSION QUESTION

What are things you do to feel less fatigued?

What should we do about fatigue?

- Rule out health problems
- Get moving (exercise)
- Strike a pose (yoga)
- Drink plenty of water
- Eat more often
- Go to bed early
- Go fish (eat fish)
- Keep in touch with your body clock
- Shed extra weight

https://www.webmd.com/balance/features/get-energy-back#3

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Fatigue Intervention

- **Cancer** (Berger et al., 2017; Wu et al., 2019; Yeh et al., 2011)
  - ***Physical activities:*** *aerobic exercise*, yoga, qigong**
  - ***Psychosocial interventions:*** *cognitive behavioral therapy (CBT)*, psycho-educational therapy*
  - ***Physical therapy:*** *acupuncture*, massage*
  - ***Bright white light therapy***
  - ***Mindfulness-based stress reduction****
  - ***Exergaming*** *(Oliveria et al., 2018)*
- **Chronic Fatigue Syndrome** (Cheshire et al., 2018)
  - *Guided Exercise Self-help booklet*
  - *Guidance from health care professionals*

VANDERBILT HEALTH

FATIGUE REDUCTION DIET

- 50% of all grains should be whole
  - At least 3 serving/day
- 5 servings of vegetables/day
  - 1 serving dark leafy green
  - 1 serving yellow or orange
  - 1 serving of tomato
  - 2 others or more of the above
- 2 servings of fruits/day
  - At least 1 serving high in vitamin C
  - 1 other or more of the above
- 2 servings/day
  - Fatty fish
  - Nuts and/or seeds
  - Oils

Diets high in antioxidants have been associated with lesser prevalence and severity of fatigue.

(Research on women with breast cancer)

Zick et al., 2017

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Fatigue Intervention

- **Multiple Sclerosis** (Wendebourg et al., 2017)
  - *Patient education programs (teaching ways to manage daily fatigue)*
  - *Cognitive-behavioral therapy*
- **Diabetes** (Menting et al., 2015)
  - *Cognitive-behavioral therapy*
    - Web-based + face-to-face sessions
- **Rheumatoid arthritis** (Katz, 2017)
  - *Increasing physical activity*
  - *Cognitive-behavioral therapy*

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CLASSROOM RECOMMENDATIONS

DISCUSSION QUESTION

If you note fatigue in your students with hearing loss, what do YOU do to intervene? What does the STUDENT do to intervene? Are parents aware?

Signs and Symptoms of Fatigue

tiredness
sleepiness in the morning
inattentiveness and distractibility
mood changes (irritability, frustration, etc.)
changes in classroom contributions
difficulty following instructions

Effects of Fatigue in the Classroom

- Reduced academic performance
- Increased school absences
- Inability to engage in usual daily activities
- Changes in social relationships
- Memory problems

Curcio, Ferrara & De Gennaro, 2006; Nagane, 2004; Stoff, Bacon & White, 1989

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Suggestions for Intervention

SCHOOL 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/RM system use
Preferential seating to potentially reduce listening effort
Visual information available in the classroom
Classroom acoustic modifications

No systematic interventions have been studied…YET!

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Classroom Strategies

- First step
  - *Talk to students with hearing loss about the concept of fatigue*
  - *Do they understand concept? Do they recognize signs and symptoms?*
- Utilize the VFS-CHL to determine if child has significant fatigue (coming soon!)
- Discuss management techniques with students and teachers
  - *What is feasible in the classroom setting?*
- Think long-term
  - *Employment*
  - *Social impacts*

Future Directions

- Following identification of fatigue, what **intervention** is systematically available?
  - "Listening break (2 minutes in duration) every hour to avoid fatigue."
  - "FM systems help with fatigue."

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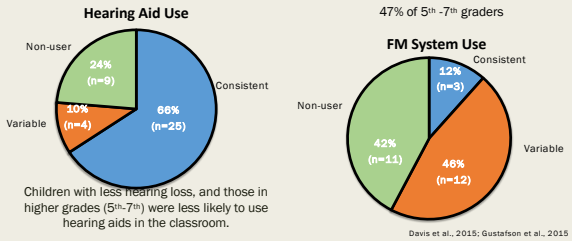
Device Use in the Classroom



Children with less hearing loss, and those in higher grades (5th-7th) were less likely to use hearing aids in the classroom.

FM system available?
89% of 1st - 4th graders
47% of 5th -7th graders

Davis et al., 2015; Gustafson et al., 2015

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Take Home Messages

- CHL are at increased risk for listening-related fatigue
- It is not simple to predict who report subjective fatigue; however, those with **additional disabilities** and **poorer language abilities** may show more problems with LRF.
- Systematic review of intervention strategies are necessary
  - *Common sense interventions*
- Make your patients, their parents, and educators aware of fatigue!

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Big Picture for Children with HL

- How can audiologists:
  - *better understand and find ways to counteract the factors underlying* ***why listeners may decide to quit participating in activities because it takes too much effort to listen***
  - *help listeners to* ***strategically employ their available cognitive capacity*** *in situations when it is hard to listen?*
  - ***prevent listeners from avoiding situations and withdrawing*** *from social participation because it is too hard to listen?*

THINK BEYOND THE AUDIOGRAM!

Pichora-Fuller et al., 2016

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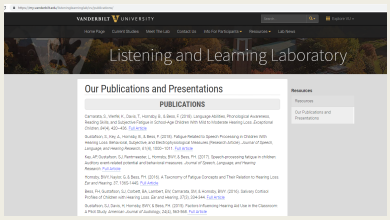
DISCUSSION QUESTION AND WRAP-UP

How would you talk about fatigue with a general educator? What resources would you share? If you note fatigue in a child with hearing loss, what will you do for that student?

Listening and Learning Lab Presentations and Publications



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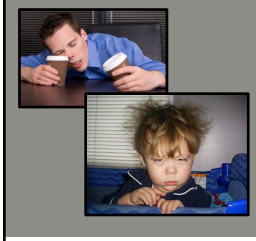
Questions? Comments?



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

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