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Subjective Fatigue in Children with Hearing Loss: Some Preliminary Findings

B.W.Y. Hornsby, K. Werfel, S. Camarata, F.H. Bess

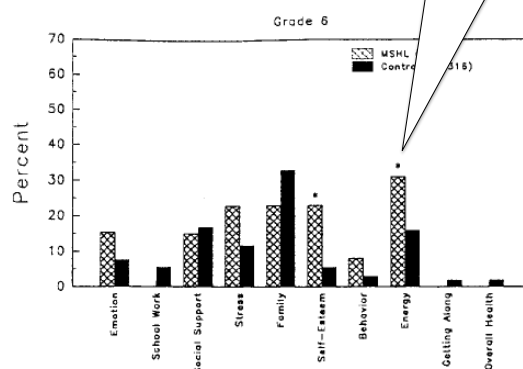
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<http://aja.asha.org>

A little background Children with Minimal Sensorineural Hearing Loss Prevalence, Educational Performance, and Functional Status

Fred H. Bess, Jeanne Dodd-Murphy, and Robert J. Bess



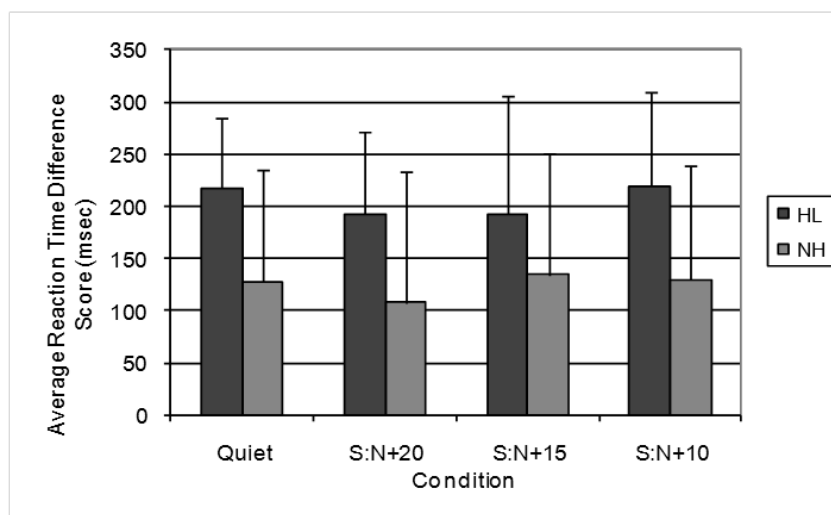
Children with MHL reported less energy than children with NH

A little background...

Assuming a limited effort capacity, performance on a secondary task will decrease when the primary listening task is made more difficult, regardless of whether primary-task performance is affected.

Listening Effort & Fatigue

C.B. Hicks & A.M. Tharpe (2002)



What they asked...

What is the effect of hearing loss on subjective reports of fatigue in school-age children?

What they did...

- 10 children with hearing loss (CHL) and 10 age-matched peers with normal hearing (CNH)
- Subjective ratings of fatigue using the PedsQL Multidimensional Fatigue Scale
- All had normal non-verbal intelligence
- CHL had poorer language abilities than CNH

What they did...

All Subjects:

- 10-13 years of age
- Age matched within ± 6 months

CHL Subjects:

- 5 who used bilateral hearing aids
- 4 who used cochlear implants
- 1 with unilateral hearing loss

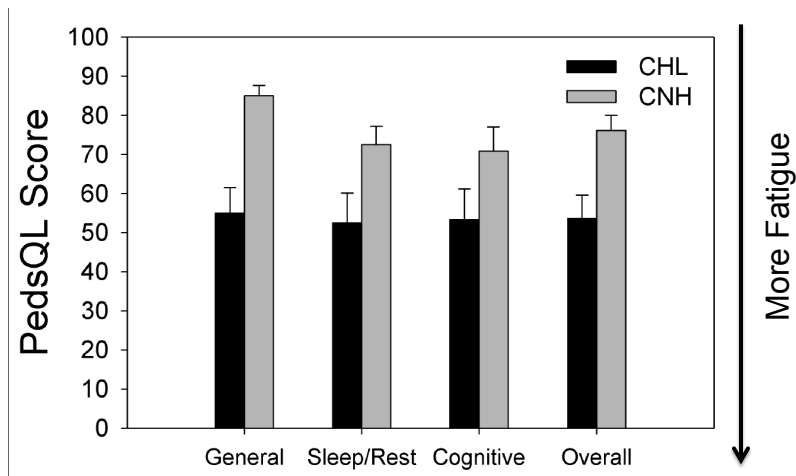
What they did...

Method:

PedsQL Multidimensional Fatigue Scale:

- General Fatigue (e.g., “I feel tired”)
- Sleep/Rest Fatigue (e.g., “I rest a lot”)
- Cognitive Fatigue (e.g., “It is hard for me to think quickly”)
- Composite Score

What they found...



Why is this important?

- The fatigue scores reported herein indicated more fatigue experienced by CHL than children with cancer, rheumatoid arthritis, diabetes, and obesity (Varni et. Al, 2002; 2004; 2009; 2010)
- These findings might underestimate the impact of HL on fatigue because the PedsQL does not include items for speech processing/listening effort

Why is this important?

- Fatigue can be caused by additional mental effort, which leads to increased stress and tension
- In adults, the extra effort was linked to increased rate of sick leave at work (e.g., Kramer et al., 2006)
- Fatigue is associated with a decreased ability to maintain attention and concentration, slower mental processing, and impaired decision making (e.g., van der Linden et al, 2003)
- Could fatigue in CHL be a mitigating factor in poor academic performance?

Predictors of Hearing Aid Use Time in Children with Mild-to-Severe Hearing Loss

E.A. Walker, M. Spratford, M.P. Moeller, J. Oleson, H. Ou, P. Roush, S. Jacobs

Language, Speech & Hearing Services in the Schools, v 44, 2013

What they asked...

What are the predictors of hearing aid use time in children with hearing loss? And, what are the challenges?

A little background...

- We now screen >95% of babies at birth (Russ et al., 2010)
- Early diagnosis of hearing loss leads to early intervention (hearing aid fitting) in many cases
- It is assumed that children who achieve consistent, full-time use of hearing aids will have better outcomes than children who do not – but this has not been explored

A little background...

- Some evidence that hearing aid use is inconsistent early in life, becoming more consistent with age (Moeller et al., 2009)
- Likely that some situations are more challenging than others and they vary by age

What they did...

Study 1:

- Part of the larger Outcomes of Children with Hearing Loss (OCHL) Study
- Parents of 272 children with permanent, bilateral, mild-to-severe HL

What they did...

Methods:

- HA Use Questionnaire
 - Completed regularly for up to 4 yrs
 - 2x/year for children <2 yrs; 1x/year for those > 2 yrs
- Parents estimated average amount of time their child used HAs per day during the week and on weekends
- Parents rated how often child wore HAs in 8 different listening environments

Environments:

Put an X in the boxes below to indicate how consistently your child uses HAs in the situations listed:

| Situation | Never (0) | Rare (1) | Sometimes (2) | Often (3) | Always (4) | N/A |
|-------------------------------------|-----------|----------|---------------|-----------|------------|-----|
| 10. Car | | | | | | |
| 11. PreSchool/School | | | | | | |
| 12. Day Care | | | | | | |
| 13. Meal Time | | | | | | |
| 14. Playing Alone | | | | | | |
| 15. Book Sharing | | | | | | |
| 16. Playground | | | | | | |
| 17. Public (store, zoo, restaurant) | | | | | | |

What they found...

- On average, parents reported children wore HAs ~ 10.5 hrs/day during week days and ~10 hrs/day during weekends
- Longer HA use time associated with older age, poorer hearing, and higher maternal education level

What they found...

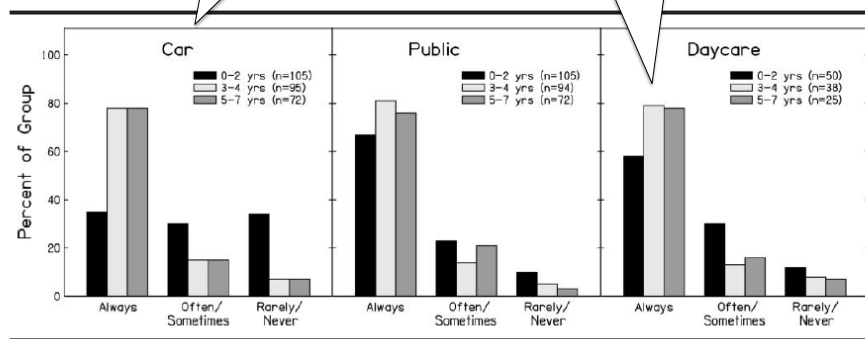
Parameter estimates indicated:

- For every 10-dB increase in better ear PTA, the average HA use time increased by .50 hr
- For every 10-mo increase in age, average HA use time increased by .71 hr
- Mothers who had obtained a college degree had children with the most HA use time compared to mothers with other educational backgrounds

Only 35% of parent of infants responded that they used HAs in the car compared to 78% of parents of preschoolers and school-age children.

58% of parents of infants reported they "always" wore HAs at daycare compared to 79% of preschoolers and 76% of school-age children.

Figure 1. Ratings for consistency of hearing aid (HA) use in the car, in public, and at daycare in relation to age.



On average, more consistent HA use in public and at school for children who had a better-ear PTA ≥ 50 dB

Figure 2. Consistent HA use in public and at school in relation to better-ear pure-tone average.

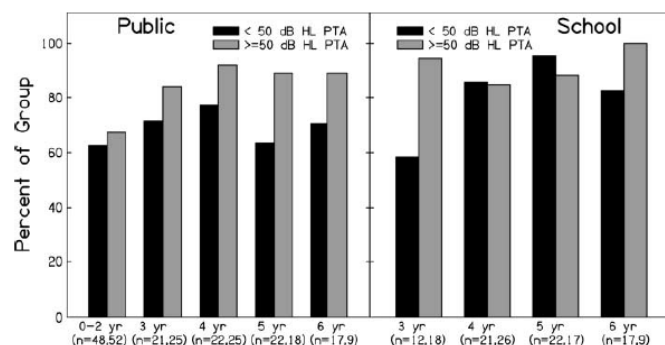
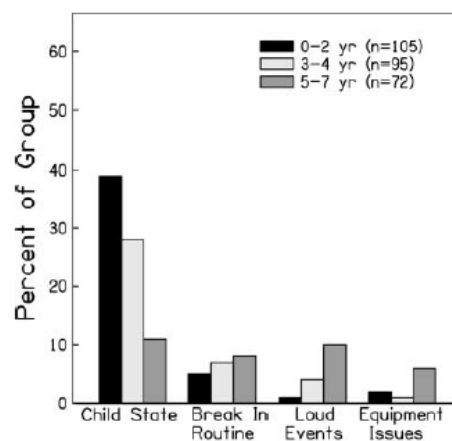


Figure 3. Reports about challenges to consistent HA use in relation to age.



What they did...

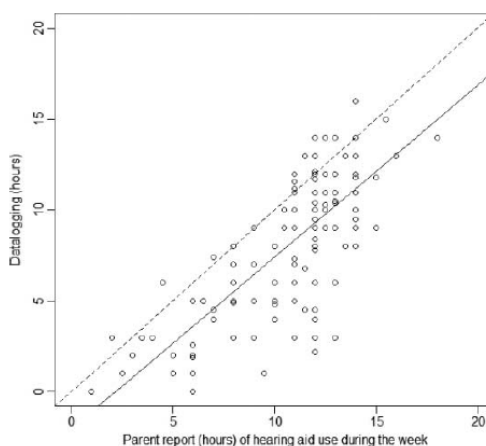
Study 2:

- Examined accuracy of parental estimates of average HA use time for their children
- Compared parent report to objective datalogging measures
- Parents were unaware that the datalogging feature was being used

What they found...

- 84% of parents overestimated their child's HA use time
- 16% either underestimated or were accurate in their estimations
- On average, parents reported 10.8 hrs/day of use and datalogging indicated 8.3 hrs/day
- The older the child was, the smaller the expected difference would be between parents' estimates and datalogging

Figure 4. HA use time by parent report and datalogging. The solid line represents the regression line; dotted lines represent the 95% confidence intervals.



Why is this important?

May be important to convey these challenges to parents with young children – things will get better

Why is this important?

- Counseling for parents of children with milder losses
- Providers should recognize that most parents will over estimate HA use time – datalogging might be helpful in monitoring use of HAs, especially with young infants and children

The Future Role of Genetic Screening to Detect Newborns at Risk of Childhood-Onset Hearing Loss

L.L. Phillips et al.

International Journal of Audiology,
52, 2013

A little background...

- HL is the most common birth defect in developed countries
- Permanent HL of \geq moderate degree is present at birth in about 1.6 per 1000 live births
- At least 2/3 of these losses have a genetic cause
- ~70% of those with genetic causes are non-syndromic

What they asked...

What is the future potential of genetic screening to detect newborns at risk of childhood hearing loss?

What they did...

Expert-led discussion of current and future developments in genetic technology and the knowledge base of genetic hearing loss to determine the viability of genetic screening

What they concluded...

- Technology will likely yield the possibility of entire genome sequencing within 10 years
- Little commercial interest in developing genetic diagnostic assays for HL compared to other conditions with a genetic basis. Why?
 - No commercially produced therapeutic interventions that could be linked to a diagnostic test
 - There is a need to standardize interpretation of genetic tests across geneticists

What they concluded...

- Genetics cannot be reliably used in a screening capacity for HL until more is known about the genes involved and clinical significance. That is,
- We can determine if asymptomatic newborn has a mutation in genes known to cause HL, but we can't always know whether individual will experience HL in the future

What they concluded...

- Current methods of DNA analysis require 2-5 mls of blood – unacceptable for a newborn screen
- Whole genome sequencing would require extensive data processing and storage requirements

Why is this important?

- What about incidental findings?
 - If whole genome is sequenced, is there an ethical/moral obligation to report all mutations that could give rise to future genetic diseases?
- Cautioned decision makers to resist the pressure to adopt genetic technologies until such time when potential benefits of this information are more certain, outweigh the harms, and can be obtained at a reasonable cost