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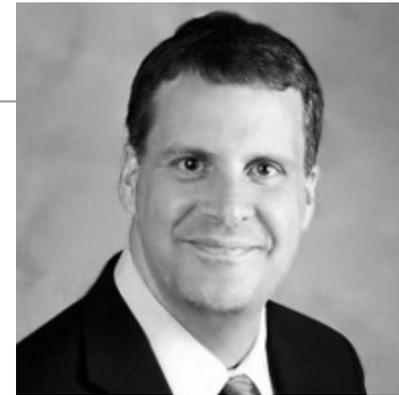
Vanderbilt Audiology Journal Club: Hearing Aid Technology for Practicing Audiologists

Erin M. Picou, AuD, PhD

Todd A. Ricketts, PhD

Gus Mueller, PhD





Todd Ricketts, PhD

Todd A. Ricketts, Ph.D., Professor and Vice Chair, department of Hearing and Speech Sciences, Vanderbilt University Medical Center. He is the Director of the Dan Maddox Memorial Hearing Aid Research Laboratory. He has published more than 100 articles, books and book chapters including the recently published textbook, *Essentials of Modern Hearing aids* with his co-authors Gus Mueller and Ruth Bentler. He has also provided over 300 presentations both nationally and internationally. He continues to pursue a very active federally and industry funded research program studying the interaction between hearing aids and other hearing assistive technologies, listening environment, and individual differences as they impact the listening and communication experience. In addition, current work also focuses on enhancing cost-effectiveness and efficiency in hearing health care while maintaining high quality. He is a Fellow of the American Speech-Language Hearing Association (ASHA), past Editor of *Trends in Amplification* and the *Journal of Speech Language and Hearing Research*, and a past member of the American Academy of Audiology board of directors. He is currently vice-chair of American National Standards Institute (ANSI) S3 (Bioacoustics) committee. He is also a current member of the International Collegium of Rehabilitative Audiologists (ICRA). In addition to his research and service, Todd teaches and mentors students at Vanderbilt.



Erin Margaret Picou, AuD, PhD

Erin Picou, PhD, CCC-A, is an associate professor in the Department of Hearing and Speech Sciences at Vanderbilt University Medical Center. She has been working in the Dan Maddox Hearing Aid Research Laboratory since she was an AuD student. After completing her Ph.D. (also at Vanderbilt) she was hired to a research faculty position. She now directs the Hearing and Affect Perception Interest (HAPI) laboratory, which focuses on speech recognition, listening effort, and emotional perception for adults and school-aged children. This work continues to be supported through a variety of industry and federal funding sources. In addition to her research activities, Erin is involved with teaching and mentoring clinical and research graduate. Erin is currently serving as section editors for the *American Journal of Audiology and Ear and Hearing*.



H. Gustav Mueller, PhD

Dr. H. Gustav Mueller holds faculty positions with Vanderbilt University, the University of Northern Colorado and Rush University. He is a Contributing Editor for AudiologyOnline, a consultant for WS Audiology, and a consulting editor for Plural Publishing. Dr. Mueller is a Founder of the American Academy of Audiology and a Fellow of the American Speech and Hearing Association. He has published extensively in the areas of diagnostic audiology and hearing aid applications, and has co-authored ten books on hearing aids and hearing aid fitting, including the recent three-volume Modern Hearing Aids series, and the clinical handbook Speech Mapping and Probe Microphone Measures. Gus is the co-founder of the popular website www.earTunes.com, and resides on a North Dakota island, just outside of Bismarck.



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Learning Outcomes

1. List new key journal articles on the topic of hearing aids that have implications for audiology clinical practice.
2. Describe the purpose, methods and results of new key journal articles on hearing aids that have implications for audiology practice.
3. Explain some clinical takeaway points from new key journal articles on hearing aids.



A look back to our first year . . .

The “hot topic” in hearing aids:

- Dead regions and frequency lowering

And then there was this article:

- Real-world benefit from directional microphone hearing aids. Gnewikow D, **Ricketts T**, Bratt G, Mutchler L.



Today's Spotlight

- Hearing aid adoption
- Hearing aid use
- Hearing aid follow-up care
 - Benefits and alternative interventions
- Technology
 - Patient preferences and outcomes

Factors Affecting Hearing Aid Adoption by Adults With High- Frequency Hearing Loss: The Beaver Dam Offspring Study

Jacqueline M. Weycker, Lauren K. Dillard, Alex Pinto, Mary E. Fischer, Karen J. Cruickshanks, and Ted S. Tweed

American Journal of Audiology • Vol 30 • 1067-1075, 2021

What they asked...

- What is the 10-year incidence of hearing aid adoption among adults with high-frequency hearing loss?
- What factors are associated with hearing aid adoption?

A little background...

- Hearing loss is common in middle-aged adults; prevalence is 20.6% in adults 48 – 59 years old
 - (Cruickshanks et al., 2010)
- Hearing loss is associated with communication difficulties and psychosocial consequences
 - (Chia et al., 2007; Dalton et al., 2003)
- Hearing aids can improve communication and quality of life
 - (Chisolm et al., 2007)
- Hearing aid adoption rates are low; between 8-36%
 - (Fischer et al., 2011; Gopinath et al., 2011)

A little background...

- Factors associated with hearing aid adoption include:
 - Severity of hearing loss
 - (Dillard et al., 2021; Fischer et al., 2011; Gopinath et al., 2011)
 - Higher socioeconomic status
 - (Fischer et al., 2011; Bainbridge & Ramachandran, 2014)
 - Health-related factors
 - (Gopinath et al., 2011)
 - Lifestyle and leisure activities
 - (Fischer et al., 2015)

Why it matters...

- Few studies focused on middle-aged adults, yet we know they also have hearing loss
- Because hearing loss often starts in middle age, it would be helpful to identify factors related to hearing aid adoption in younger ages
- Those with hearing aid experience are more likely to continue use
 - (Dillard et al., 2021)
- Understanding hearing aid adoption in middle-aged adults with high-frequency hearing loss may improve clinical decision-making regarding hearing aid candidacy and counseling

What they did...

- Examined data in the Beaverdam Offspring Study (BOSS)
 - Ongoing, longitudinal cohort study of middle-aged adults
 - Adult offspring of people who were in the Epidemiology of Hearing Loss Study (ELHS; 1993 – 2020; Cruickshanks et al., 1998, 2010)
- Participants
 - Baseline in 2005 – 2008 (n = 3,298, mean age = 56 yrs)
 - Follow-ups occurred every 5 and 10 years
 - 85% participation rates
 - Had HFPTA (3, 4, 5, 8 kHz > 25 dBHL)

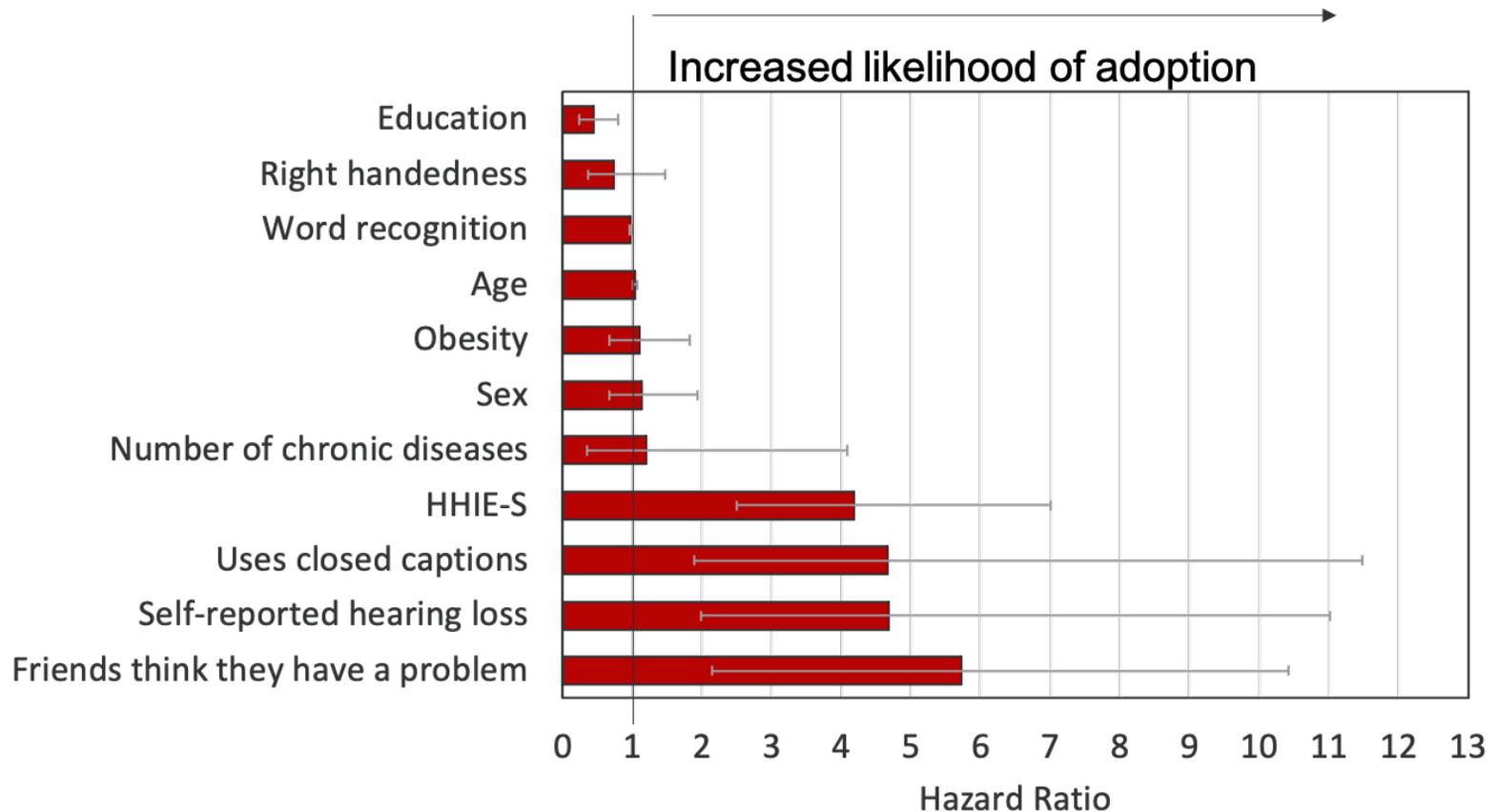
What they did....

- BOSS data
 - “Have you ever worn a hearing aid or amplifying device?”
 - Audiometry (pure-tone thresholds, word recognition scores)
 - Hearing-related covariates
 - Self-reported hearing loss
 - History of noise exposure
 - Use of assistive technology (amplified telephone, television)
 - Use of closed captions
 - Difficulty in certain situations
 - Tinnitus
 - Hearing Handicap Inventory-Screening

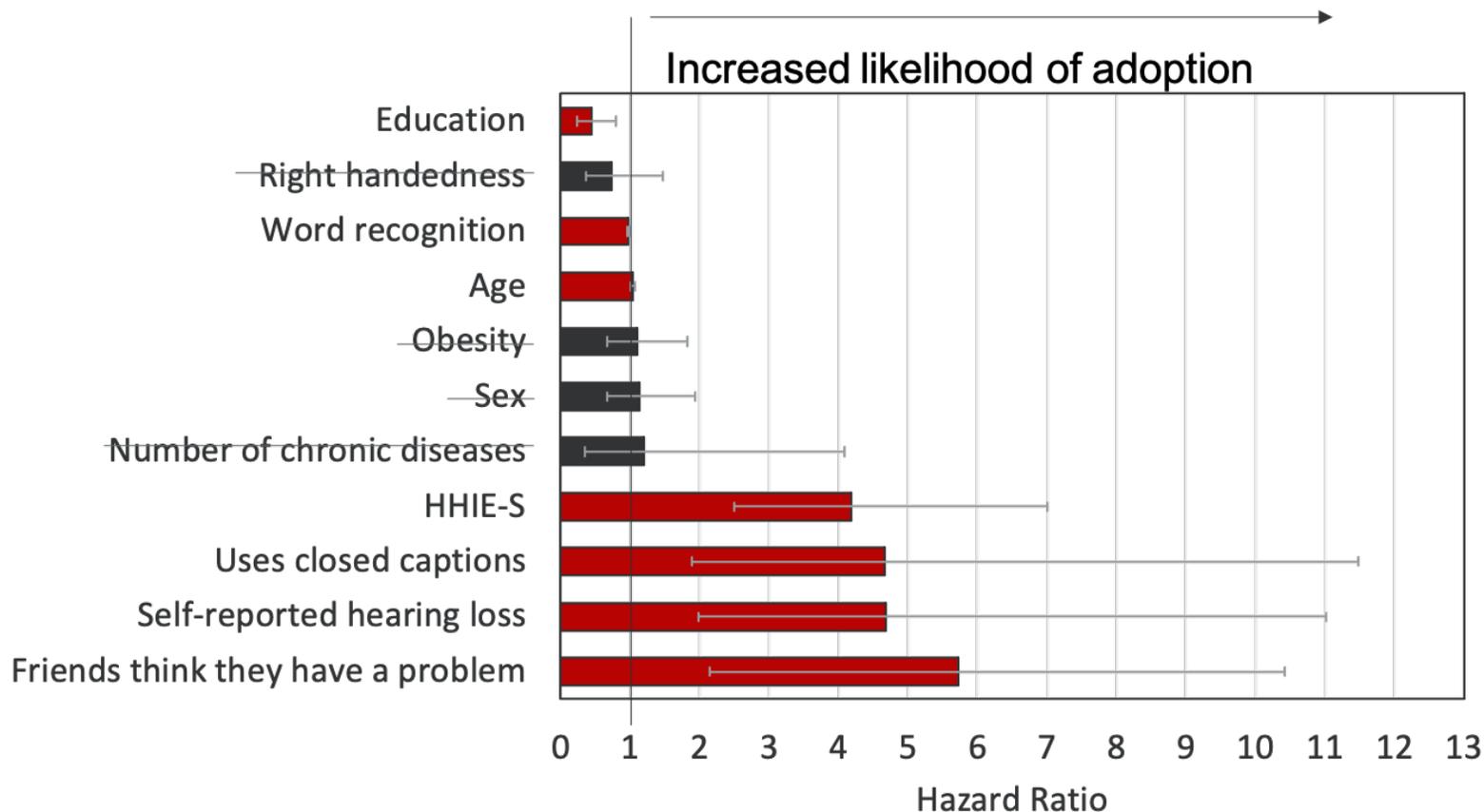
What they did....

- BOSS data (continued)
 - Demographic covariates
 - Age, sex, gender
 - Lifestyle covariates
 - Education, co-habitants, marital status, employment, handedness
 - Health covariates
 - Body mass index, number of chronic diseases
- Statistical analysis
 - Calculated hazard ratios to determine factors associated with hearing aid adoption

What they found...



What they found...



What they found...

- Hearing aid adoption rates were low (14/1,000)
- Hearing aid adoption increased for
 - More severe high-frequency hearing loss
 - Higher education
 - Self-reported hearing handicap (>8 HHIE-S)
 - Those using closed captions
 - Those whose friends/relatives notice a hearing problem

Why this is important...

- High frequency hearing loss is common and modern hearing aid technology allows us to fit these losses
- Demographic variables minimally related to adoption (age, sex, gender)
- Social and emotional effects of hearing loss (HHIE-S score) was better predictor than self-reported hearing loss or PTA
 - The consequences of hearing loss motivate hearing aid adoption

Why this is important...

- Other important signs that someone might be more likely to adopt hearing aids
 - Closed caption use
 - Television / movies important for many adults
 - (Depp et al., 2010; Hasan et al., 2014)
 - Friends think they have a hearing loss
 - Speaks to importance of social support for hearing aid adoption
 - (Singh et al., 2015, 2016)

Does it matter clinically?

- Yes
- Be on the look out for
 - High HHIE-S scores
 - Use of closed captions
 - Reporting friends say they have difficulty
- Remember, these results are limited to a specific population
 - Middle-aged adults
 - High-frequency hearing loss
 - Offspring enrolled in a longitudinal study

Electronic Health Records As a Platform for Audiological Research: Data Validity, Patient Characteristics, and Hearing-Aid Use Persistence Among 731,213 U.S. Veterans

Gabrielle H. Saunders, Lauren K. Dillard, Oliver Zobay, John B. Cannon, and Graham Naylor

Ear and Hearing • Vol 42 • 927 - 940, 2021

What they asked...

- Are there associations between hearing-related and health-related variables?
- Can we use large-scale, electronic health records as databases for answering useful clinical and scientific research questions?

A little background...

- We don't fully understand the factors that go into hearing aid adoption / use (e.g., Weycker et al., 2021)
- Electronic health records are a potentially useful set of data that are accessed regularly by healthcare providers
- Large data sets can be powerful
- Electronic health records research is relatively rare
 - Zapala et al. (2010) – Medicare records to evaluate safety risks for audiology referrals
 - Wilson & McArdle (2013) – documenting noise notches in clinical audiograms in the VA system
 - Singh & Launer (2016) – evaluating hearing aid adoption with (or without) presence of significant other

Why it matters...

- First stage of a project using health records in the VA system
 - Diverse array of diagnostic, care process, and outcome variables.
- Eventually, can elucidate previously unnoticed clinically significant connections
- Basis for future research on predictors of hearing care outcomes and general health
- Explore relationship between health and hearing aid use persistence among veterans

What they did...

Data table in dataset	Records comprised of	Source	Date range
Demographics	date of birth, date of death, gender	CDW	Jan 2007 to Dec 2017
Outpatient diagnoses	date and time diagnostic code assigned	CDW	Jan 2007 to Dec 2017
Outpatient procedures	CPT code, date and time procedural code assigned	CDW	Jan 2007 to Dec 2017
Inpatient stays	admission and discharge dates, primary and secondary diagnosis	CDW	Jan 2007 to Dec 2017
Audiometry	date of examination, AC thresholds 250-8000 Hz, BC thresholds 250 - 4000 Hz	HLR	April 2012 to October 2014
Hearing aid orders	date of order, new/experienced, BTE/TE/RIC, right/left/both	ROES	April 2012 to October 2014
Battery orders	date of order	ROES	April 2012 to December 2017
IOI-HA	date of completion, date of entry into ROES, individual item scores	ROES	April 2012 to March 2015

What they did...

- Extensive data cleaning
 - Details provided in supplemental material
 - Missing data, non-numerical data
- Defined outcome measure
 - Hearing aid use persistence
 - Duration of time from initiation to discontinuation of therapy or the portion of patients still continuing therapy after given amount of time
 - Not confounded by audiologist recommendation
 - Who is still using hearing aids 24 months post-fitting?

What they found...

- Sample of patients who ordered hearing aids between April 1, 2012 and October 31, 2014
- 731,213 patients with a HA order
 - 53% new users ($M = 70.6$ years)
 - 47% experienced users ($M = 75.7$ years)
- 98.4% male
- 91.0% bilateral
- 43.7% receiver-in-the-canal hearing aids
- 26.4% behind-the-ear hearing aids

What they found...

- Hearing aid use persistence, based on battery orders...
 - 63.3% at 24 months
 - Higher than persistence of treatments for other conditions
 - Asthma, psoriasis, COPD, Type 2 diabetes, hypertension
- Hearing aid outcomes, based on IOI-HA...
 - Response rate was low (20.1%, $n = 146,699$)
 - Not mandatory
 - Generally high ($M = 28.8$, on 7 – 35 scale)

What they found...

- Data validity, based on comparisons to published literature
 - IOI-HA scores similar, but slightly higher
 - Socialized medicine, advancements in technology
 - Confirmed moderate relationship between self-perceived difficulty and audiometric thresholds
 - Confirmed relationship between age and hearing loss

What they found...

- Experience matters
 - Persistence lower for new hearing aid recipients than for experienced hearing aid users
- Age matters
 - Persistence lower for 60-69 year olds than for older patients
- General health matters
 - Persistence lower for those with higher multimorbidity index scores
 - More impactful for new hearing aid users

Why this is important...

- Establishing Veteran's Administration electronic health record as a rich source of clinical data for research
- Documenting hearing aid persistence (~63%)
- Demonstrates some interesting relationships between hearing aid use and predictive factors
 - Age
 - Experience
 - General health
 - Experience/general health

Does it matter clinically?

- Be on the look out for more in-depth analyses from this research team
- Big data sets are a powerful way to answer questions
- Both reveal and hide nuance
 - Detect small differences
 - Ascertainment bias
 - Meaningfulness of ‘missing’ data
- Veteran’s Administration is a specific healthcare setting, so more work is necessary to determine the generalizability of the findings

Targeted Re-Instruction for Hearing Aid Use and Care Skills

Carly C. M. Alicea and Karen A. Doherty

American Journal of Audiology • Vol. 30 • 590–601, 2021

What they asked...

- Can targeted re-instruction improve hearing aid wearers use and care skills compared to standard of care?
- The also asked if memory function, hearing handicap, and hearing aid–related attitudes might affect HA use and care skills.



A little background...

- Adults with poorer working memory capacity struggle more with hearing aid use and care (Desjardins et al., 2019).
- Patient's level of hearing handicap and attitude toward hearing loss and hearing aids are significantly related to motivation to take action for hearing problems (Alicea and Doherty, 2017).
- There are several tools clinicians can use to assess hearing aid use and care skills (Desjardins & Doherty, 2009; Dillon et al., 1999; Doherty & Desjardins, 2012; Kemker, 1999; West & Smith, 2007).

Why it matters...

KNOWN KNOWNS

I know...

KNOWN UNKNOWNNS

I know I don't know...

UNKNOWN KNOWNS

I don't know, but
somebody does...
and they ain't tellin'

UNKNOWN UNKNOWNNS

Who would have thunk?

- A lot of information is presented during a hearing aid orientation, and we know people struggle to remember it (Margolis, 2004), with between 40% and 80% of medical information forgotten immediately (Kessels, 2003) and half of the recalled information remembered incorrectly (Kessels, 2003; Margolis, 2004).
- 96% of experienced hearing aid users report that they know how to use their hearing aids, but only 48% can actually demonstrate these skills (Desjardins and Doherty, 2009).
 - They don't know what they don't know.
- Targeting specific skills can provide more limited information and focus on the specific problem areas.

What they did...

- 13 older adults (60-85, mean = 71 yo), without hearing aid experience were randomly assigned to receive targeted reinstruction at fitting and at the two-week follow-up (based on the Practical Hearing Aid Skills Test–Revised; PHAST-R) and 13 did not receive targeted re-instruction (26 total).
- All had normal cognitive function, finger dexterity function, normal or corrected normal vision and were fit with HAs and provided a standard orientation.
- All were administered the Hearing Handicap Questionnaire (HHQ; Gatehouse & Noble, 2004) and the Hearing Attitudes in Rehabilitation Questionnaire (HARQ; Hallam & Brooks, 1996), prior to the fitting and 4-weeks post-fit.
- Hearing aid use and care skills were assessed at the fitting and 4 weeks post-fitting using the Hearing Aid Skills and Knowledge (HASK) test (Saunders et al., 2018) - developed by adapting a combination of the PHAST-R and the Hearing Aid Probed Recall Inventory (HAPRI) – skills, troubleshooting skills, knowledge of hearing aid use and care.

What they did...

- The PHAST-R is a clinician administered survey that asks hearing aid users to demonstrate 8 hearing aid use and care skills:
 - inserting the hearing aid
 - removing the hearing aid
 - opening the battery door
 - changing the hearing aid battery
 - Cleaning the hearing aid
 - changing the volume
 - using the hearing aid with the telephone
 - using the noise program or directional microphones
- Targeted reinstruction based on: 2 performed correctly with no difficulty, 1 performed with one or more mistakes (including deviant means), 0 could not perform the task at all.

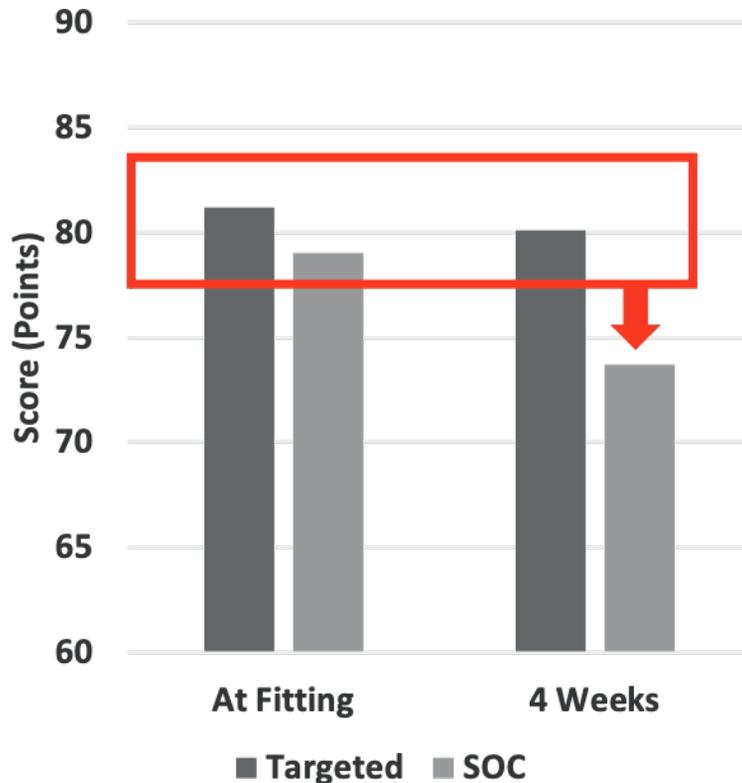
What they found...

- All 13 participants needed targeted reinstruction at fitting, and 12 of 13, at the two-week follow-up.
 - The PHAST-R scores were not significantly different at these two time points.
- Administering the PHAST-R took 4-18 minutes (Mean = 9 minutes).
- Working memory, hearing handicap, and HA-related attitudes were not correlated with HA use and care skills.
- Significant differences in use and skills outcomes between groups at 4 weeks, but not knowledge outcomes (although a similar trend).

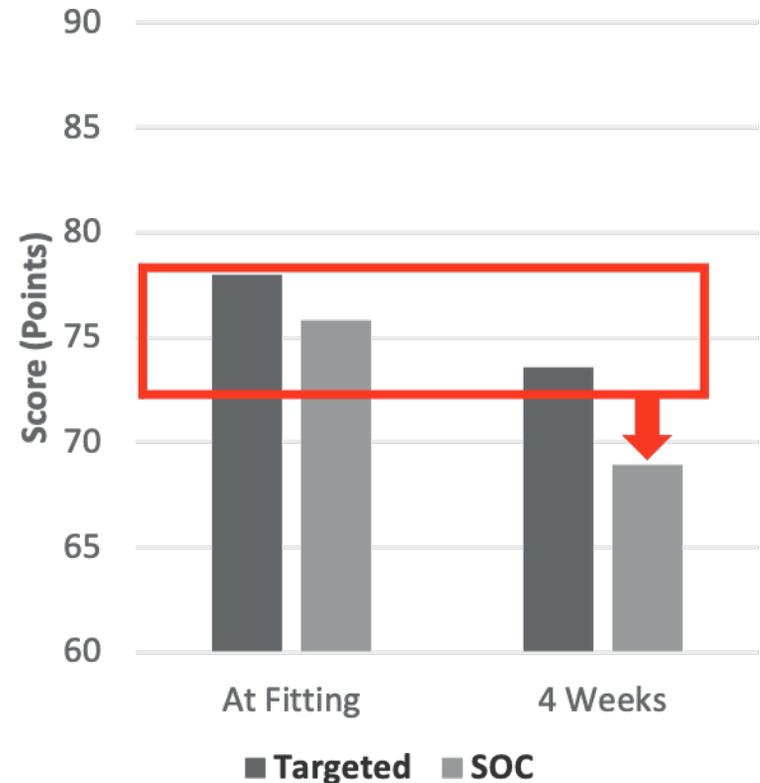
What they found...

Without PHAST-R targeted training, use and care skills declined! Specifically, microphone port cleaning, activating the phone program, changing the wax trap.

HASK Targeted Skills



HASK Skills Subtest



What they found...A few more details

When you start talking about the known knows and the unknown unknowns, you're thrown into a crazy meta-level discussion. Do I know what I know, do I know what I don't know, do I know what I don't know I don't know. It becomes a strange, Lewis Carroll - like nursery rhyme.

Errol Morris

- Those with received targeted reinstruction showed a 23% improvement on microphone port cleaning and wax trap changing tasks, while SOC group decreased by 38% and 23% on these tasks.
- Switching to the phone program was difficult for both groups, but less so for those that received targeted reinstruction (successful completion 39% versus 8%).
- After the 4-week trial, all reported that they could use their hearing aids well; however, they were unable to perform several of the basic use and care skills.
 - Still some unknown unknowns...

Why is this important...

- This study demonstrates that it is possible to target hearing aid user skills in individuals to improve training and (potentially) its' efficiency.

What I found looking for
unknown unknowns....

Does it matter clinically?

- Hearing aids continue to evolve and require user skills that are often a challenge for patients.
- The PHAST-R is currently being updated to include additional required skills for modern hearing aids (e.g. recharging).
 - Moving unknown unknowns to known knowns!
- A targeted training approach may provide individual patients improved use and care skills (compared to current abilities) in a manner that is clinically viable from a time efficiency standpoint.

Related research in brief

- More data supporting benefits, but challenges with follow-up care remain.
- Self-reported hearing aid problems decrease significantly after a follow-up appointment; however, long travel can be a barrier to these benefits.
 - Bennett, R. J., Kosovich, E., Cohen, S., Lo, C., Logan, K., Olaithe, M., & Eikelboom, R. (2021). Hearing Aid Review Appointments: Attendance and Effectiveness. *American Journal of Audiology*, 30(4), 1058-1066.
- A mobile, multi-media intervention (M-Health) is feasible and beneficial for use in the self-management of hearing aids.
 - Ferguson, M. A., Maidment, D. W., Gomez, R., Coulson, N., & Wharrad, H. (2021). The feasibility of an m-health educational programme (m2Hear) to improve outcomes in first-time hearing aid users. *International Journal of Audiology*, 60(sup1), S30-S41.
- Teleaudiology follow-up appointments are beneficial and provide similar improvements to face-to-face appointments.
 - Tao, K. F., Moreira, T. D. C., Jayakody, D. M., Swanepoel, D. W., Brennan-Jones, C. G., Coetzee, L., & Eikelboom, R. H. (2021). Teleaudiology hearing aid fitting follow-up consultations for adults: single blinded crossover randomised control trial and cohort studies. *International journal of audiology*, 60(sup1), S49-S60.

Going down memory lane



The perceptual limitations of troubleshooting hearing aids based on patients' descriptions

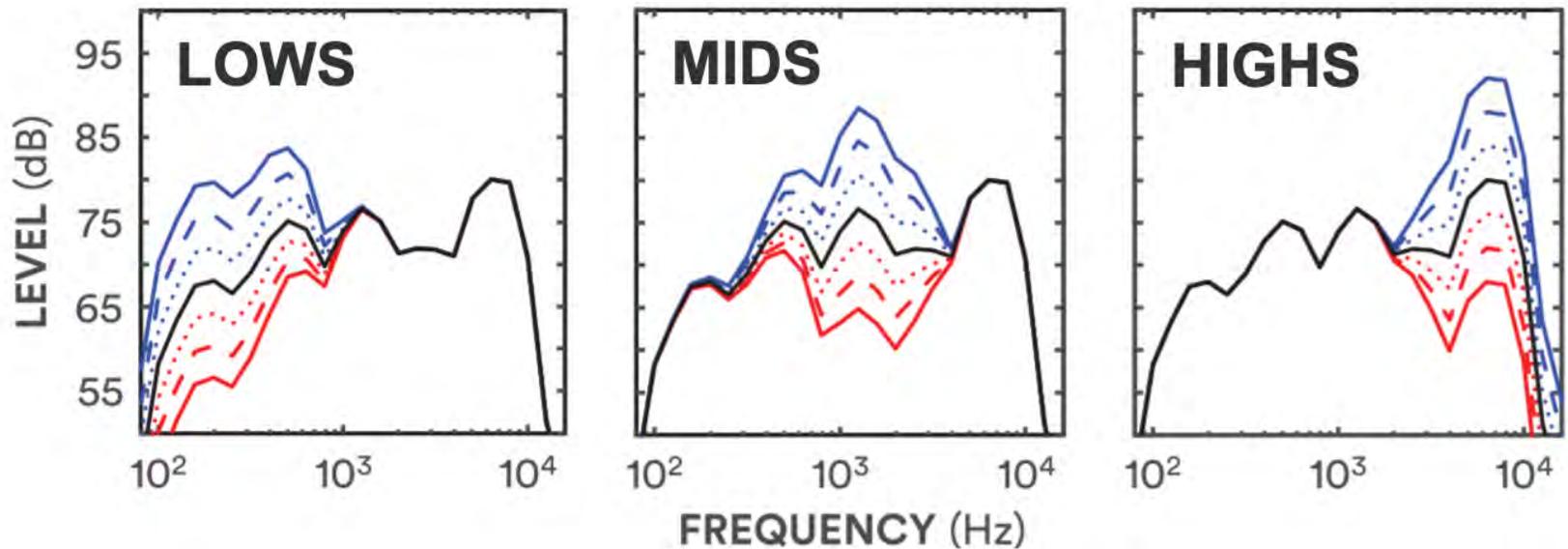
Benjamin Caswell-Midwinter & William Whitmer

International Journal Audiology, 2021, 60 (6):427-437

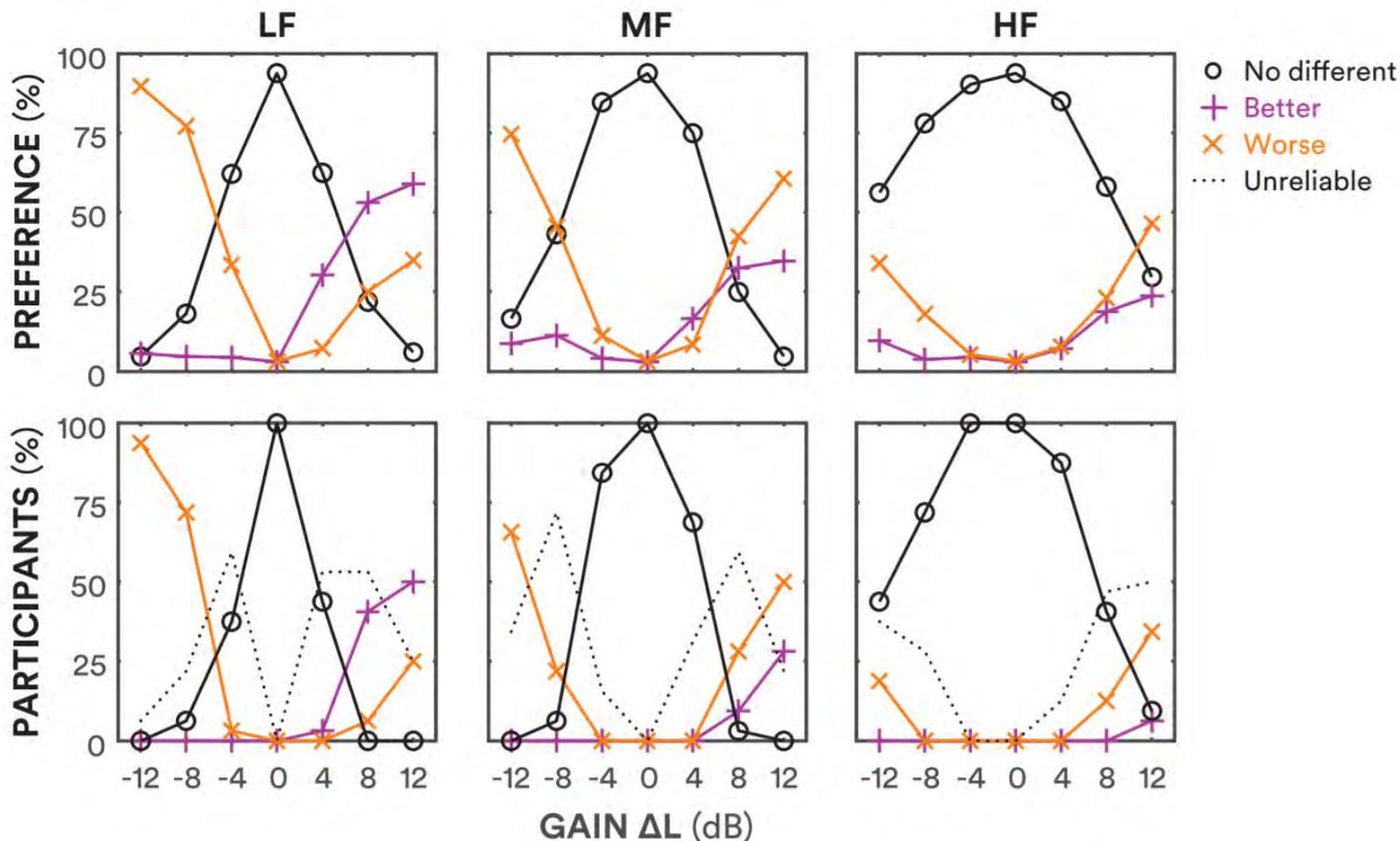
What they did:

- Experienced hearing aid users (n=32), listening to speech, made judgements (better, worse, or the same) regarding changes in gain in the filtered speech signal, relative to their target-prescribed gain.
- There were 18 experimental adjustments. These were both increments and decrements of 4 dB, 8 dB and 12 dB for three different frequency bands: low frequency, mid-frequency and high frequency.
- There also were three “control” adjustments, where the speech signal was not changed (0 dB for all three bands). Participants compared each adjustment to their standard target fitting 10 times, totaling 210 comparisons.

Degree of change for three test regions

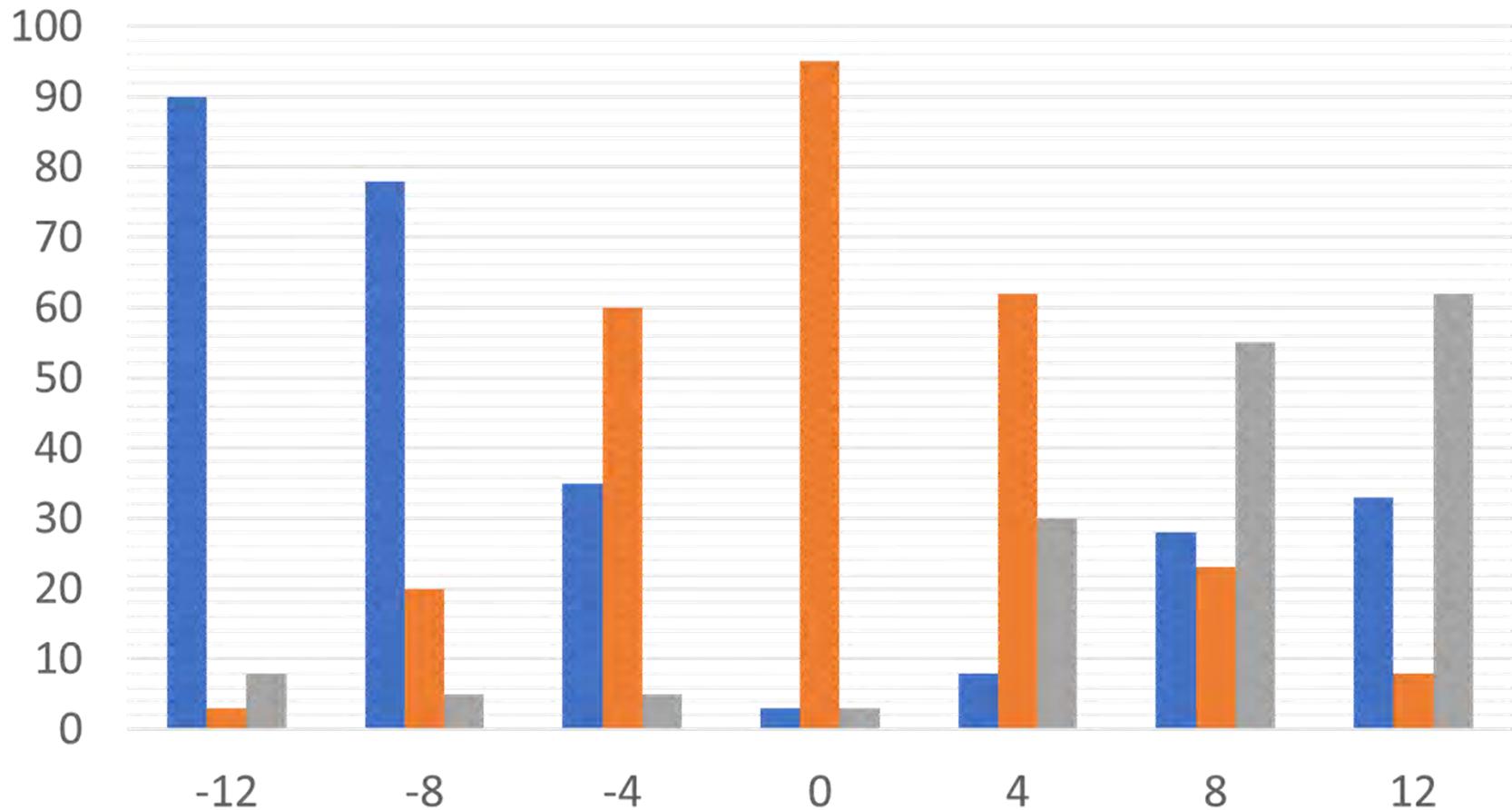


Preferences as function of dB change



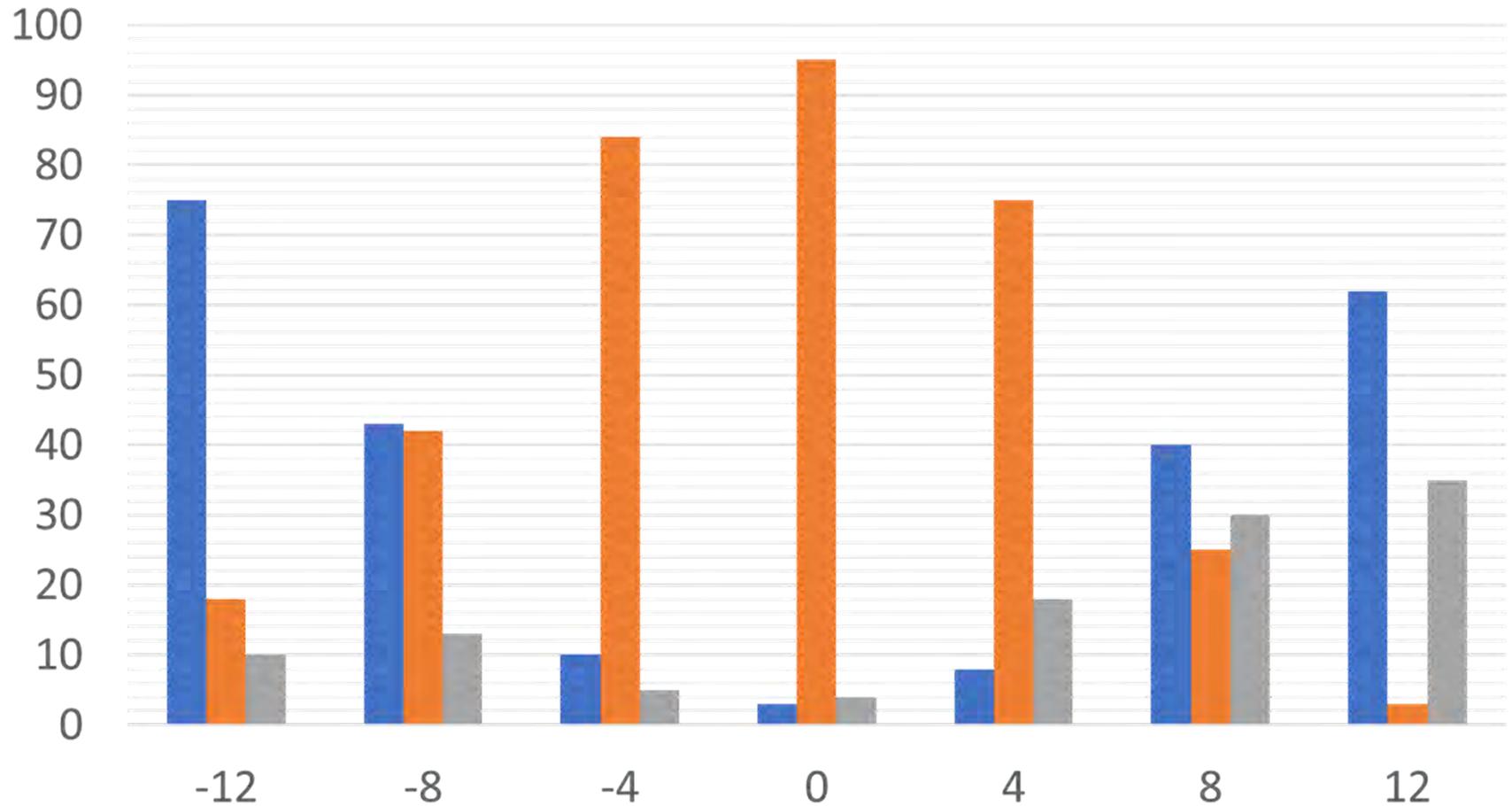
Low Frequencies

■ Worse ■ Same ■ Better



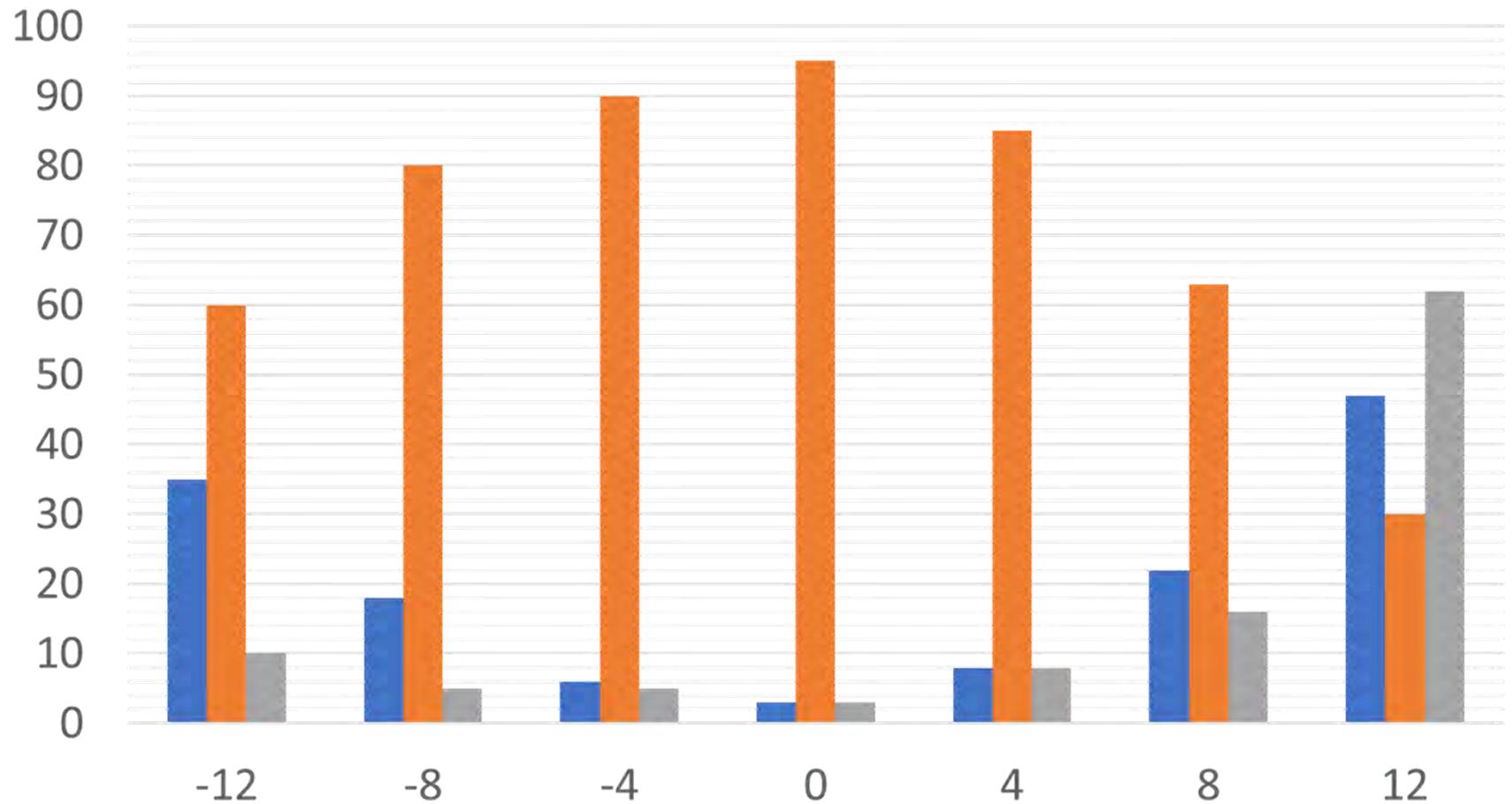
Mid Frequencies

Worse Same Better



High Frequencies

Worse Same Better



Does this matter clinically?

- The smile that you put on the patient's face simply may be due to a "Placebo Effect", a "Halo Effect," or random luck, and not at all reflective of a true improvement in the processing of the hearing aids.

Effect of Hearing Aid Technology Level and Individual Characteristics on Listener Outcome Measures.

Plyler, Hausladen, Capps & Cox (2021). Effect of Hearing Aid Technology Level and Individual Characteristics on Listener Outcome Measures. Journal of Speech, Language, and Hearing Research, 64(8), 3317-3329.

What they asked...

- Does hearing aid technology level affect hearing aid outcomes?
- Are individual patient factors (i.e. noise acceptance, listening environment) related to outcomes and/or preference?

A little background...

- Modern hearing aids vary a lot in the sophistication of their processing (often described by “technology level”), and this is often used to justify large differences in cost.
- However, studies have provided little evidence to suggest premium hearing aids lead to better average outcomes in daily life as measured by subjective outcomes (e.g. Cox et al., 2016; Wu et al., 2019).
 - Although a lot of lab data and targeted survey data!
- Despite the lack of group outcome differences, nearly all the participants in these same studies reported technology level preferences (blinded), with approximately half indicating a definite preference (Cox et al., 2016).

Why it matters...

Understanding the affects of technology level on patient preferences and outcomes is a critical factor in evidenced based technology selection. Particularly given the impact of technology level on cost to the patient.

What they did...

- 24 older adults (average 75 years; range: 64–86 years) with hearing aid experience.
- Two, 2-week trials with a single hearing aid (Unitron T Moxi Fit FLEX) programmed with basic or premium technology levels (single blinded, repeated measures).
 - Fitted to NAL-NL2 targets
- Aided outcomes included hearing aid determined listening environment and program, high frequency speech in quiet, speech (front) in noise (back) at low and high noise levels, SNR acceptance (Acceptable Noise Level – speech level fixed at 65 dB SPL), and subjective ratings (Speech, Spatial and Qualities of Hearing short form (SSQ-12), satisfaction ratings, preference) after each trial.

Level of Technology...

- As is typical, the Premium Programming included more automatic and environment specific setting differences than the Basic Programming (e.g. Sophistication in setting different strengths of processing based on specific environment factors – 7 environments versus 3).
- In addition, this specific premium programming included additional processing aimed at reducing the distortion of natural binaural cues commonly associated with some hearing aid processing (not available if in the Basic Programming).



What they found... Group Differences

- There were no significant differences in speech recognition in noise or quiet in the lab across the two technology levels.
 - Not terribly surprising given a single noise loudspeaker behind and the same audibility (e.g. fitted to the same targets).
- There were no significant differences in subjective ratings as measured by the SSQ-12 or satisfaction ratings for speech in quiet, speech in a small group, or music.
- The Premium Technology Programming resulted in better ANL scores (tolerated poorer SNRs) and speech in large group satisfaction ratings.



What they found... Data Logging

- Data logging was used to estimate the “Percentage of coverage” based on the devices estimates of the environments the listeners were in, versus the programs chosen by the device.
- These data were further analyzed to investigate whether the estimated listening environment and/or its difficulty might be used to predict benefits.
- Difficult to draw conclusions on these data since they are all based on estimates based on the hearing aid manufacturers’ algorithms. Further investigation related to whether “Premium Benefits” are related to individual listening needs is of interest.

What they found... Preferences

- Fourteen preferred the Premium level and nine the Basic level (one no preference).
- For participants who preferred the Premium level, outcomes for the ANL and satisfaction for speech in small and large groups were significantly higher when using the Premium level. There were no significant differences in outcomes for participants who preferred the Basic level.
 - That is, outcome differences supported preferences for the Premium level.

Why is this important...

- Differences across hearing aid technologies (technology levels) often do not show up in general outcome measures or real-world trial group data, despite differences measured in laboratory-based studies.
- However, these data provide evidence that individual preferences for higher level technologies are present in some individuals and are supported by outcomes measured in these individuals.

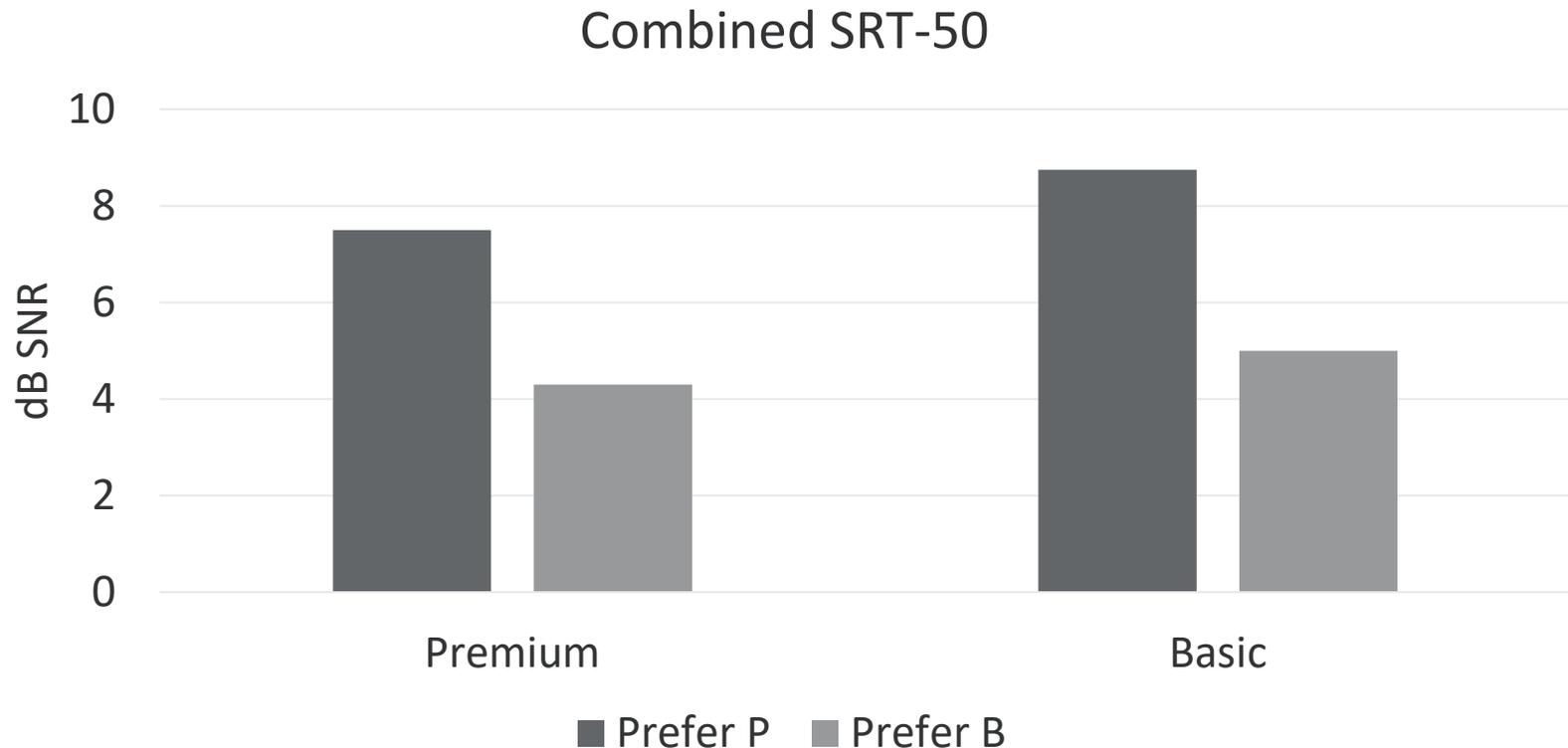
Does it matter clinically?

- This study demonstrated technology-level-based preference differences in individual listeners. If these differences are found to be predictable based on clinically measurable factors, an evidenced based criteria for recommending technology level may be identified.
- This study also demonstrated that some listeners do not demonstrate outcome or preference differences across Basic and Premium technology levels.
 - These data provide further evidence that higher levels of technology may not result in clinical advantages for a sub-set of hearing aid wearers.

Related research in brief

- Plyler et al. demonstrated that individual listeners can exhibit differences in hearing aid preference, but this difference was not predictable from patient factors like hearing loss. It is also of interest to know if there are there also individual differences in hearing aid satisfaction and if they are predictable based on individual patient factors.
- Davidson et al., (2021) performed a systematic review to examine whether hearing aid satisfaction in adults was predictable.
 - Davidson, A., Marrone, N., Wong, B., & Musiek, F. (2021). Predicting Hearing Aid Satisfaction in Adults: A Systematic Review of Speech-in-noise Tests and Other Behavioral Measures. *Ear and hearing*, 42(6), 1485-1498.
- Interestingly, this review found that satisfaction was generally not related to degree of hearing loss (PTA). Instead, the best predictor was unaided speech recognition in noise ability.

Interesting finding from Plyler et al., (2021) – No analysis



Data suggest that preference was possibly related to speech recognition in noise – poorer SRT-50 more preference for higher level technology.

Summary and Conclusions

- Middle-aged adults who notice hearing difficulty, use closed captions, and have friends/relatives who notice communication difficulties are more likely to adopt hearing aids
- New hearing aid users, hearing aid users aged 60-69 years, and people who have multiple medical diagnoses are less likely to be persistent hearing aid users 24 months after the fitting (based on research in health records at the VA).

Summary and Conclusions

- Speech recognition in noise abilities are related to the magnitude of hearing aid benefits.
- The Practical Hearing Aid Skills Test–Revised (PHAST-R) can be used to provide targeted reinstruction and demonstrate that this reinstruction supports better hearing aid use.
- Even though outcomes are similar for different levels of technology, patients who prefer “premium” devices have better outcomes for premium devices than basic devices.

Thank You!

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Questions?