



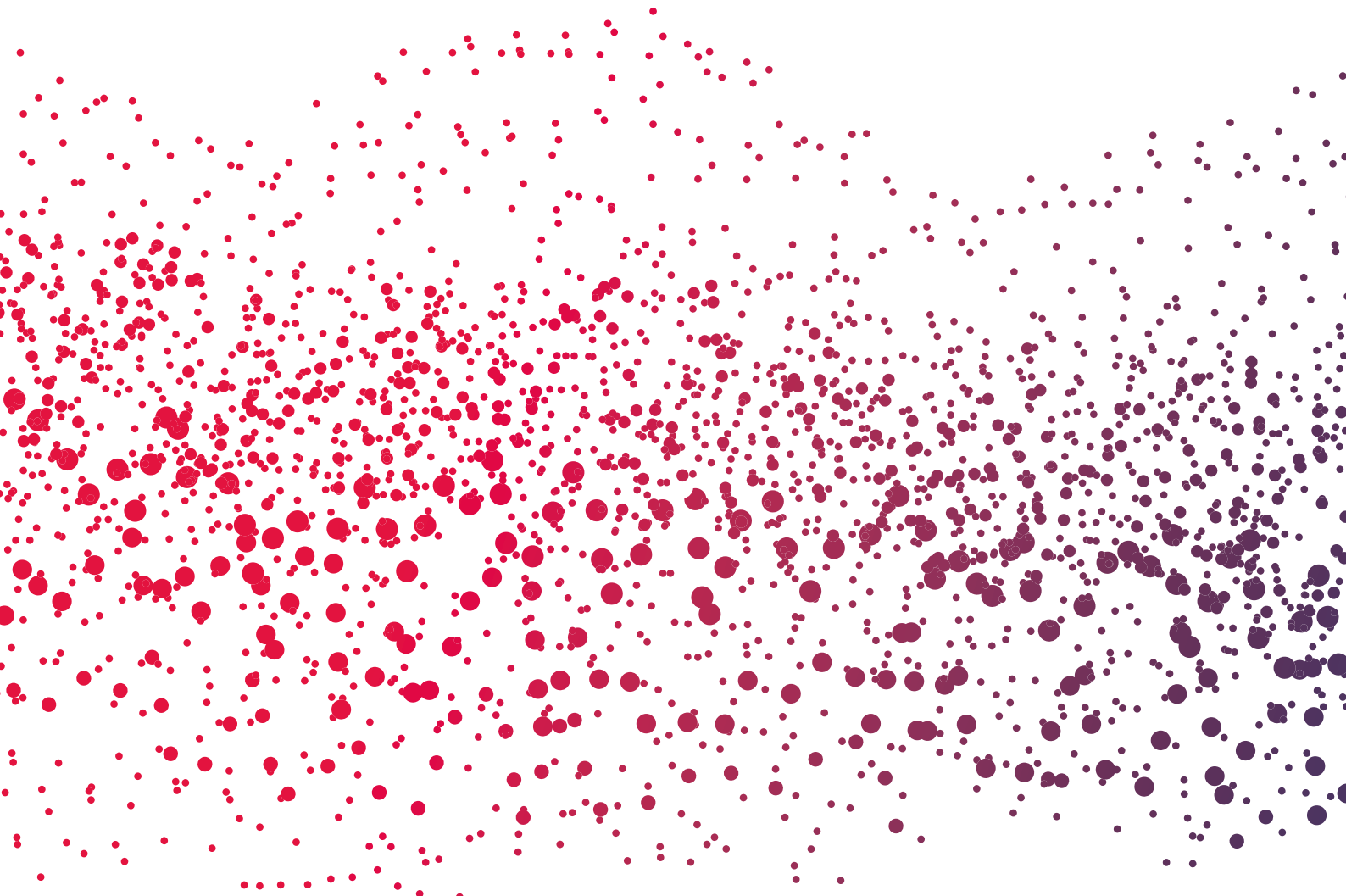
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Otology & Audiology Article Review

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How Does the Hearing Handicap Inventory for the Elderly Score Predict the Intention of Hearing Aid Adoption in Older Adults?

Cochlear implant benefits over time in adult patients with Single Sided Deafness.

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EDITORIAL



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Dear Reader, the Amplifon Centre for Research and Studies, CRS, houses one of the finest private libraries in the field of audiology and otorhinolaryngology, offering the sector's most important international journals. Every quarter, a team of Amplifon Audiologists from around the globe select the most relevant publications in the field of Otology and Audiology and make a comprehensive review. The Amplifon Centre for Research and Studies coordinates the development of this quarterly review. We are happy to share these new reviews with you. For this issue, our team reviewed 9 interesting articles published in the fourth quarter of 2025.

We start with a review of the World Health Organization (WHO) guidance aiming to increase global access to critical hearing aid (HA) services, focusing on systemic barriers and promoting the ATscale framework for hearing health care delivery. A second review evaluates the predictive value of the Hearing Handicap Inventory for the Elderly Score (HHIE-S) for HA adoption, while a third explores the impact of hearing handicap on listening fatigue in clinical settings.

Cochlear Implantation (CI) for subjects with single-sided deafness (SSD) has recently gained acceptance as a clinical indication and is increasingly covered by health insurance systems. This issue features three reviews on CI in SSD: one on the impact of processing delay on sound localisation, another on the benefits of CI in SSD over time, and a third examining decision regret after CI for SSD. Collectively, these contributions underscore the importance of expectation management and comprehensive pre-operative counselling for candidates undergoing this type of intervention.

Lastly, we present a review highlighting insights from large-scale longitudinal health cohort studies regarding strategies to promote the adoption of amplification and increase daily use.

We hope you enjoy this issue of our CRS Scientific Journal

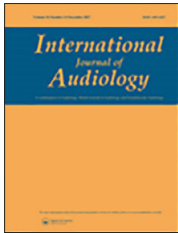
Mark Laureyns

Global International CRS & Medical Scientific
Research Manager





AN OVERVIEW OF WORLD HEALTH ORGANIZATION GUIDANCE AIMING TO INCREASE GLOBAL ACCESS TO CRITICAL HEARING AID SERVICES



Dillard LK., Der C. & Laplante-Lévesque A., et al.
Int J Audiol. (2025): 64(10), 984–90.
doi: 10.1080/14992027.2025.2492151. Epub 2025
Apr 24. PMID: 40272388.
By Laurens Soens –Belgium

A comprehensive and well-organised synthesis of World Health Organization guidelines designed to expand global access to essential hearing aid services, serving as a practical call to action for stakeholders to promote accessible hearing health care worldwide.

INTRODUCTION

Recent studies by the World Health Organization (WHO) indicate that a substantial proportion of the global population is at risk of hearing loss (HL) and its associated secondary consequences. The affected individuals frequently experience limited access to effective communication, which not only significantly hinders their participation in daily life but is also increasingly acknowledged for the wider socio-economic repercussions.

These negative outcomes are often exacerbated among populations residing in resource-limited settings. Barriers to the uptake and sustained use of hearing aids (HAs) stem from misconceptions of HL and hearing technology and the high cost of hearing devices and associated services.

The article discusses the principal barrier to access to HAs in low- and middle-income countries: the shortage of hearing health care providers, including audiologists and ENTs, as well as the poor geographical distribution of such services. The authors examine the limitations of the current hearing health care landscape and explore task sharing in hearing health care as a potential strategy to address these challenges. The article further discusses recent WHO resources on hearing health care intended to improve global access to HAs and related rehabilitation services.

A primary limitation highlighted by the authors is the insufficient geographical availability of hearing health care services. These comprise multiple specialised disciplines, and their limited geographical coverage is partly attributable to its organisation predominantly at the secondary and tertiary tiers of care.

CRITICAL NOTE

Ongoing monitoring of these initiatives by both local and global stakeholders is essential. The article does not stress the potential influence of the hearing aid industry, which could also play an important role in expanding hearing health care around the world or at least support the organisations and authorities responsible for developing and implementing these programs.

The overall availability of audiologists and ENT specialists is inversely correlated with the economic prosperity of a country or region. Although the scarcity of hearing health care professionals is a global concern, disparities in their geographic distribution persist even in wealthier nations.

As a short-term strategy to expand hearing health care provision, task sharing is proposed and discussed. The objective of task sharing within hearing health care is to increase service coverage. It is considered effective when audiological skills and competencies are transferred across different levels of specialisation. The reviewed articles reach consensus regarding the value of task sharing by engaging non-specialist providers, so long as audiologists and ENT specialists are closely involved in their training, evaluation, and ongoing mentorship.

By involving non-specialist providers who are already embedded within communities, geographical barriers to hearing health care access can be reduced. This approach facilitates not only the delivery of specialised services but also the broader dissemination of innovative, cost-lowering HA solutions.

Although task sharing promotes functional specialisation, sustained efforts to educate and train more hearing health care specialists remain essential to address long-term challenges and ensure continued system improvement.

The discussion then turns to the main principles of the WHO and ATscale guidelines for HA service delivery, built around clearly defined components, logically divided into adults and children: first appointment; first and second follow-up appointments; long-term follow-up (on demand). In addition, for children, WHO recommend implementing a screening protocol to detect HL at an early stage.

FIRST APPOINTMENT:

Adults:

- Case history
- Otoscopy
- Air-conduction audiometry (at minimum at 500, 1000, 2000 and 4000 Hz)
- HA fitting
- Counselling

Children:

- Tympanometry is added as they are more likely to have a middle-ear condition.

FIRST AND SECOND FOLLOW-UP APPOINTMENTS:

Adults:

- Questionary-based assessment
- Whenever required:
- Ear examination
- HA check
- Troubleshooting as needed

Children:

- The Ling sounds test is also to be carried out.

LONG-TERM FOLLOW-UP:

Adults:

- Questionary-based assessment
- Otoscopy
- Audiometry
- HA assessment and adjustment, if needed

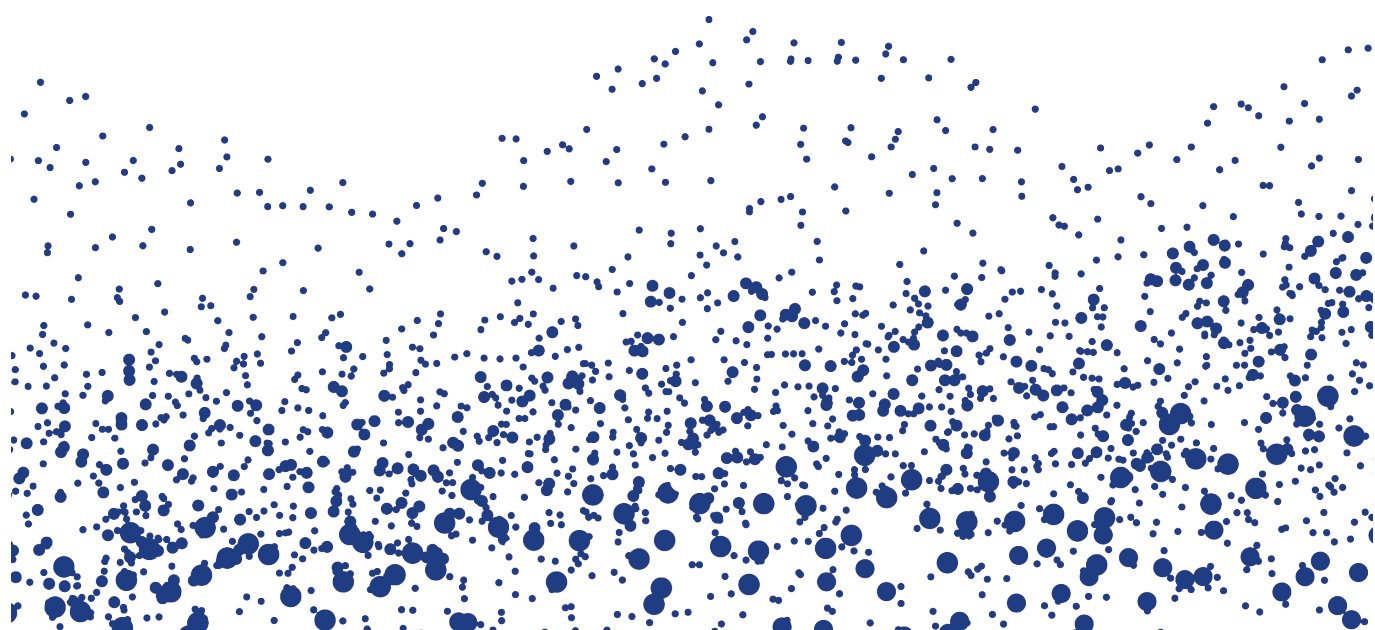
Children:

- Every six months: device check
- Annually: same follow-up as for adults, in addition to Ling sounds test

Beyond these guidelines, specific recommendations for onward referral are also provided, as the proposed framework is closely tailored to the degree of HL. The establishment of clear referral pathways to specialised hearing health care is therefore crucial.

The guidelines are essential for delivering appropriate hearing health care and HA fitting. However, without a clear implementation strategy, their impact will remain limited. The WHO guidelines also outline detailed key components of implementation. All elements of these protocols should be adapted to the local context while remaining aligned with the WHO technical resource.

There is broad consensus that improving global access to hearing health care requires the provision of community-based services, the application of task sharing, and adherence to the WHO technical resource 'Hearing aid service delivery approaches for low- and middle-income settings.' These measures should be implemented alongside other resources developed by the WHO and its partners, and integrated into existing programs to ensure that limited resources are used efficiently and sustainably. •





HOW DOES THE HEARING HANDICAP INVENTORY FOR THE ELDERLY

SCORE PREDICT THE INTENTION OF HEARING AID ADOPTION IN OLDER ADULTS?



Seet KY, Mo PH., Siu TC., et al.

J Speech Lang Hear Res. (2025): 68(9), 4529–49.

doi: 10.1044/2025_JSLHR-24-00887. Epub 2025

Aug 28. PMID: 40875366

By Gian Carlo Gozzelino –Italy

The article explores whether pre-fitting scores from the Hearing Handicap Inventory for the Elderly (HHIE) can predict subsequent intention or behaviour related to hearing aid adoption in older adults.

CRITICAL NOTE

Despite its contributions, the review is limited by the quality and consistency of the underlying studies. Definitions of hearing aid (HA) adoption vary widely, ranging from expressed intention to long-term usage, which complicates direct comparison and weakens causal inference. Without standardised endpoints, it remains difficult to determine whether HHIE scores predict initial acceptance, sustained use, or both.

The reliance on secondary data further constrains the robustness of the statistical synthesis. Conversions between screening and full versions of the HHIE, as well as reconstructed total scores from subscales, introduce potential measurement error. While these adjustments are methodologically reasonable under the circumstances, they reduce confidence in the precision of pooled estimates.

Another limitation of the review is the potential bidirectional relationship between HHIE completion and adoption behaviour. Completing the questionnaire may itself increase awareness and perceived need, thereby influencing subsequent decisions. This raises the question of whether HHIE scores function purely as predictive markers or also partially act as active components of the adoption pathway.

Cultural and health system differences across countries are acknowledged but not explored in any great depth. Factors such as reimbursement models, stigma, family influence, and access to care may moderate the relationship between perceived handicap and adoption, thereby limiting the generalisability of the findings. Finally, the predominance of the observational studies included precludes definitive conclusions regarding causality.

Overall, the reviewed article provides a well-structured and thorough synthesis of evidence linking self-perceived hearing handicap to HA adoption in older adults. The findings underscore that subjective experience, rather than objective hearing thresholds alone, plays a decisive role in help-seeking behaviour. Higher HHIE scores consistently correspond to both a greater likelihood and earlier timing of adoption, whereas lower scores identify individuals at risk of under-treatment.

INTRODUCTION

The adoption of hearing aids (HAs) among older adults remains a persistent challenge in hearing health care, despite robust evidence linking untreated hearing loss (HL) to negative cognitive, social, and health outcomes. While technological advances have improved HA performance and accessibility, uptake rates continue to fall short of demonstrated clinical need. One of the most widely discussed determinants of HA adoption is the individual's subjective perception of hearing difficulties, rather than audiometric thresholds alone. In this

context, patient-reported outcome measures have gained increasing relevance not only as tools for assessment but also as potential predictors of help-seeking behaviour.

The article under review explores whether scores obtained from the Hearing Handicap Inventory for the Elderly (HHIE), administered prior to HA fitting, can predict subsequent intention or behaviour related to HA adoption in older adults. By synthesising evidence from multiple observational studies, the authors aim to clarify the role of self-perceived

hearing handicap in shaping adoption decisions. This review, positioned at the intersection of audiology, behavioural science, and public health, aims to inform both clinical practice and population-level intervention strategies.

SUMMARY OF KEY FINDINGS

The review synthesises findings from nine primary studies that examined the relationship between HHIE scores and HA adoption outcomes in adults aged over 60. Across the majority of included studies, higher HHIE scores prior to intervention were consistently associated with a greater likelihood of HA uptake. This association was observed using different operational definitions of adoption, including device acquisition, self-reported use, duration of daily use, or expressed willingness to procure HAs.

Most studies demonstrated that individuals who ultimately adopted HAs reported significantly higher mean HHIE scores compared to non-adopters. Additionally, several studies further quantified this relationship using odds ratios or hazard ratios, showing incremental increases in adoption likelihood with each unit increase in HHIE score. In some cases, the social subscale of the HHIE appeared particularly influential, suggesting that perceived communication difficulties in social contexts may act as a stronger behavioural trigger than emotional distress alone.

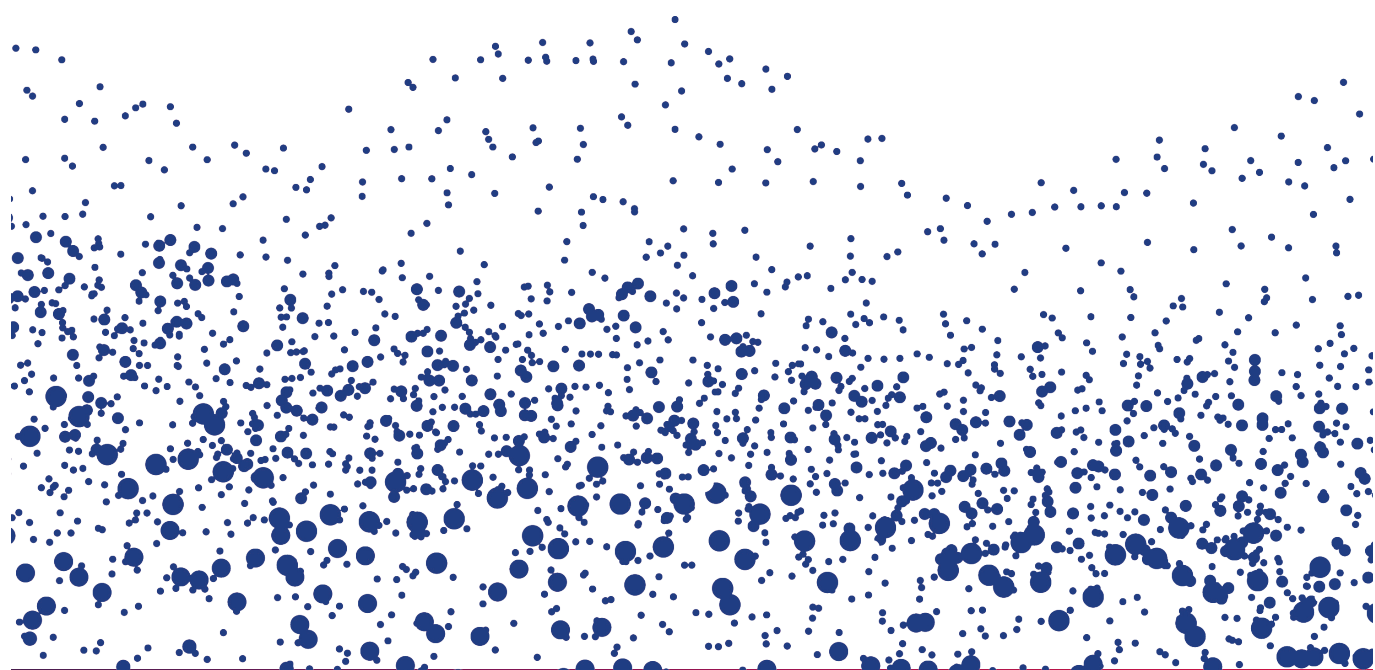
One study did not identify a statistically significant relationship between HHIE scores and adoption, highlighting variability across methodologies and contexts. Nevertheless, when data from multiple studies were aggregated, the overall pattern revealed a clear and statistically meaningful difference in self-perceived handicap between adopters and non-adopters. The authors also noted that self-perceived HL measured through single-item questions showed predictive value,

sometimes comparable to HHIE scores, although evidence for this was less consistent.

KEY STRENGTHS

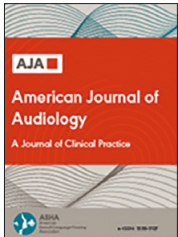
A major strength of this review lies in its focus on patient-reported perception rather than purely audiometric indicators. By centering the analysis on HHIE scores, the authors address a critical gap between clinical diagnosis and real-world behaviour. This perspective aligns closely with contemporary models of health care decision-making, which emphasise subjective burden, quality of life, and readiness for change. From a methodological standpoint, the use of a scoping review framework is appropriate given the heterogeneity of the available literature. The authors provide a clear rationale for this approach and transparently acknowledge the limitations arising from inconsistent outcome definitions and reporting formats across studies. The systematic search across multiple databases combined with the inclusion of studies from different countries further strengthens the comprehensiveness of the review.

Another notable strength of the review is its effort to synthesise quantitative data across studies, even in the absence of raw datasets. The exploratory statistical comparison of mean HHIE scores between adopters and non-adopters, while inherently imperfect, provides an additional layer of evidence supporting the central hypothesis. Importantly, the authors explicitly acknowledge the assumptions and constraints of this analysis, thereby avoiding overstatement of the findings. From a clinical standpoint, the review offers actionable insights. It suggests that HHIE scores may serve not only to identify individuals likely to adopt HAs, but also those less likely to do so despite demonstrable HL. This reframing shifts attention toward a population that may require targeted counselling, education, or motivational interventions. •





AN EXPLORATORY STUDY OF THE IMPACT OF HEARING HANDICAP ON LISTENING FATIGUE DURING HEALTH CARE ENCOUNTERS AMONG OLDER ADULTS



West JS., Pavon JM., Guggenheim DS., et al.

Am J Audiol. (2025): 34(4), 886–95.

doi: 10.1044/2025_AJA-25-00056. Epub 2025

Sep 8. PMID: 40920960.

By Jan De Sutter–Belgium

This study explores the link between hearing loss and listening fatigue, alongside the influence of various types of personal protective equipment such as face masks in an outpatient health care environment, with cognitively demanding discussion topics.

INTRODUCTION

An increasing body of evidence suggests a strong relation between hearing loss (HL) and fatigue, more specifically listening fatigue, which may contribute to a heightened risk of worsening social-emotional wellbeing. Listening fatigue tends to be more pronounced during conversations of higher intensity, often resulting in greater difficulty participating in the exchange or accurately understanding its content.

This study focuses on conversations with older adults in medical settings, such as hospitals, more specifically in situations where the speaker is wearing personal protective equipment (PPE). Research conducted during the COVID-19 pandemic demonstrated that increased use of PPE was associated with increased listening effort, attributable to reduced speech quality and/or the loss of visual cues, such as lip reading.

The present study aims at further examining the relationship between HL and listening fatigue in older adults seeking help in a hearing health care setting, as well as the effect of different types of PPE's on this relationship.

Design

The study enrolled participants aged 60 years or older who attended an outpatient clinic for a single medical appointment. Following the appointment, participants were required to fill in questionnaires, including documentation regarding the types of PPE used during the visit. The primary outcome, i.e. listening fatigue, was measured using the VFS-A-10. Secondary independent variables included self-perceived hearing handicap, measured using the HHIES, and anxiety, assessed via the PROMIS-Anxiety scale.

Three types of face masks were included in this study: (1) a standard surgical face mask with protective goggles; (2) a standard surgical face mask with a face shield; and (3) a clear face mask with protective goggles.

CRITICAL NOTE

Effective communication between patients and caregivers is a critical factor in health care and should not be underestimated. Research examining factors that may impede this communication is therefore particularly valuable. The fact that this study involved health care professionals trained to support individuals with hearing loss strengthens the validity of the conclusions drawn.

The researchers note that clinical settings are particularly challenging due to the complexity of conversation topics, as well as the presence of background noise. However, the acoustical environment in which study participants interacted with their caregivers were neither evaluated nor described, including the nature and sources of noise sources.

I agree that various strategies can be employed to reduce listening effort, starting with optimising the acoustical settings, improving signal quality through free-field amplification or providing communication training for health care providers. From the patient's perspective, the use of a well-fitting hearing solution combined with support from a friend or family member during clinical visits could be beneficial.

RESULTS

A total of 88 participants completed the questionnaires completely, resulting in a predominantly female, non-Hispanic white sample, with a mean age of 73,8 years. Hearing handicap ranges from no handicap (34,3%) to

severe handicap (20,2%). 50 participants had at least one interaction with a health care provider wearing a face mask. Listening fatigue was evaluated using three models: (1) the association between hearing handicap and listening fatigue; (2) the association between hearing handicap and listening fatigue with covariates; and (3) the association between hearing handicap and listening fatigues accounting for PPE type.

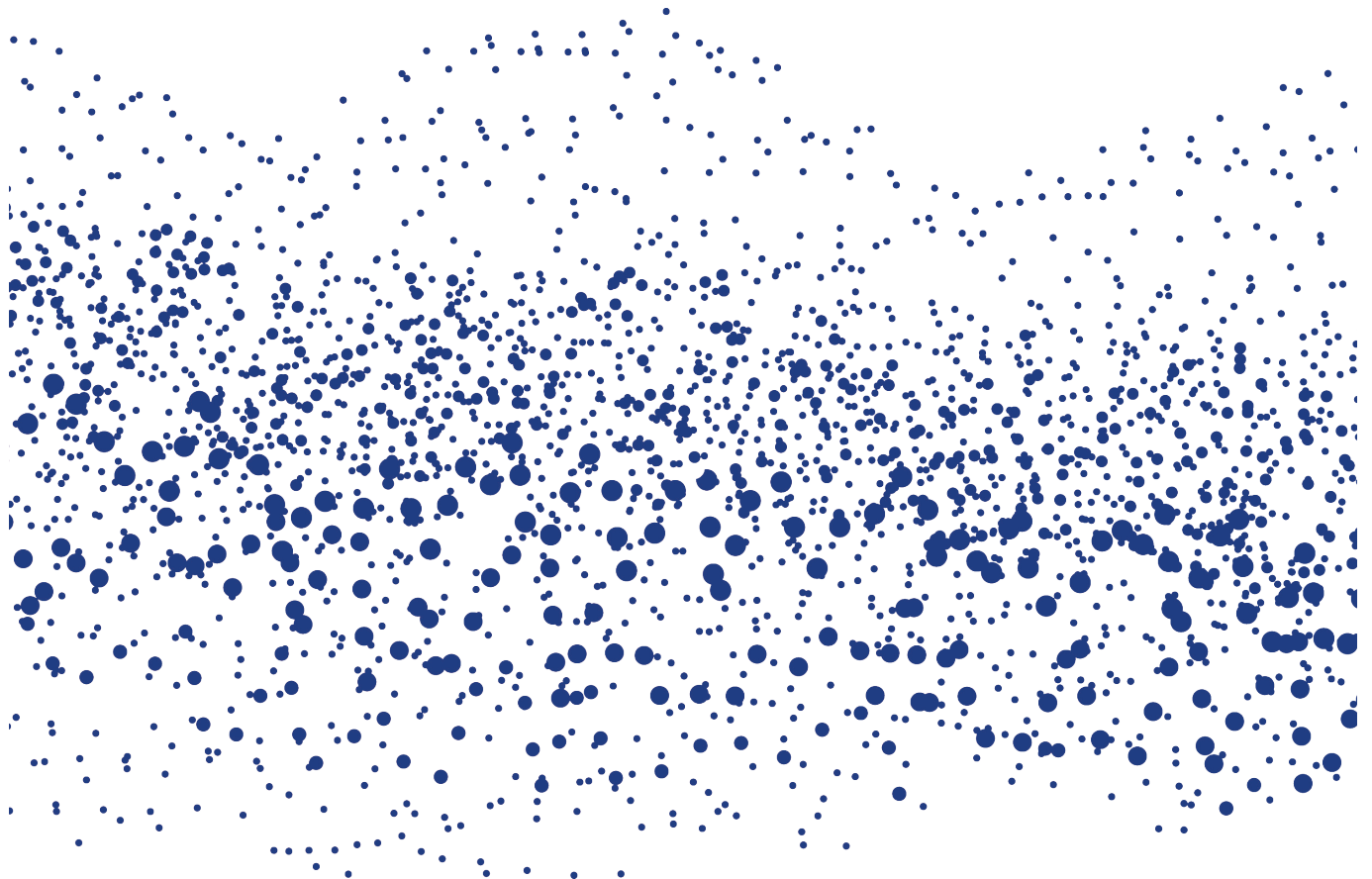
DISCUSSION AND CONCLUSION

Two main findings can be derived from the study. First, consistent with previous studies, the association between HL and listening fatigue was confirmed. Second, the researchers identify the short VSF-10-A as a useful and reliable tool for evaluating listening-related fatigue in clinical settings.

The second finding states that the clear face mask induces less additional listening fatigue than a standard surgical mask. It is suggested that patients with a higher degree of HL-who rely more heavily on visual cues- experience less listening-related fatigue when health care providers would wear clear face masks compared to standard surgical face masks.

Discrepancies found with an earlier study by Mendel et al. (2022) may be explained by the differences in participant age and HL severity within the test group.

Lastly, the authors consider that all health care providers involved in the study were experienced in communicating with individuals with hearing impairment. The authors suggest this factor may have attenuated the impact of adverse listening conditions and the use of PPE's. •





THE INTERACTION OF MULTIGENERATIONAL HOME ENVIRONMENTS WITH HEARING LOSS, COGNITION, AND DEPRESSION



Tucker LH., Weinstein HNW., Denham MW., et al.

Laryngoscope. (2025): 135(11), 4341–7.

doi: 10.1002/lary.32312. Epub 2025 Jun 11. PMID: 40497648.

By Sayantane Ghosh–Australia

This outstanding article is likely one of the first to study the relationship between multigenerational household living and hearing loss, and its impact on cognitive function and subsequent cognitive and depression outcomes.

Research over the past several decades has focused on the correlation between hearing loss (HL) and its detrimental health outcomes such as increased risk of falls, dementia, social isolation and depression as well as inclusive of cardiovascular diseases. Three consecutive LANCET commissions have identified HL as the leading modifiable risk factors for cognitive decline and dementia, while also underscoring its relevance to depression prevention and management. In this context, the authors hypothesised that individuals with HL living in multigenerational households—defined as non-nuclear family settings comprising more than three generations—may benefit from greater social engagement and more frequent family interactions, potentially reducing the risk of cognitive decline and depressive symptoms.

METHOD

Using data from the 2011–2012 National Health and Nutrition Examination Survey (NHANES) cycle, this cross-sectional study examined cognition, depression, and hearing status. Cognitive performance was measured with the digital symbol substitution test (DSST), depressive symptoms with the Patient Health Questionnaire- 9 (PHQ- 9), and HL through audiometric testing based on the four-frequency pure tone average in the better ear. Demographic, socioeconomic, health, and nutritional data were collected via interviews and clinical examinations.

PARTICIPANTS

- The sample was drawn from a multistage survey of noninstitutionalised U.S. civilians across all 50 states and the District of Columbia.
- A total of 9,756 participants completed the interview; 9,338 completed the physical exam.

CRITICAL NOTE

As one of the first studies of its kind, this research provides an initial understanding of how living in a multigenerational household may support better cognitive outcomes for individuals with hearing loss, potentially through increased social interaction and engagement within the home. The study also reinforced established findings that HL is associated with declines in cognition and elevated depressive symptoms, particularly among individuals residing in non-multigenerational homes. Key limitations include a relatively small sample size and missing data on factors such as education and household income, which would have enhanced the analysis of the complex relationship between HL, cognition, and household structure. Additionally, the study included limited data from formal neurocognitive assessments and dementia diagnoses. The authors emphasise that larger-scale studies are needed to further investigate the potential protective effects of multigenerational living on cognitive outcomes in individuals with HL.

- A total of 673 participants had complete data; 108 participants lived in a multigenerational home.
- All individuals who were < 18 years old or ≥ 60 years old were included. The mean age was 63.8 years.
- The mean Hearing loss was 18.4 dB on the better ear.
- Household composition was categorised as multigenerational (three or more generations or skipped-generation households with members <18 and ≥60 years) or non-multigenerational.
- Exclusions: Participants with no HL, lower cardiovascular risk factors, as well as lower Cognitive and Depression scores on DSST & PHQ-9, respectively.

CONDITIONS

- Hearing status was defined using the four-frequency pure tone average (500–4000 Hz) in the better ear, with a mean threshold of 18.4 dB HL.
- Cognitive performance: assessed using the Digit Symbol Substitution Test (DSST), where higher scores (range 0–133) reflect better cognitive functioning.
- Depressive symptoms were evaluated with the Patient Health Questionnaire-9 (PHQ-9), in which higher scores reflect greater symptom burden, and scores ≥ 10 were considered indicative of at least moderate depression.
- Cardiovascular risk burden was estimated from self-reported medical history, producing a composite score between one and five, with higher scores representing a greater accumulation of risk factors

STATISTICAL ANALYSIS

Regressions were done for cognition and depression measures, including continuous scores as well as binary variables. There were three separate outcomes that were analysed including Pure tone average, multigenerational home environment, and pure tone average plus multigenerational

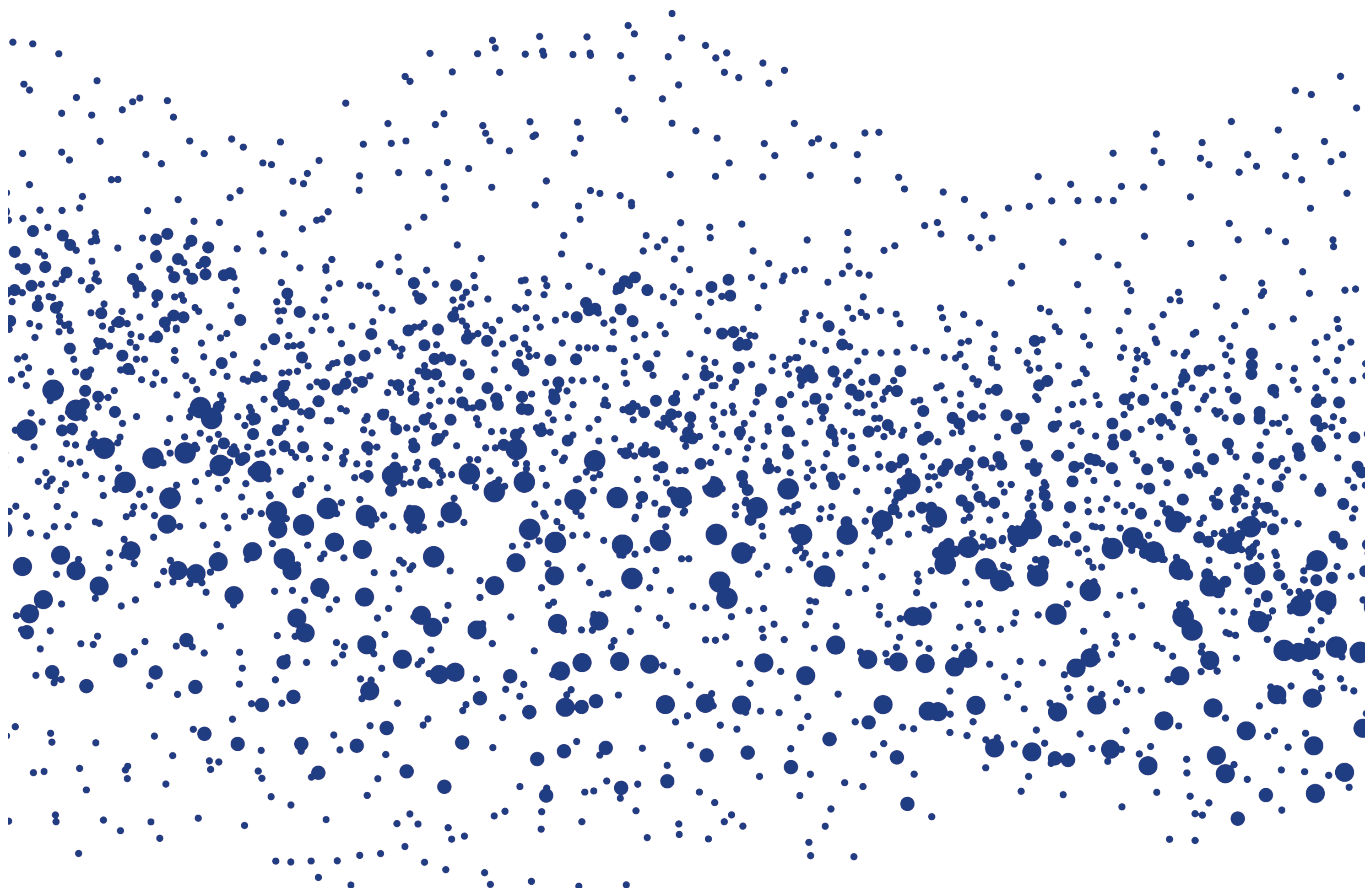
home environment.

Regression models were fitted to assess cognitive and depressive outcomes using both continuous scores and binary classifications. Analyses evaluated three predictors: hearing level (PTA), multigenerational household status, and their combined association.

All models were adjusted for age, sex, and cardiovascular risk burden.

Linear regression was used for continuous outcomes (cognition and PHQ-9 scores); while logistic regression was employed for dichotomous depression outcomes (PHQ-9 ≥ 10).

The findings of this study indicate that in non-multigenerational households, each 10 dB increase in HL was associated with a 1.90-point decrease in cognitive scores, reflecting cognitive decline. In contrast, among individuals residing in multigenerational homes, each 10 dB increase in HL corresponded to a 1.98-point increase in cognitive scores, suggesting better cognitive performance. The authors also reported that the interaction between HL and multigenerational household status was not statistically significant for depression scores. •





BIMODAL COCHLEAR IMPLANTS: MEASUREMENT OF THE LOCALIZATION PERFORMANCE AS A FUNCTION OF DEVICE LATENCY DIFFERENCE



Felsheim RC., Hochmuth S., Kleinow A., et al.

Trends Hear. (2025): 29, 23312165251396658.

doi: 10.1177/23312165251396658. Epub 2025 Nov 24.

PMID: 41284569; PMCID: PMC12644428.

By Charles-Edouard Sonnet –France

This experimental study shows that sound localisation performance in bimodal cochlear implant users improves with interaural latency compensation, with the best performance observed at cochlear implant delays slightly longer than the predicted hearing-aid latency.

Bimodal cochlear implant (CI) users—individuals using a cochlear implant in one ear and a hearing aid (HA) in the contralateral ear—typically exhibit poor sound localisation performance. One major contributing factor is interaural latency mismatch caused by differences in processing delays between acoustic and electric stimulation. These latency differences can amount to several milliseconds, largely exceeding naturally occurring interaural time differences. Previous studies have shown that compensating for this mismatch by adding delay to the CI processor can significantly improve localisation. However, the optimal latency value for maximising localisation performance remains unclear.

In this study, sound localisation performance was measured in 11 bimodal MED-EL CI users across an extended range of CI delays. Localisation experiments were conducted in an acoustically treated room using a semicircular loudspeaker array in the frontal plane. Broadband noise stimuli were presented at a fixed sound level with level roving. Localisation

accuracy was quantified using both the root mean square error (RMSE) and localisation bias.

Results showed a clear dependence of localisation performance on CI delay. For most participants, RMSE decreased with increasing CI delay, reached a minimum at intermediate delays, and increased again at longer delays. Nine out of the 11 listeners achieved their optimal localisation performance with a CI delay that was 1–3 ms longer than the estimated compensation based on HA latency. Localisation bias, which was initially directed toward the CI side at short delays, systematically decreased with increasing CI delay and, in several listeners, reversed direction for longer delays.

These findings demonstrate that the estimated interaural latency compensation does not necessarily correspond to the optimal delay for sound localisation. Instead, slightly longer CI delays appear to be beneficial for most bimodal listeners, highlighting the need for individualised latency optimisation in clinical fitting. •

CRITICAL NOTE

Optimising the management of bimodal users appears particularly compelling for several reasons. As cochlear implant (CI) fitting is part of my professional practice, this article immediately caught my interest, as it is both rigorous and stimulating, opening promising perspectives toward complementary protocols that extend beyond CI fitting alone.

Given that bimodality is indeed a common clinical scenario, the challenge of jointly optimising both fitted

ears—a CI on one side and a contralateral hearing aid (HA) on the other—has become an increasingly important concern for patients.

The article provides an in-depth analysis of the various factors likely contributing to the degraded sound localisation performance observed in bimodal CI users, including tonotopic, level, latency, and spectral content mismatches. While latency mismatch, the primary focus of the study, demonstrates clear potential for optimising bimodal fitting, other dimensions

warrant consideration. In particular, level mismatch is noteworthy, as it already represents a daily challenge in the fitting of bilateral HAs.

It is well established that spatial sound localisation is optimal when interaural level or intensity differences (ILDs) and interaural time differences (ITDs) are properly aligned and exploited by the auditory system. While the present study focuses primarily on interaural latency, and therefore on ITD optimisation, a more comprehensive approach that also integrates ILD optimisation, wherever possible, may be valuable. In this regard, the authors note that normal-hearing listeners can discriminate sound sources separated by angles as small as 1° (Mills, 1958). By contrast, Dorman et al. (2016) report that the root mean square error (RMSE) reaches approximately 12° in bilateral HA users, 29° in bilateral CI users, and up to 62° in bimodal CI users. In light of these performance differences, it is reasonable to pursue strategies aimed at reducing, as much as possible, the factors limiting spatial localisation.

While this study provides strong support for translating latency adjustment into clinical practice, several limitations warrant consideration.

First, latency compensation is currently available from only one CI manufacturer, MED-EL, and cannot be implemented in an equivalent manner by other companies. With MED-EL devices, the process involves entering the estimated processing delay of the contralateral HA so that the software can add the corresponding latency.

Second, if RMSE is to be measured in order to optimally adjust latency, the complexity of the experimental setup raises questions regarding its feasibility in routine clinical practice, particularly in terms of time, acoustic environment, and required equipment.

Finally, patient fatigue represents a non-negligible factor, as the study protocol involves a high number of stimulus presentations (55).

Beyond latency, it may be valuable to explore protocols aimed at achieving a finer balance of auditory perception between the two fitted ears, particularly with respect to sound level. If the goal is to maximise patient benefit and move toward a form of 'pseudo-stereophony,' especially within frequency bands that remain audible and amplifiable by the contralateral HA, further studies on binaural loudness balancing could be considered.

In this context, the maximum comfort level (high MCL) could serve as a common reference point for both systems, as it is routinely used during CI fitting and can also be adjusted on the HA. An exploratory protocol could involve presenting a

narrowband stimulus via a frontal loudspeaker at a level corresponding to the high MCL validated on the implant side, and subsequently asking the patient whether the perceived loudness is equivalent, louder, or softer on the contralateral side. Based on the patient's response, HA level could be adjusted, provided that sufficient residual dynamic range exists between the hearing threshold level (HTL) and the uncomfortable loudness level (UCL).

This hypothesis echoes the authors' discussion, in which they propose that the optimal latency, often longer than expected, may partly compensate for the residual presence of other interaural mismatches, particularly level mismatches. From this perspective, combining prior ILD optimisation with latency adjustment could represent an interesting research avenue. Improved interaural coherence in intensity could, within this framework, contribute to enhanced localisation abilities, particularly in patients who retain exploitable high-frequency hearing on the aided side.

Such a protocol would likely be even more relevant in the context of bilateral CI, where limitations related to differences in dynamic range (acoustic versus electric) and technology (microphone input dynamics, microphone directivity, compression systems, environmental analysis, etc.) would largely be eliminated.

In this regard, and as a reminder, Dorman et al. (2016) report a mean RMSE of 29° in bilateral CI users, suggesting that a substantial margin for improvement remains.

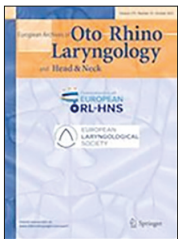
Finally, developing bimodal optimisation protocols tailored to the typology of contralateral residual hearing could prove beneficial for patients. A distinction could thus be drawn between profiles with moderate HL, exhibiting a wide frequency overlap, and those with severe HL, limited to low or mid frequencies. It should be noted that technological advances may eventually allow better management of these mismatches. Currently, compatible and synchronised HAs, such as those proposed by Advanced Bionics, can operate in tandem with CIs using shared signal processing and compression strategies in order to preserve ILDs.

In the meantime, although bilateral CI remains the solution offering the best spatial performance, it is essential to fully leverage existing fitting options in order to optimise auditory benefit for bimodal users. This is particularly true in health care systems where CI fitting and conventional HA fitting may be carried out in separate clinical settings, depending on local organisational structures.



COCHLEAR IMPLANT BENEFITS OVER TIME IN ADULT PATIENTS

WITH SINGLE SIDED DEAFNESS



Cuda D., Pizzol E., Laborai A., et al.
Eur Arch Otorhinolaryngol. (2025): 282(10), 5023–35.
doi: 10.1007/s00405-025-09298-9. Epub 2025 Mar 21.
By Mark Laureyns –Italy–Belgium

This study evaluates the long-term outcomes and usage of cochlear implants in 57 individuals with single-sided deafness.

INTRODUCTION

In this paper, the authors highlight that cochlear implantation (CI) for adults with single-sided deafness (SSD) has only recently become an accepted indication in Italy, prompting them to examine the long-term benefits, patterns of device use, and performance stability in these patients.

SUBJECTS

The study included 57 subjects with SSD (60% female, mean age at diagnosis 43 years, mean age at CI surgery 49 years). The majority of the cohort (60%) was diagnosed with sudden hearing loss (HL). Patients with radiological otologic malformations were excluded. SSD was defined as pure tone average (PTA4) < 30dBHL in the better ear and > 70dBHL in the worst ear). A total of 53% of participants had left-sided SSD. CIs were distributed as follows: Medel (49%), Cochlear (33%), AB (11%) and Oticon Medical (7%).

METHOD

Participants were evaluated at multiple time points: before implantation (T0), at six months (T06), then at one (T12), two (T24), three (T36), four (T48) and five (T60) years after implantation at their regular follow-up visits in the hospital. The following assessments were conducted at the specified visits:

- **PTA:** unaided under headphones at T0, in free field 0° aided at T12
- **Speech audiometry in noise:** using the Italian Matrix or OLSA test in free field, with SNR corresponding to a 50% score. Three spatial configurations were tested consistently across all visits: speech presented at 0° and N0° (noise from front), NCI (noise from CI side), NCO (noise contralateral side)
- **Sound localisation:** seven loudspeakers positioned at 30° intervals (180° in total). Stimuli intensity was roved between 65, 70 and 75dBA at all visits

CRITICAL NOTE:

A notable limitation of this study is the incomplete assessment of several participants, with attrition differing substantially across time points, complicating the evaluation of long-term effects. Although sound-localisation performance improved significantly, the RMS error in the aided condition remained above 40°. Overall, the findings are encouraging, and the emphasis placed by the authors on comprehensive counselling, expectation management, and a holistic approach to candidacy for cochlear implantation in SSD is particularly valuable.

- **Subjective auditory experience:** evaluated with the Speech, Spatial and Qualities of Hearing Scale (SSQ) at all visits
- **Tinnitus Handicap Inventory (THI):** points/scores and grades were recorded at all visits, classified as: Grade 1–slight or no handicap; Grade 2–mild; Grade 3–moderate; Grade 4–severe; Grade 5–catastrophic
- **Device usage:** logged via datalogging (hours of use/day) at all visits

RESULTS

- **PTA (unaided at T0):** Mean PTA was 17 dB HL in the better ear and 107 dB HL in the worse ear
- **Speech audiometry in noise:**
 - Only 56% of the subjects were assessed at T0 and T12, and only 19% at T60
 - Condition N°: a small but statistically significant improvement for the at T12 (0.4 dBSNR for 50% score improvement)
 - Condition NCI and NCO: no significant improvement at T12

• **Localisation test:**

- Significant reduction of localisation errors at T12 compared to T0 ($p=0,001$), with root mean square (RMS) error reduction of 27°
- Despite improvement, the aided RMS error at T12 and T60 remained greater than 40°, indicating persistent localisation challenges

• **Speech, Spatial and Qualities of Hearing Scale (SSQ):**

- Speech domain: significant improvement ($p=0,001$ – 1.5 points improvement)
- Spatial domain: significant improvement ($p=0,001$ – 2.2 points improvement)
- Qualities domain: no significant difference

• **Tinnitus Handicap Inventory (THI)**

- Only 53% of the subjects completed the THI at T0 and T12
- Significant improvement observed at T12 ($p=0,001$; mean decrease of 20 points).
- Long-term follow-up showed that 67% of participants improved in THI grade, 14% maintained the same grade, and 12% experienced worsening.

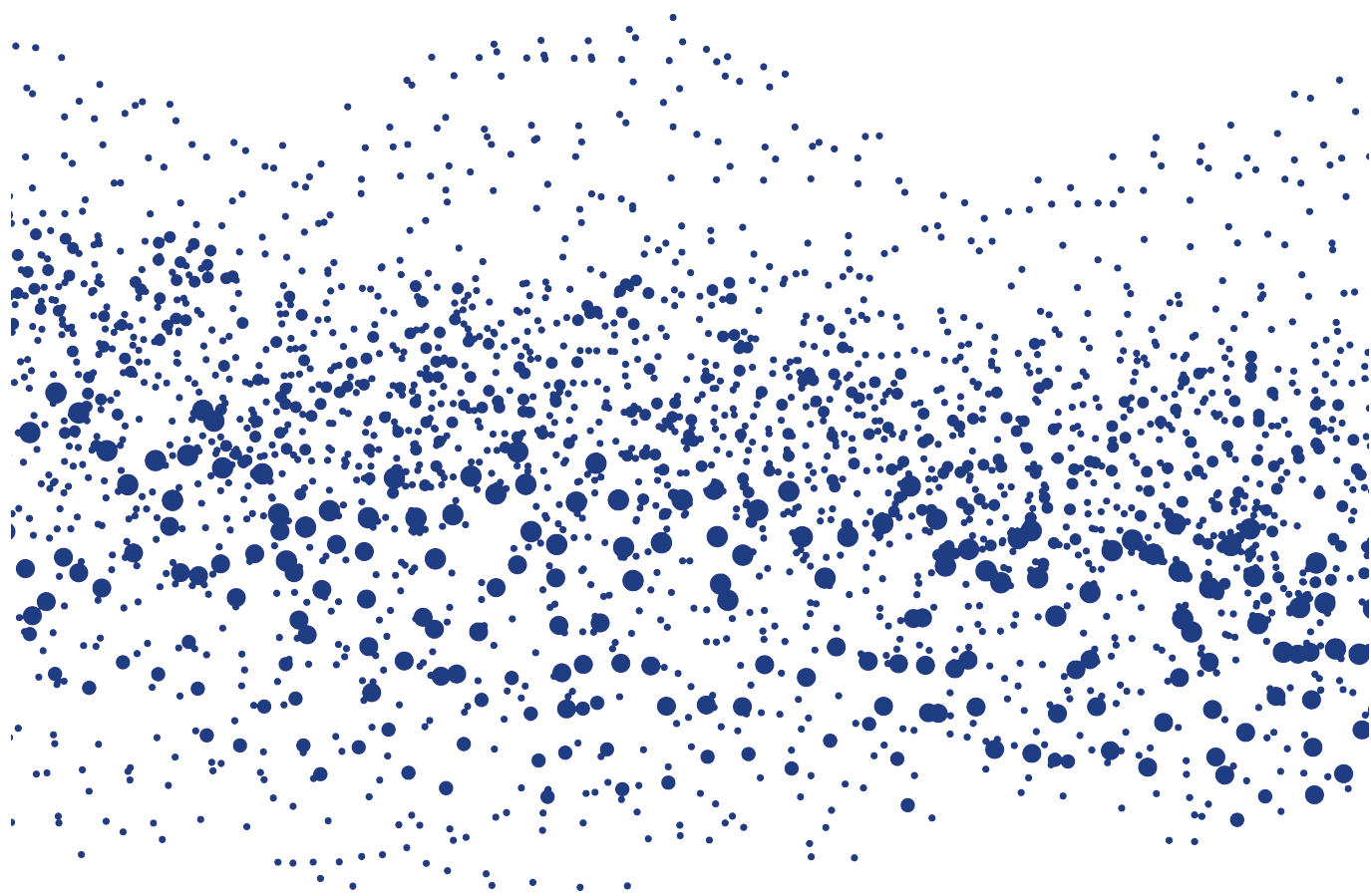
• **Datalogging data (hours of use/day)**

- Data available for 75% of participants due to technical limitations in some devices CIs
- Mean daily use: T6 = 11 h/day, T48 = 9 h/day, T60 = 6 h/day
- The reduction at T60 was primarily driven by eight participants with minimal CI use. Excluding these subjects, daily use was 11 h/day at T6 and T48, decreasing to 8 h/day at T60

CONCLUSIONS

In adults with SSD, this study shows that CI can effectively improve speech perception in noise, enhance sound-localisation skills, alleviate tinnitus, and improve patients’ subjective listening performance. Importantly, these benefits appear to be largely stable over time. However, daily CI use decreased over the follow-up period, with 14% of the subjects exhibiting insufficient use of their CIs.

The authors stress that evaluating SSD candidates goes further than standard hearing tests. Clinicians must also consider factors such as patient expectations, lifestyle, occupational demands and psychological status. Accordingly, comprehensive, tailored counselling is crucial. •





DECISIONAL REGRET IN ADULT COCHLEAR IMPLANT RECIPIENTS

WITH SINGLE-SIDED DEAFNESS



Báez Berríos Al., Singer LA., Vitulano S., et al.

Otol Neurotol. (2025); 46(9), 1101–8.

doi: 10.1097/MAO.0000000000004604. PMID: 40940014.

By Katrien Hoornaert – Belgium

This study examines the psychological outcomes and satisfaction levels of adults who chose a cochlear implantation to treat single-sided deafness.

In addition to contralateral routing of sound (CROS) and bone-conduction hearing aids (HAs), cochlear implantation (CI) has emerged over the past decade as a treatment option for patients with single-sided deafness (SSD). The study under review investigates the psychological outcomes and satisfaction levels of adults who elected CI for the management of SSD.

METHOD

Fourteen adults with SSD were included. Quality of life was assessed using the Cochlear Implant Quality of Life-10 Global scale (CIQOL-10 Global); decision satisfaction was evaluated using the Decisional Regret Scale (Brehaut et al.), both at least three months after surgery. Follow-up assessments were also performed at six and twelve months; however, only nine and six participants, respectively, completed these follow-ups. Audiological testing included Consonant-Nucleus-Consonant (CNCq) monosyllabic word testing in quiet at 70 dBA.

RESULTS

Among participants, 78.6% reported minimal to no decisional regret, whereas 21.4% reported moderate regret. No significant differences were observed with respect to age, insurance status, race or ethnicity, cochlear implant (CI) laterality, device manufacturer, or underlying etiology of HL.

Notably, some variability was observed in daily CI engagement (mean daily usage), quality-of-life scores, and discrepancies between objectively measured speech outcomes and patients' subjective perceptions of satisfaction.

CRITICAL NOTE:

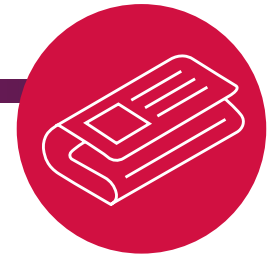
The study offers a meaningful contribution to the literature. It addresses a highly relevant topic, highlighting that although cochlear implantation for single-sided deafness is increasingly accepted, promoted, and reimbursed, careful management of patient expectations and comprehensive pre-operative counselling remain essential to minimise the risk of decisional regret.

Surprisingly, patients reporting moderate regret demonstrated greater objective improvement in speech perception scores (CNCq) at six months compared to those reporting minimal or no regret. This suggests that objective hearing gains do not always correlate with subjective satisfaction.

Subjective satisfaction appears more closely linked to expectation fulfilment, that is, the extent to which the CI meets pre-operative expectations rather than audiometric outcomes alone. These results underscore the need for clinicians to move beyond conventional speech-in-quiet testing when evaluating success, and highlight the importance of comprehensive pre-operative counseling to appropriately manage patient expectations.

CONCLUSION

Patient-reported quality of life (QOL) and consistent device usage appear to be more reliable predictors of successful cochlear implant outcomes than objective speech scores alone. •



DEVELOPMENT OF COMPETENCY CRITERIA FOR REAL-EAR MEASUREMENT: FINDINGS FROM A MODIFIED E-DELPHI ROUND 1



Venkatesan B., Bagatto M., Moodie S., et al.

Am J Audiol. (2025): 34, 1–18.

doi: 10.1044/2025_AJA-25-00012.

By Gian Carlo Gozzelino – Italy

The article proposes a structured framework of consensus-based competency criteria for real-ear measurement, developed using a modified electronic Delphi process.

INTRODUCTION

Real-ear measurement (REM) is widely recognised as a cornerstone of evidence-based hearing aid (HA) fitting; yet its consistent and effective implementation remains uneven across clinical settings. While professional guidelines strongly recommend real-ear verification to ensure audibility and alignment with prescriptive targets, uptake in routine practice remains limited. Among the most frequently cited barriers are not lack of awareness, but rather insufficient competence, confidence, and structured training among clinicians. This disconnect highlights a broader issue within audiology education: the absence of clearly articulated, consensus-driven competency criteria that define what it actually means to be ‘competent’ in real-ear verification.

The article under review addresses this gap by proposing a structured framework of competency criteria for REM, developed through a modified electronic Delphi process. Rather than focusing on outcomes or technology performance, the authors shift attention to the human factor: the specific knowledge, skills, and clinical judgments that audiologists must demonstrate to independently perform HA verification across the lifespan. By doing so, the study positions itself at the intersection of clinical practice, professional education, and competency-based training models.

SUMMARY OF KEY FINDINGS

The study reports the results of the first round of a modified e-Delphi process designed to establish expert consensus on competency criteria for real-ear measurement. An initial set of 54 competency items, derived from established guidelines and clinical workflows, was organised into seven domains covering the full verification process: equipment calibration; patient preparation; verification preparation; real-ear-to-

coupler difference (RECD); prescription configuration; on-ear verification; and simulated real-ear verification.

A panel of 29 experts with diverse professional backgrounds—including clinicians, educators, managers, and industry professionals—completed the first survey round. Using a predefined consensus threshold of 70% agreement, the panel reached consensus on 52 of the 54 proposed competencies. Many of these achieved very high levels of agreement, particularly those related to calibration procedures, otoscopy, probe tube placement, RECD measurement, and interpretation of aided responses relative to targets.

Items that failed to meet consensus or generated substantial qualitative feedback were earmarked for revision and re-evaluation in a subsequent Delphi round. The qualitative comments highlighted areas of ambiguity, overlap between competencies, and variability in clinical practices, particularly regarding optional software tools and brand-specific features. Overall, the findings indicate strong expert alignment on the core elements required for competent real-ear verification, while also identifying aspects of practice where standardisation remains challenging.

KEY STRENGTHS

One of the article’s primary strengths lies in its explicit emphasis on competency rather than procedure alone. By framing real-ear measurement as an entrustable professional activity, the authors align the study with modern competency-based education paradigms that prioritise observable, measurable performance. This approach moves beyond checklists of recommended actions and instead clarifies what clinicians should be able to do independently, safely, and effectively. The methodological choice of a modified e-Delphi process is well justified and well executed. Grounding the initial items

CRITICAL NOTE

Despite its strengths, the study also presents several limitations that should be considered when interpreting the findings. First, the article reports only the results of the initial Delphi round. While this is methodologically defensible, the absence of finalised competencies means that the framework remains provisional. Some items that achieved consensus still required rewording or consolidation, and the definitive structure will only emerge after subsequent rounds are completed and published.

The geographic distribution of participants represents another limitation. The majority of experts were trained in North America, which may influence perspectives on best practice, available equipment, and training norms. Although real-ear verification principles are broadly international, variations in local health care systems, regulatory environments and educational models could affect how competencies are prioritised or implemented in other regions.

An additional consideration is the inherent tension between universality and flexibility within the proposed competencies. While the framework aims to define core expectations, several items revealed disagreement related to optional software tools, manufacturer-specific features, or alternative verification strategies. This raises important questions about the degree of rigidity with which such competencies should be applied, particularly in contexts with limited resources or variable technological infrastructures.

Lastly, the study does not yet establish a direct link between the proposed competencies and measurable clinical outcomes. While the framework is logically grounded in best practice principles, future research will need to determine whether competency-based training using these criteria leads to improved verification rates, greater fitting accuracy, or enhanced patient outcomes.

Overall, this article makes a meaningful contribution to the field of audiology by addressing a long-standing gap between evidence-based recommendations and routine clinical practice. By establishing consensus-driven competency criteria for real-ear measurement, the authors provide a foundational structure that can support education, supervision, and professional development.

The findings underscore that improving hearing aid outcomes is not solely a matter of technology or guidelines, but of equipping clinicians with clearly defined, assessable skills. While the work is still in progress, the high level of agreement achieved in the first Delphi round suggests strong professional alignment regarding what constitutes competent practice.

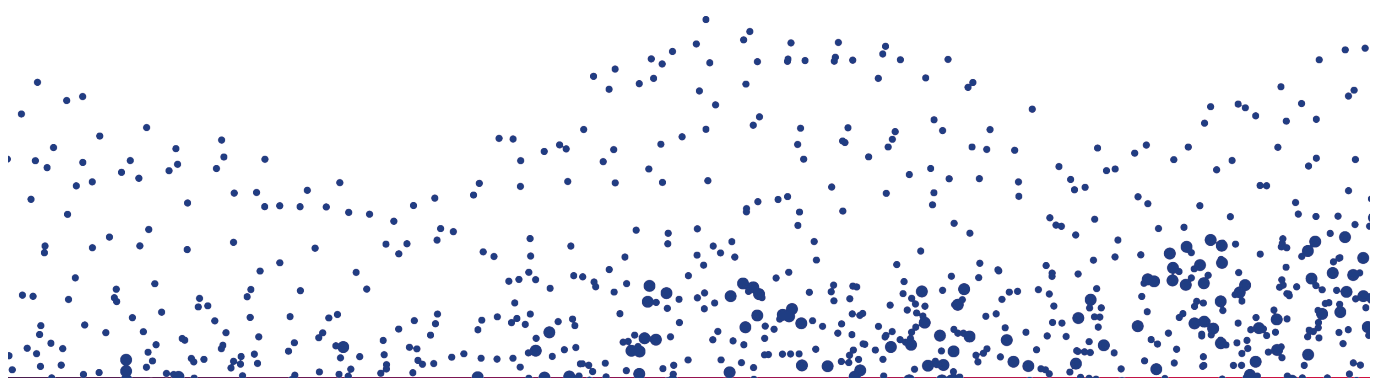
If further validated and operationalised, this framework has the potential to standardise training, boost clinician confidence, and ultimately promote the consistent use of real-ear verification. In doing so, it could help close the gap between recommended best practice and real-world implementation, with tangible benefits for both clinicians and patients.

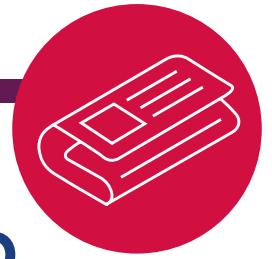
in established guidelines ensures relevance and efficiency, while the iterative consensus-building process enables expert judgment to refine and validate the framework. Moreover, the inclusion of both quantitative agreement metrics and qualitative feedback strengthens the credibility of the results and provides transparency regarding how consensus decisions were reached.

Another notable strength of the study is the comprehensive scope of the competency domains. The proposed framework captures the entire verification workflow, from technical setup to patient interaction and interpretation of outcomes. This

holistic perspective acknowledges that real-ear verification is not merely a technical task, but a complex clinical activity requiring the integration of measurement accuracy, patient comfort, communication skills, and clinical reasoning.

Finally, the diversity and depth of experience of the expert panel add weight to the findings. With a substantial proportion of participants having more than two decades of clinical experience, the consensus reflects deep practical knowledge rather than purely academic perspectives. This enhances the applicability and acceptability of the resulting competencies in real-world clinical environments. •





ASSOCIATIONS BETWEEN PREDISPOSING, ENABLING, AND NEED FACTORS AND HOURS OF DAILY HEARING AID USE IN THE ATHEROSCLEROSIS RISK IN COMMUNITIES STUDY



Reed NS., Jiang K., Bessen SY., et al.
Am J Audiol. (2025): 34(4), 927–36.
 doi: 10.1044/2025_AJA-24-00251.
 By Mark Laureyns –Italy–Belgium

Years of prior hearing aid use, poorer pure-tone average (PTA) thresholds, and worse speech-in-noise performance in the better ear were all associated with increased daily hearing aid use.

INTRODUCTION

The authors note that the prevalence of hearing loss (HL) in the United States is on the rise and is projected to double by 2060. Existing literature has found that HL is a significant risk factor for cognitive decline, dementia, hospitalisation, depression, and increased fall incidence, whereas the use of hearing aids (HAs) have been associated with improved life quality and a reduction in the rate of cognitive decline. Consequently, mitigating the consequences of untreated HL through higher rates of HA adoption among individuals with hearing impairment is of critical importance. Socio-economic factors and stigma have been found to play an important role in the non-adoption of hearing care; however, recent population-based studies examining the individual factors influencing the daily HA use remain limited. To address this gap, the authors analysed data from the longitudinal population-based cohort Atherosclerosis Risk in Communities Study (ARIC) to look into these individual determinants.

SUBJECTS

The authors analysed the results of 764 subjects in this longitudinal ARIC study, who had reported using HAs during their sixth visit (2016 and 2017), who had correctly reported the hours of daily use data for one or both ears, and who showed no significant difference in hours of use between the right and left ear.

METHOD

In addition to daily HA usage, the authors collected the following participant characteristics, organised into three conceptual categories:

- Predisposition factors: age, gender, race

CRITICAL NOTE

Large-scale longitudinal health cohort studies, such as the ARIC study, provide a valuable resource for studying the long-term impact of hearing care, including amplification, on multiple health outcomes, as well as the influence of socioeconomic and other individual factors on the adoption and use of hearing devices.

Based on prior research, one might have expected a greater influence of socioeconomic status, health literacy, and cognitive function on daily hearing aid (HA) use. However, the authors clearly delineate the scope and limitations of the current study. The focus was not on whether participants initiated HA use, but rather on the individual-level variables associated with the number of hours of daily use. Future findings from the ACHIEVE study, in which more recent ARIC participants are enrolled, may provide additional or complementary insights regarding the determinants and broad health impacts of HA use.

- Enabling factors: education, relationship status, years of HA use, cognitive ability (global cognitive factor score), depressiveness (CES-D Scale), access to health care, health literacy
- Need factors: pure tone audiometric (PTA) and speech in noise (QuickSIN) performance

RESULTS

Hours of daily HA use was significantly associated with several individual-level factors:

- Female gender (p: 0,02 / r: 0,96 / OR: 1,46) (OR = Odds Ratio)–female subjects had 46% higher odds of using their HAs more hours/day than male subjects, but available case analyses yielded findings that were only marginally significant.
- Years of HA use (p: <0,001 / r: 0,08 / OR: 1,03)–each additional year of HA use was associated with an increase of 0.08 hours per day in daily use.
- PTA of the best ear (p: 0,01 / r: 0,63 / OR: 1,32)–for every 10dB PTA increase, daily use increased by approximately 0,63 h/day
- Speech audiometry in noise (p: 0,03 / r: –0,53 / OR: 0,80)–for every five-point increase in QuickSin score, daily use decreased by 0,53 h/day

CONCLUSIONS

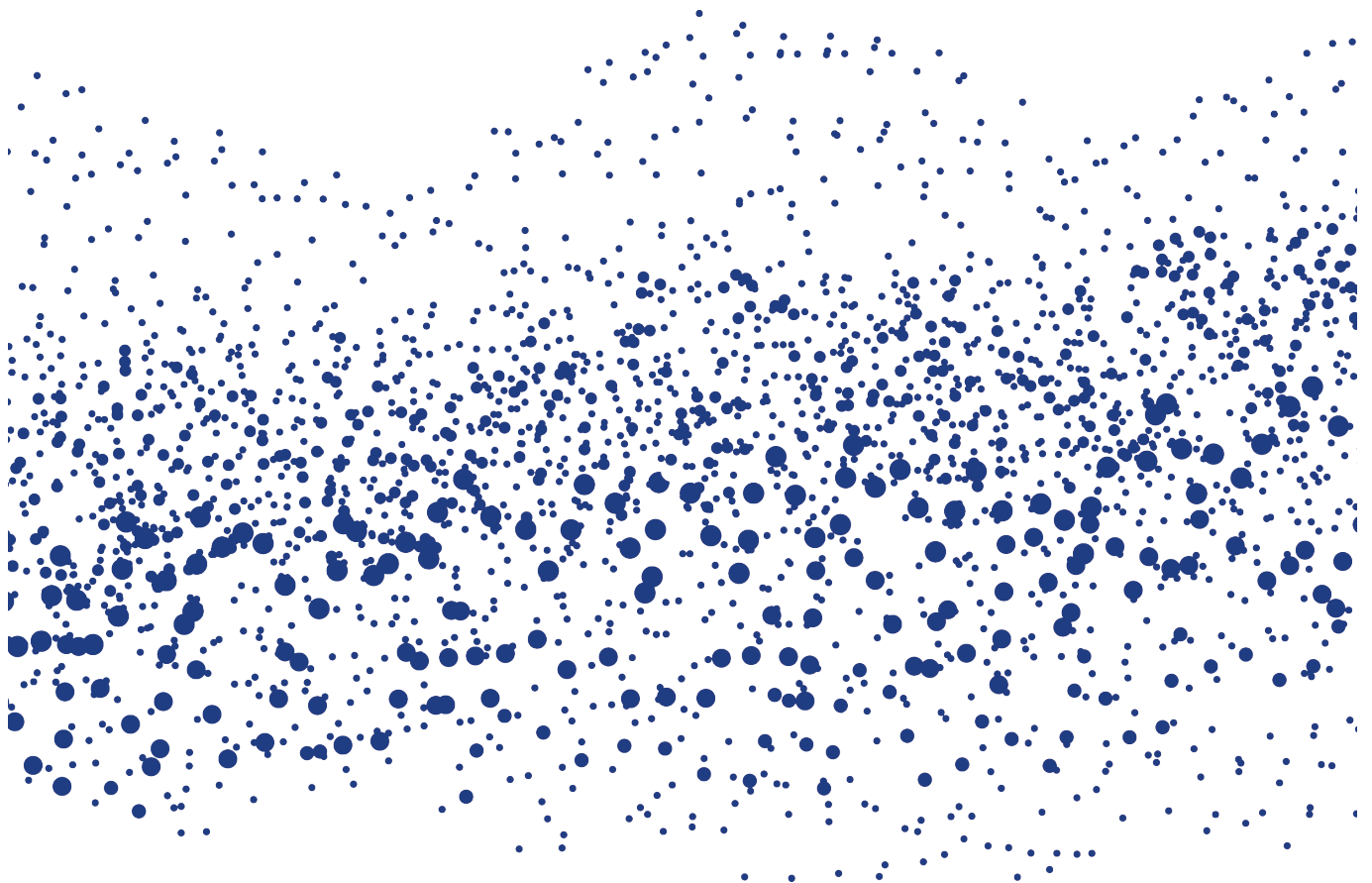
- Predisposition factors: Age and race were not found to have a significant correlation with daily HA use: Gender seems to be only marginally related, with female participants showing slightly higher odds of increased daily HA use
- Enabling factors: education, relationship status, cognitive

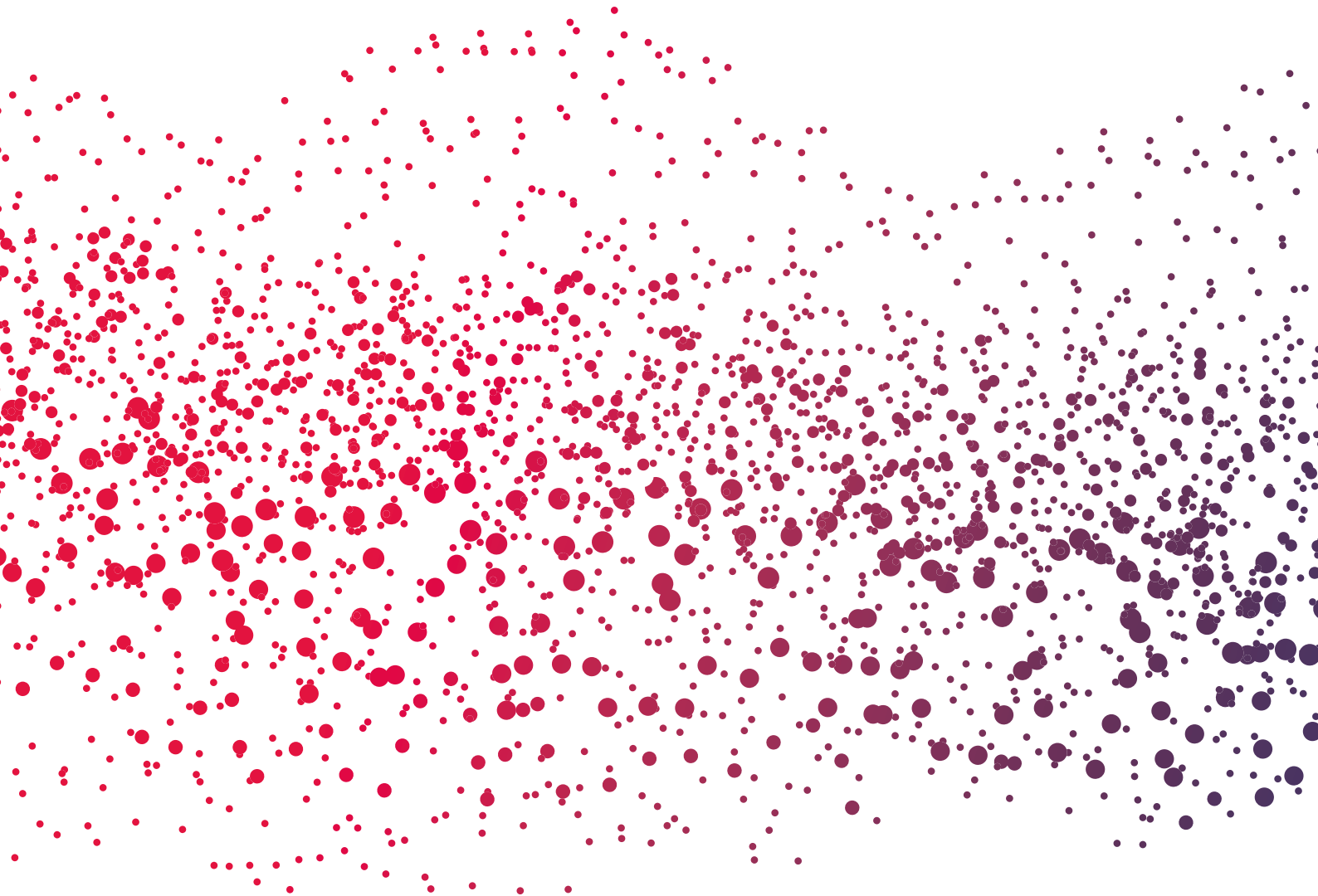
ability, depressiveness, access to health care and health literacy were not significantly related to daily HA use. However, a longer duration (more years) of HA use was positively associated with greater daily use

- Need factors: Both poorer PTA results in the better ear and speech in noise performance were associated with increased daily HA use.

LIMITATIONS

The authors acknowledge several limitations of their study. First, no assessments were conducted regarding participants' satisfaction with or attitudes toward their HAs, the quality of the HA fit, or the acoustic environments in which the devices were used. Second, the ARIC cohort consisted predominantly of white participants with a mean age of approximately 80 years, and inclusion was limited to those attending the sixth study visit. This may have introduced a selection bias toward a healthier and more active subset of the population. Consequently, the findings may only be generalisable to the specific demographic represented in this sample. •





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