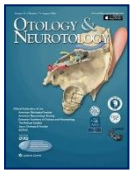
association between sound quality and performance problems and outcomes.

- Page 14: Reddy Sivaprasad – India:
  - Long-term Audiologic Outcomes After Cochlear Implantation for Single-Sided Deafness.
    - *Sullivan SB et al.*
    - *Laryngoscope, 2020: 130, 1805–1811.*
    - *This a large group study which measured speech perception scores and localization ability over a longer-term post implantation is subjects diagnosed with single-sided deafness. Results indicated that there was an immediate improvement in scores such as speech in quiet and head shadow effect, localization ability gradually improved over time.*
- Page 16: Reddy Sivaprasad – India:
  - Single-sided deafness after sudden hearing loss: late effect on cochlear nerve size.
    - *Islamoglu Y et al.*
    - *European Archives of Oto-Rhino-Laryngology, 2020: 277, 2423–2426.*
    - *As a greater number of cases with sudden-onset SSD being reported across, this study examined an important question – Does the deafness affect cochlear nerve diameter in SSD ears? MRI studies were obtained in a large number of subjects and the results showed that the cochlear nerve diameter was not different in normal versus deaf ears and the diameter is not affected by number of deafness ears.*
- Page 17: Reddy Sivaprasad – India:
  - Age-Related Central Auditory Processing Disorder, MCI, and Dementia in an Older Population of Southern Italy.
    - *Sardone R et al.*
    - *Otolaryngology–Head and Neck Surgery, 2020: 163(2), 348-355.*
    - *Age-related hearing loss leads to cognitive dysfunction in later age. This study found another missing link to this theory using a huge population-based cross-sectional study. Authors concluded that age-related central auditory processing disorder has stronger association with mild cognitive impairment that that with a peripheral hearing loss.*
- Page 19: Reddy Sivaprasad – India:
  - Audiological Findings in Children Suspected to Have Been Exposed to the Zika Virus in the Intrauterine Period.
    - *Cardoso CAA et al.*
    - *Otology & Neurotology, 2020: 41 (7), e848-e853.*
    - *In this prospective study, authors examined 78 babies using automatic ABR screening test twice within 6 months intervals. Leaving out 24 babies, other had a risk of maternal exposure to zika virus. Tests showed that results did not change within the time frame.*
- Page 20: Reddy Sivaprasad – India:
  - Hearing Outcomes of Treatment for Acute Noise-induced Hearing Loss: A Systematic Review and Meta-analysis.
    - *Koochakzadeh S et al.*
    - *Otology & Neurotology, 2020: 41 (7), e848-e853.*
    - *Pharma options to treat acute acoustic trauma have been studied for long. Authors conducted a first-ever systematic review and meta-analysis of the published literature on this subject. Strong statistical techniques and relevant observations were drawn from this study.*

- Page 22: Imran Dhamani – Australia:
  - Cortical Neuroplasticity and Cognitive Function in Early-Stage, Mild-Moderate Hearing Loss: Evidence of Neurocognitive Benefit from Hearing Aid Use.
    - *Glick H & Sharma A.*
    - *Frontiers in Neuroscience (2020): Vol 14, Art. 93, 1-22.*
    - *Even a mild to moderate degree of untreated age-related sensorineural hearing loss can lead to deficits in auditory speech perception in noise and cognitive functioning. Hearing aid use can reduce listening effort which can therefore lessen the cognitive effort required for top-down modulation of auditory processing.*
- Page 25: Majda Basheikh – Canada:
  - Relationships Between Coping Behaviours and Social Loneliness in Adults With Self-Reported Hearing Problems.
    - *Warringa L et al.*
    - *Ear & Hearing, Vol. 41 (2020), No. 4, 1040-1050.*
    - *This study examined adults with hearing loss to determine if the use of helpful coping behaviours will reduce feelings of social isolation. Statistical analyses were applied to evaluate the relationship between measures of 6 coping behaviours and social loneliness. This study gives great insight on the value of adequate coping behaviours in the hearing-impaired.*
- Page 27: Thomas Zacharia – Australia:
  - Discovering the unmet needs of people with difficulties understanding speech in noise and a normal or near-normal audiogram.
    - *Mealings K. et al.*
    - *American Journal of Audiology Vol. 29 (2020) 329–355.*
    - *The authors of this study used a design thinking approach to better understand King-Kopetzky syndrome (Hinchcliffe, 1992) which is described as individuals with clinically normal hearing or mild hearing loss, but experience greater than expected hearing difficulties in noise.*
- Page 29: Thomas Zacharia – Australia:
  - Use of mild-gain hearing aid by middle-age normal-hearing adults who do and do not self- report trouble hearing in background noise.
    - *Singh J. & Doherty K.*
    - *American Journal of Audiology Vol. 29 (2020) 419–428.*
    - *The current study aimed at finding how individuals with clinically normal hearing but self-reported to have trouble hearing speech in noise and self-reported not having any issues hearing in background noise with mild gain hearing aid for 2 weeks.*

Influence of Cochlear Dead Regions on Hearing Outcome in Sudden Sensorineural Hearing Loss.



Choi JE et al.

Otology & Neurotology (2020): 41(6), 889-894.

A cochlea dead region (DR) is defined as a region of the cochlea where the inner hair cells (IHC) or its associated auditory nerve is completely non-functioning. Basilar membrane motion in this DR would not be able to be detected by that neuron. However, if the sound is loud enough, the increase in basilar membrane motion may be detected by its adjacent neurons that are tuned to either higher or lower frequencies. DRs have somewhat important implications in rehabilitation, as amplifying DRs may not give functional benefit and/or cause distortion.

DRs are difficult to identify on the pure-tone audiogram alone as the threshold measured may be a result of this 'off-frequency listening' described above, with the actual threshold being much worse. It is well accepted that DRs are most prevalent in hearing losses of at least 70dB HL, where there is nearly always associated IHC damage on top of OHC damage.

The Threshold-Equalising Noise (TEN) test utilises a tone-in-noise paradigm, where pure-tone thresholds are obtained in the presence of an ipsilateral noise. If a DR is present, the noise would mask the adjacent neurons and prevent 'off-frequency' listening, causing the threshold to be masked down.

Sudden sensorineural hearing loss (SSNHL) is defined as a drop of hearing of at least 30dB HL in three adjacent octave frequencies occurring over a course of three days. Though some are attributable to pathologies such as Meniere's Disease, vestibular schwannoma, viral infections, or congenital anomalies; most causes of SSNHL are idiopathic, with both the configuration of hearing loss as well as the prognosis from treatment is widely variable. This study sought to investigate the usefulness of the TEN test to identify the prevalence of DRs and their use as a prognostic factor for SSNHL patients.

-

A total of 130 participants with SSNHL without a known cause were included in this study. The TEN test was performed before and after steroid treatment (systemic and/or intratympanic).

Of the 130 participants with SSNHL, 20.8% had one or more DRs, with the DRs mainly observed in low frequencies and in the moderately-severe region. When participants were assigned to a DR+ (those who had DRs) and DR (those who did not have DRs) group, the only difference were the word recognition scores, with the DR+ group performing significantly worse than the DR- group.

Of the 130 participants, only 68 followed through to the post-treatment assessment. These participants were assigned to a hearing improved group and hearing non-improved group in order to identify key predictors for hearing improvement. The proportion of participants with

a DR in the non-improved group was 34% compared to 14% in the improved group. Other factors related to hearing recovery were: absence of comorbid disease, better word recognition score, method of steroid treatment.
Multiple regression analysis resulted in these variables in order of strength of association to hearing gain from highest to lowest: initial pure-tone average, method of steroid treatment, presence of DRs, age.

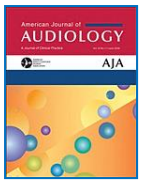
Critical Note

This is one of the first studies to evaluate hearing outcomes in SSNHL according to the presence of cochlea DRs, where DRs were observed in 21% of SSNHL participants, and the presence of DRs being a greater predictor of hearing gain compared to age.

Weaknesses of this study include the fact that the TEN test is unable to test hearing losses of greater than 95dBHL, therefore excluding profound hearing losses from the study. Also, the fact that a considerable number of participants did not follow through to the final assessment weakens the power of the study.

Use of the TEN test to identify DRs in order to predict potential outcomes of SSNHL treatment may be useful in the clinical setting, as the test itself does not take long to administer. Further studies should be done to assess the usefulness of the TEN test.

Subjective Hearing Difficulty and Fall Risk.



Critera E. & Gustavsona M.

American Journal of Audiology (2020): 29, 384–390.

Hearing loss is a risk factor for falls. Hearing loss prevalence increases with age and so does the risk of falls., There is therefore a substantial overlap between individuals who report hearing loss and those who report falls, but this overlap is not coincidental and in the existing literature not all studies implicate measured hearing loss as a fall risk factor where in the past literature investigated only limited age groups (40–69years) with the use of audiometric data available from the National Health and Nutrition Examination Survey (Lin and Ferrucci, 2012) and was only based on the better ear pure-tone average.
Pure-tone audiometric results do provide the important and useful information for the audiologists but they lack the information such as listening difficulties obtained via self-reported hearing measurements.
Subjective measures of hearing difficulty, such as the Hearing Handicap Inventory for the Elderly (1982) was created to capture the perceived hearing difficulty in an individual's daily life and has been a useful tool for various research studies for so many years. According to the authors in the study there was a need to investigate further if fall risk is related to measured behavioural audiometric thresholds or other hearing-related factors, such as subjective
Hearing difficulty, is also important to determine risk of falls.

The authors used subjects as community-dwelling older adults, aged from 60 years and older who met a number of criteria to ensure safe participation in the study, and were classified into three groups as non-audiology patients(n=28), audiology patients with hearing aids (n=18) & audiology patients without hearing aids (n=28) who had to complete a case history including the medications & history of falls within past 12 months along with three questionnaires, including the Hearing Handicap Inventory for the Elderly (HHIE), Dizziness Handicap Inventory (DHI), Activities-Specific Balance Confidence Scale (ABC); and one functional balance measure, the Timed Up and Go (TUG) test. A Pearson and Spearman correlations were calculated after analysing the group differences in mean age using a one-way analysis of variance (ANOVA) and evaluated how subjective hearing difficulty (i.e., HHIE score) relates to other measures by the authors.

The result of the study depicted the average TUG times, ABC score, DHI score, the number of medications, and the number of recent falls which were then plotted according to group and HHIE score category (i.e., mild, moderate, severe).
The authors found that both HHIE score and categories were associated with increasing DHI score in audiology patients who had not been fitted with hearing aids.
In audiology patients with hearing aids, HHIE unaided scores were correlated with history of falls within the last 12 months with reference to the time period of the study.
Furthermore, the results of this study suggested that increasing levels of subjective hearing difficulty, as measured by the HHIE, are significantly correlated with some fall risk factors in older adult participants, including history of falls.
Overall, participants with higher degrees of subjective hearing difficulty were on an average at risk of falls more often than those with lower degrees of subjective hearing difficulty or

the audiology patients who were fitted with hearing aids and that reported lesser number of falls.

Therefore, the authors concluded that there is a crucial need to investigate further the potential role that hearing and hearing aids have on fall risk in a wider population with longitudinal studies including other variables like aided versus unaided HHIE scores, comparative pure-tone thresholds, data-logging or stating the usage of the hearing aids especially during TUG tests, with equal distribution of the subjects in each groups of interest and exploring the gender factor, hearing related fatigue as well as social interaction in fall risk.

Critical Note

This interesting study provides a good understanding of the correlation between risk of falls, hearing loss and the importance of hearing aid usage which can be further incorporated in various clinical counselling tools to facilitate regular hearing aid usage along with the early management of the hearing loss in the elderly.

However, the study was mainly dependent on subjective measures and with unequal number of subject distributions across the studied groups which limits the scope to evaluate the benefit of long-term usage of hearing aids can have on reducing the risk of falls.

Perception of One's Own Voice After Hearing-Aid Fitting for Naive Hearing-Aid Users and Hearing-Aid Refitting for Experienced Hearing-Aid Users.

Hengen J, Hammarström I & Stenfelt S.

Trends in Hearing – 2020 Volume 24: 1–17.

Introduction:
Patients' concerns regarding own-voice perception has been a longstanding issue when fitting hearing aids. Potential influences for the dissatisfaction with one's own voice are the occlusion effect when using custom earmolds or closed domes, the time difference with the digital processing of the air conduction sounds and the person's bone conduction component of their voice, and the settings on the hearing aid (e.g., high compression ratios and directional microphones). Many clinicians counsel patients on the perception of their own voice being attributed to the altered tonal quality from their hearing loss, and now with the hearing aids they are hearing how their voice should sound. Thus, counselling them that they will get used to the sound of their voice over time. Adjustments can be done in order to try and reduce discomfort, such as reducing the compression or decreasing the gain for low frequency sounds, but it is not always successful.

The goal of the study was to investigate participant's own voice perception before and after a hearing aid fitting/refitting. Specifically, the researchers hypothesized that first time users would report a larger difference in their own-voice perception than experienced users and those who required an earmold would be report more issues than those with an open fitting.

Methods:
There were three participant groups: first time hearing aid users (n=70; average age =74 years old), experienced hearing aid users being fit with new technology (n=70, average age= 75), and an unaided control group (n=70, average age= 71). There were 50 hearing aids fit with domes and 20 hearing aids with earmolds for the first-time users and 21 hearing aids with domes and 49 hearing aids with earmolds for the experienced users.

The hearing aid fitting process was approximately four appointments over 3-4 months. Participants completed questionnaires and forms discussing their self-reported hearing problems, perceived own voice quality, and additional demographic information at the before and after the fitting process. The Hearing Handicap Inventory for the Elderly (HHIE) questionnaire was used to gather participants' self-reported hearing problems, a modified version of the Own Voice Quality (OVQ) questionnaire was used to gather information regarding participants' own voice, and the Voice Handicap Index (VHI) was used to gather information of any voice problems described by participants.

Findings:
Both first-time users and experienced users had reduced post-fitting scores on the HHIE when compared to pre-fitting, indicating increased satisfaction with their hearing ability with the hearing aid. With the VHI, first-time users had higher scores post-fitting, indicating an increase in self-rated voice problems. Where experienced users again had lower post-fitting scores on the VHI. When asked about their agreement to the statement 'the sound of my own voice is a problem for me' on the OVQ questionnaire, experienced users had higher

scores (more problems) pre-fitting compared to first-time users and the control group. Post-fitting, there was no significant difference in scores between the experienced and first-time users. Suggesting, that first time users had more issues regarding the sound of their voice after the HA fitting. The control group had the lowest scores across all questionnaires compared to the first-time users and experienced users, suggesting they had little to no issues regarding their own voice perception.

When comparing earmold versus dome users, more first-time users fitted with earmolds indicated having problems with their own voice than those fitted with domes. There were no significant differences between experienced dome and earmold users, both groups had less problems with their own voice post-fitting but generally still experiencing issues with their voice.

Participants' perceived ability to simultaneously speak and hear in conversations was different between the first-time users and experienced users; first-time users' perceived ability was better than experienced users pre- and post-fitting. Both groups reported more issues with speaking and hearing in a conversation than the control group, suggesting it influenced by the hearing loss not necessarily the hearing aids.

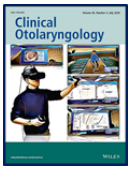
First-time users had similar scores to the control group pre-fitting regarding disturbing sound qualities, suggesting that the hearing loss has less influence on perception of one's own voice compared to the hearing aid. Experienced users did not differ from first-time users post-fitting when discussing disturbing sound qualities of their own voice. This result indicates that the low satisfaction regarding ones' own voice perception will not improve over time. Perhaps, patients become more accepting of the new quality of their own voice as a compromise for better hearing.

Conclusion:
There was an increase in dissatisfaction of own voice perception after a hearing aid fitting with first-time users whereas experienced users had less issues with their own voice post refitting. The researchers believe that participants' voice intensity and their ability to speak and hear in conversations may be influenced by both the hearing loss and the hearing aids but the disturbing sound qualities that participants' hear in their own voice is greatly related to the hearing aids.

Critical Note

The questionnaires used in this study were briefly described but additional information about each one should have been included. For example, the OVQ questionnaire was not provided in any supplementary files so readers must search for the questionnaire themselves. Also, the authors did not mention the length of each questionnaire, the OVQ questionnaire was 102 questions, and this may have influenced participants responses. Additionally, even though the authors propose that clients will always have low satisfaction with their voice, it would have been interesting to see the results of the first-time users a month or so after the hearing aid fitting to see if any counselling improved their perception or satisfaction.
I enjoyed reading this article and felt like it confirms our daily interactions with client, especially when counselling on own voice perception. This article provides clinicians information that they can take away and incorporate into counselling (e.g., the hearing loss and hearing aid are both contributing to own voice perception).

An effective decision-making aid for patients with tinnitus: A retrospective review of 205 patients.



Murphy D & Phillips J.

Clinical Otolaryngology Vol 45, n° 5 (Sept 2020), p818–822.

There is a considerable increase of people with tinnitus, and in the UK 10.2% - 14.2% of the population has this symptom.
To guarantee a referral of patients with tinnitus, it is important to have an effective triage pathway that facilitates the identification of the need for therapy by primary and secondary health care. Through a clear triage model, it is possible to reduce the waiting time as well as the cost-effectiveness associated with monitoring these cases.
The authors assessed the effectiveness of the triage pathway put in place in 2015 at the Norfolk and Norwich University Hospitals NHS Foundation Trust.
The referral process considers multidisciplinary skills, referring cases according to the combination of the results obtained in the Pure Tone Audiogram, the presence of Red Flag symptoms and the result obtained in the THI questionnaire. The referral can consist of group therapy, individual therapy or counselling, guidance and self-management of tinnitus; depending on the severity of the case.
Patients with mild tinnitus are provided with written and online material so they can self-regulate their tinnitus. Cases of moderate tinnitus (THI up to 56) are referred to group therapy sessions. The goal is to have more knowledge about tinnitus, to know of techniques to reduce its intensity, for example, relaxation techniques and meet other people with the same symptoms. This therapy reduces waiting times, as well as decreases the costs associated with the therapy while maintaining it's effectiveness. Individual therapy sessions (ITS) are indicated for patients with severe tinnitus. ITS allows for individual monitoring of the case, exploring relaxation solutions, as well as techniques for improving sleep and psychological support, in addition to the techniques presented in group sessions. A hearing aid assessment is done in all cases with hearing loss, in cases of severe or profound hearing loss, the hearing rehabilitation is completed before tinnitus therapy.
The authors defined cases where triage and therapy took place within 12 months as a "successful triage". They defined that a "triage failure" consists of referral to insufficient therapy, resulting in a re-referral to more effective therapy.
In order to analyse the success of the triage pathway, the authors identified the individuals followed in the service within 12 months, from 01 January 2017 to 31 December 2017. Of the 205 cases identified, eleven were re-referred to the service, but only one if due to a "triage failure". Ten of the patients were re-referred due to external causes, for example, refusal of treatment, missed appointments, among others. The only case of "triage failure" was due an error in the calculation of the result of the THI questionnaire.

The authors consider, taking into account the low failure rate, that this triage pathway is effective, and it is important to guarantee the simplicity of the process and the instruments used (THI) in order to reduce "user errors".
As indicated by the authors, it is important to analyse the effectiveness of this triage pathway in other health systems and relate to the patient's economic level. There is also a need to relate the effectiveness of the triage to the geographical location of medical services.

Critical Note

The health system must ensure a clear triage pathway and referral process effective to ensure the success of therapy in patients with tinnitus. It is also important to ensure that primary and secondary health services are aware of this reality. At the same time, it is essential to reduce waiting times and costs associated with tinnitus therapy, ensuring appropriate health services for all patients with tinnitus.

Investigating the prevalence and impact of device-related problems associated with hearing aid use.

Bennett R, Kosovich E, Stegeman I, Ebrahimi-Madiseh A, Tegg-Quinn S & Eikelboom R.

International Journal of Audiology (2020) Vol 59: 8, 615–623

Researches have been shown that although hearing aid (HA) technology has improved in recent years, there are still many clients who are not using their HA due to problems they experience with them. These problems relate to physical fit, sound quality and also handling and maintaining the HA. Most of the problems can be addressed by audiologists through modifications of the HA and by educating and training the clients. It seems that some of the HA owners do not recognize their problems, some do not report them to their audiologists and in other cases clients that seek help for their problems are not provided with the right solutions from their audiologists.

The purpose of this study was to explore the prevalence of problems related to HA use, to investigate HA owners help-seeking behaviours regarding the problems they experience with their HA and to identify outcome and demographic factors correlated to those problems.

413 Australian HA owners (34-97 years old) participated in the study. 61% were male, 92.7% had binaural HA, 84.6% wore BTEs with HA experience of 6 months to 61 years. All participants completed: 1. Short anamnesis; 2. a survey regarding HA problems, developed especially for this study; 3. Questions regarding help-seeking behavior for each problem mentioned in the survey; 4. The International Outcome Inventory for Hearing Aids (IOI-HA); 5. The self-administered Hearing aid Skills and Knowledge Inventory (HASKI-self).

The survey that was developed for this study was based on previous research. It contained 26 items related to HA management (14) and HA sound quality and performance (12). Results showed that 98% of the participants experienced at least one of the HA problems included in the survey. The 3 most common reported problems were related to difficulty hearing conversation in noisy and in windy environments and difficulty hearing certain voices. The least reported was problems with changing batteries. Less than half of the problems (only 46.3%) were reported to the clinic. The 3 problems most commonly reported to the audiologist, but were not solved, related to sharp and high-pitched sound quality, what to do in case the HA stops working and about loud sounds. Participants who owned their HA more than a year and those with poor HA management skills and knowledge self-reported greater number of problems. Participants who self-reported more HA problems also reported lower level of HA benefits and satisfaction. There was an association between sound quality and performance problems and outcomes.

Critical Note

This research emphasises the extent HA owners face HA related problems. Many of the problems are not reported to the audiologist or remain unsolved although they

can be managed with fine tuning of the HA or by educating and training the clients. Developing and using clinical questionnaires that identifies HA related problems may help the client to recognize and report all the problems he or she faces with their HA and give the audiologist the information needed in order to decide which actions will solve the client's problems without creating new ones in the process.

This research by R.J. Bennett et al. is another one in a series of studies putting an important spotlight on our clients' HA management skills and knowledge, their recognition and responding to problems they face with their HA and the professional answers and solutions audiologists provide them with. As clinicians it is very important for us to be aware of those problems, know how to recognize them and find the right professional solutions. The tools Bennett et al. developed for their studies may have important clinical implications and should be considered to be implemented in our daily practice.

Long-term Audiologic Outcomes After Cochlear Implantation for Single-Sided Deafness.

Sullivan SB et al.

Laryngoscope, 2020: 130, 1805–1811

Single-sided deafness affects a variety of hearing abilities where binaural hearing is crucial. Speech understanding in noise, localization, understanding the depth and movement of sound source are some of the abilities that get hampered by SSD. Traditionally CROS/ BiCROS devices is provided as an immediate option for SSD. With obvious limitations, CROS has delivered mixed results to these individuals.

With increasing use of Cochlear implantation (CI), their benefits to SSD individuals are presently being studied. While most of these are pre- and post-CI studies, longitudinal study of benefit is very important. CI usage in SSD versus bilateral sensorineural hearing loss can be very different. In implanted SSD individuals, central neural adaptations between acoustic and electric hearing may take longer to result in any benefits. With this hypothesis in mind, the authors examined the longitudinal audiometric outcomes, sound localization abilities, tinnitus changes, and binaural benefits in this study.

60 subjects (33M and 22F, average age of 52y) with SSD who were implanted (Nucleus, Med-El, Clarion and Advanced Bionic devices) in the deaf ear between 2011-17 were included in this study. They were examined pre-op and post-op at intervals of 3,6, 12 months and annually. Speech perception scores for words and sentences in quiet, Hearing in Noise Test with different azimuths and localization test with environmental sounds were the measures obtained at all these intervals – all performed in sound field conditions. Tinnitus was measured using the Iowa Tinnitus Handicap Questionnaire during all the visits.

The following was observed:

1. There was a 42% mean and significant improvement of word scores in quiet in the first post-op test. Further tests did not show significant improvement

2. There was a significant improvement of sentence scores in quiet in the first post-op test. Further tests did not show significant improvement

3. Localization scores did not show improvement in the first post-op test but the scores improved gradually over time in subsequent post-op tests

4. From HINT scores, the performance was calculated for head shadow effect and binaural squelch effect. Results showed the head shadow effect improved significantly but the squelch scores did not improve post operatively

5. In subjects with tinnitus, there was no definite pattern/ improvement seen in ITHI scores post-operatively

Authors concluded that CI provided immediate improvements in understanding speech in quiet and head shadow effects, gradual improvements were seen in localization abilities. These findings support the benefit provided by CI in SSD groups.

Critical Note

This study had the largest group of subjects on this topic ever published. Authors considered a variety of variables that may be affecting the performance to understand the diversity. All statistical measures were quite appropriate for the research question. While etiology of hearing loss was included as a factor, more factors such as the device type, signal processing algorithm, number of hours of use, age of the subject and number of years with SSD should have also been considered.

Single-sided deafness after sudden hearing loss: late effect on cochlear nerve size.

Islamoglu Y et al.

European Archives of Oto-Rhino-Laryngology, 2020: 277, 2423–2426

Single-sided deafness (SSD) significantly lowers speech understanding in noisy backgrounds and when the sounds are arriving to the deaf ear even in quiet situations. Also affected are the abilities to localize, detect distance and movement. Cochlear implant is emerging as an option to rehabilitate SSD.

It is well known that the cochlear nerve (CN) diameter is an important prognostic factor in outcomes of CI and the CI diameter is negatively proportional to the duration of deafness. This study aimed at examining the CN diameter between normal and deaf ears in post lingual SSD and also examine the effect of the duration of deafness on the CN diameter.

53 subjects (25M and 28F, mean age 45.5 years) all having sudden onset SSD (better ear normal, poor ear being deaf) were chosen for this study. Deafness duration ranged from 5-20 years. High resolution 3D-T2 space MRI images of both temporal bones were obtained. Vertical and horizontal measurements of the cochlear nerve were obtained at fundus level.

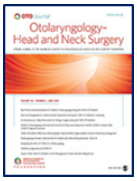
The study found:
1. No differences in horizontal and vertical diameters and area of CN between normal and deaf ears
2. The same was observed in both male and female subjects
3. The same was observed irrespective if the age of the subject

Authors concluded that no spiral ganglion cell/ cochlear nerve loss happened due to sudden onset SSD, hence, they remain best candidates for CI at all age groups.

Critical Note

This study added a crucial piece of information at the time when CI is emerging as an important option to treat sudden-onset SSD. As this is a simple research question, the methodology chosen was appropriate.

Age-Related Central Auditory Processing Disorder, MCI, and Dementia in an Older Population of Southern Italy.



Sardone R et al.

Otolaryngology–Head and Neck Surgery, 2020: 163(2), 348-355

Age-related central auditory process disorder (CAPD), now considered an aspect of age-related hearing loss (ARHL) is characterized by poor speech understanding in noisy environments or against competing speech or any other alteration in terms of acoustic features of speech perception. As a result of poor auditory perception, adults with CAPD rely more on visual cues and develop compensatory strategies to communicate. Several studies, systematic reviews and meta analyses have shown that ARHL and later age cognitive disorders including the mild cognitive impairment (MCI) are associated. This study was aimed at studying the association between age-related CAPD and MCI in a population study.

The study was conducted between 2013-18. All subjects (n=1647) whose age was above 65 years, underwent several examinations: Blood samples were collected for checking the serological markers Audiological assessments included puretone audiometry, impedance tests, Synthetic Sentence Identification – Ipsilateral Competing Message test (SSI-ICM for subjects with PTA < 40 dB HL). CAPD was diagnosed when scores were < 50% in the better ear for 0 dB message-competition ratio. A battery of neurological and neuropsychological tests was also conducted to evaluate the cognitive functions. Based upon these tests, 3 subgroups were identified– normal cognition, MCI (n=260) and dementia (n=59).

The following were the important findings:
1. Prevalence of CAPD was 14%. More in males (55%) compared to females (45%)
2. Mean - age 74 yrs, education 7 years, MMSE score 27
3. Prevalence of CAPD increased with age
4. Lower SSI-ICM scores were seen in the better ear (with lower PTA) in MCI and dementia groups compared to the normal group.
5. CAPD has been a good predictor of a diagnosis of MCI. With every single unit increase of SSI-ICM score, the MMSE score also increased
6. The degree hearing loss (PTA) could not affect the prediction of MCI using CAPD

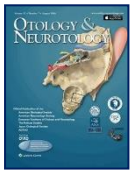
The Authors called for more such population-based studies for further insights. For clinical use, they indicated the need for more comprehensive audiological examination to include CAPD assessment in this age group. Authors also acknowledged some limitations that can be considered by future studies.

Critical Note

This is a landmark study trying to find the evidence to support for the link between ARHL and MCI. The conclusions are thought provoking and instigate the clinicians to change their assessment and rehabilitation aspects. Huge data was collected in this

study, but the presentation of the results could have been better. Using appropriate statistical methods was another strength of the study.

Audiological Findings in Children Suspected to Have Been Exposed to the Zika Virus in the Intrauterine Period.



Cardoso CAA et al.

Otology & Neurotology (2020): 41(7), e848-e853.

Maternal exposure to Zika Virus (ZIKV) leads to congenital anomalies such as microcephaly and neurological complications, which is known as congenital Zika syndrome (CZS). Through fetal brain disruption sequence, CZS results in cortical calcifications, cortical dysplasia, atrophy of the cortex, microcephaly, and ophthalmologic and auditory alterations.

ZIKV is presumed to affect both inner ear structures and auditory neural structures there by affecting various aspects of hearing. This study was conducted in Brazil with newborns born between 2015-16. Authors aimed at studying the frequency of abnormal auditory manifestations in the first 6 months and at 12 months of age in children born to mothers exposed to ZIKV.

78 babies were tested using automatic ABR screening (using CE chirp stimulus at 30 dB nHL) twice within 6 months intervals. They were grouped into 4: Group1 (n=36) with confirmed ZKV exposure, Group2 (n=24) with no ZKV exposure and Groups 3 (n=12) and 4 (n=6) with suspected ZIKV exposure, but not confirmed by lab tests. Results showed that 4 babies (from groups 1,3,4) showed abnormal results (5.1%) in both the assessments and their hearing thresholds did not change between assessments.

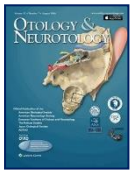
Further diagnostic tests confirmed that one child had bilateral moderate to severe hearing loss. Two babies had unilateral moderate to severe hearing loss. The remaining one had unilateral moderate hearing loss. Out of these 4, two infants had a microcephaly.

Non-progressive hearing loss seen in this study is similar to a pattern seen in cases of STORCH agents. This supports the theory that CZS results in fetal brain disruption sequence. Authors concluded that ZIKV exposure results in higher fail rate in newborn hearing screening making it a potential cause of hearing loss.

Critical Note

The sample size seems to be higher than in other studies on this subject. Introduction of a control group brought provided a useful perspective. Use of 30 dB chirp sounds was able to capture more abnormal results. 6 months interval is probably too short to capture auditory changes. Longer term longitudinal studies may reveal changes in children and pre-teens exposed to ZIKV.

Hearing Outcomes of Treatment for Acute Noise-induced Hearing Loss: A Systematic Review and Meta-analysis.



Koochakzadeh S et al.

Otology & Neurotology (2020): 41(8), e971-e981.

It is well known that exposure to loud noise is the single largest preventable cause of hearing loss both in adults and teens. Short exposure to loud noises results in acute acoustic trauma (AAT) and repeated exposures lead to a higher degree of permanent loss. At the AAT stage, several changes are seen in stereocilia of inner and outer hair cells, organ of Corti, supporting cells and blood vessels. Though these changes are initially seen in apical region of the basilar membrane, repeated exposures create similar changes all across the basilar membrane. Various pharmacological agents such as vasodilators, antioxidants, vitamins, steroids, JNK inhibitors and hyper baric oxygen therapy (HBOT) have been attempted to treat AAT. Authors conducted a systematic review and a meta-analysis to review the effectiveness of various drugs reported in the literature.

Studies from medical databases up to 2018, of subjects with sudden impulse noise exposure and detailed measurements of hearing thresholds, and use of one of the pharma agents were included in this review. 16 studies were analysed using the Downs and Blacks quality assessment tool for the quality of methodology. 4 studies (n=187 subjects) were included in the meta-analysis of proportions. Firearms and other weapons were the main case of AAT as reported in 14 studies. Outcome of the treatment was difference in HTLs before and after the treatment.

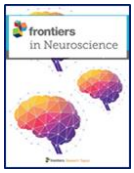
Meta-analysis showed:
a. The improvement after medication was seen in high frequency HTLs, but not seen at low frequency HTLs
b. Significant HTL improvement was seen within 48 hours of exposure. The effect was not significant post 48 hours.
c. Pharma agents used were: steroids, vascular agents, nootropics, antioxidants, vitamins, and cell apoptotic pathway inhibitors. Use of nootropic drugs along with a pharma agent resulted in significant HTL improvement. The same pharma agent when administered without a nootropic drug was not effective.
d. 47% subjects showed full recovery with drugs, 33% showed partial recovery (10 dB or greater) and 32% did not show any improvement.
e. Steroids and HBOT showed significant effects in all studies reported.

Authors concluded that within the timeframes reported, the acute acoustic trauma can be treated effectively using a pharma regime that includes a nootropic drug.

Critical Note

This study is probably the first systematic review on acoustic trauma treatment. Methodology and statistical techniques are a strength in this paper. Reporting the critical time period and effective drug regimen is the success of this study. Some more factors such as age, gender etc should have been studied in the meta-analysis.

Cortical Neuroplasticity and Cognitive Function in Early-Stage, Mild-Moderate Hearing Loss: Evidence of Neurocognitive Benefit from Hearing Aid Use.



Glick H & Sharma A.

Frontiers in Neuroscience (2020): Vol 14, Art. 93, 1-22.

It is now common knowledge amongst audiologists that auditory deprivation after hearing loss can lead to longstanding implications regarding cognitive function and neural plasticity as well as neural atrophy. There have been several recent studies which indicate a strong link between age related hearing loss and the risk for mild cognitive impairment and/or dementia, as well as accelerated decline in cognitive function over time. Amongst the various risk factors for dementia and accelerated cognitive decline, hearing loss is one of the important reversible factors. One of the most commonly proposed hypotheses for cognitive issues subsequent to age related hearing loss is the cognitive load theory which suggests that due to lack or degradation of the input to the auditory system, there is excessive listening effort which requires excessive use of top down cognitive resources such as attention and memory. This in turn affects the availability of these cognitive resources for other tasks which can manifest in terms of cognitive decline. As clinicians we often counsel our clients about these possible implications as well. However, there are only a few studies which have objectively demonstrated the benefit of using hearing aids as well as early intervention.

This study by Glick and Sharma is one of those clinical gems that could be helpful for obtaining a better objective understanding of some cognitive and neural changes that may take place as a consequence of auditory deprivation and the importance of correcting hearing loss. It has been studied extensively in the past that cross modal reorganization can occur as a consequence hearing loss whereby the neural structures responsible for auditory processing can be gradually and extensively deployed for other sensory tasks such as visual and tactile perception subsequent to large periods of auditory deprivation.

In this study the authors focus on the finding that auditory deprivation, because of presbycusis,s can lead to the reorganization of auditory cortical structures for visual perception. They divided the participants in two main age matched groups (mean age = 64 years) namely control group consisting of normal hearing participants and experimental groups which consisted of 28 adults with untreated mild-moderate degree of age-related sensorineural hearing loss. They then measured cortical visual evoked potentials using 128 high density EEG recordings, cognitive function and speech perception abilities for these participants. Later they fit the hearing-impaired participants in the experimental group with bilateral well fitted hearing aids and evaluated them again. The results indicated the following:

1) The hearing-impaired participants indicated extensive recruitment of auditory cortical neurons in a visual motion processing task used during the measurement of cortical visual evoked potentials. This result corroborates the previous finding of cross modal reorganization of auditory cortex for visual task after age related hearing loss and auditory deprivation. It also suggests that even a short period of auditory deprivation can cause compensatory changes in cortical neuroplasticity
2) Greater deployment of right side auditory cortical structures in visual task was associated with greater severity of hearing loss, poor speech perception in noise as well as cognitive performance. This may imply that there may be a link between such cross-modal reorganization and prognosis with hearing aids
3) There was a reversal in the observed cross-modal reorganization as well as improvement in performance on cognitive as well as speech perception tasks for the hearing-impaired participants when they were tested 6 months post fitting of hearing aids. This suggests that use of hearing aids can improve auditory processing as well as cognitive function

Clinical implications
1) Even a mild to moderate degree of untreated age-related sensorineural hearing loss can lead to deficits in auditory speech perception in noise and cognitive functioning.
2) Hearing aid use can reduce listening effort which can therefore lessen the cognitive effort required for top-down modulation of auditory processing. This may thus enhance cognitive function or in other words reverse the cognitive changes which would have occurred due to the consequence of age-related hearing loss
3) cross-modal reorganisation that can occur due to untreated presbycusis can be reversed due to neural plasticity even above 60 years of age by consistent hearing aid use for at least 6 months
4) Such changes due to hearing loss such as visual cross-modal re-organization can explain the variability in outcomes with hearing aid use as well as possible reasons for low uptake of hearing aids

Critical Notes

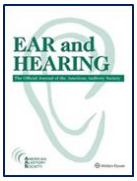
a) there were a smaller number of participants in the control groups as authors found it hard to find normal hearing individuals in that age range
b) Both groups were matched for age, gender, level of education and handedness before statistical comparisons
c) The hearing-impaired participants did not have any prior history of hearing use
d) The inclusion criteria for the experimental group was a high frequency pure tone average (2, 4, 6kHz) > 25 dB HL in both ears and absence of air bone gap or interaural asymmetry
e) Probe-microphone measures were performed to verify hearing aid fittings and gain was adjusted to meet NAL-NL2 prescribed targets
f) Before baseline testing, the experimental groups were fitted with hearing aids for a noticeably short duration to remove the confounding factor of audibility/familiarity

g) QUICKSIN test was used to measure speech perception in noise ability and the Arizona auditory-visual test for assessing auditory-visual speech perception at conversational level (60 dB SPL)

h) The cognitive domains that were measured were global cognitive function, executive function, processing speed as well as visual and auditory working memory

i) One of the limitations of the study was that they did not have aged matched controls during the second phase where they evaluated the experimental group after 6 months of hearing aid use.

Relationships Between Coping Behaviours and Social Loneliness in Adults With Self-Reported Hearing Problems.



Warringa L. et al.

Ear & Hearing, Vol. 41 (2020), No. 4, 1040-1050

Hearing loss is a disabling condition that results in significant impacts in daily communication. Social settings typically become more difficult to manage with hearing loss due to increased need for audibility in the presence of multiple speakers and background noise. Previous studies have indicated a relationship between hearing loss and feelings of loneliness, whereby loneliness and social withdrawal is more likely to be reported by individuals with hearing loss. Understandably, there is greater pressure to be able to hear in an environment as demanding as a social setting. How one reacts to these social pressures and to their hearing loss can potentially affect their social ability. In this study, it is hypothesized that adults that utilize more adequate coping behaviours are less likely to report feelings of social loneliness.

Data from 686 individuals from the Netherlands Longitudinal Study of Hearing with reported hearing problems were reviewed. The De Jong Gierveld loneliness scale was used to measure each participant's loneliness score on a five-point response scale (ranging from 0 [not socially lonely] to 5 [severely socially lonely]). Six subscales from the Communication Profile for the Hearing Impaired (CPHI) were also used to measure coping behaviours. The subscales selected covered the following coping behaviours: maladaptive behaviour, stress and withdrawal, verbal strategies, nonverbal strategies, acceptance of loss, and self-acceptance. Participants answered 35 items in the subscales using a five-point scale (ranging from 1 [almost never/strongly disagree] to 5 [almost always/strongly agree]. Further self-reported data related to such subjects as socioeconomic and demographic factors were also gathered to account for potential confounding factors that could affect both general psychosocial well-being and coping behaviours.

Statistical analyses of the reported data were used to explore the relationship between social loneliness and coping behaviours. It was found that 66.9% of the participants reported moderate to severe levels of social loneliness. Furthermore, strong correlations were found between social loneliness and all six coping behaviours. More adequate coping strategies were defined via such CPHI scores as higher levels for self-acceptance or acceptance of loss, lower scores for levels of stress and withdrawal, and infrequent use of maladaptive behaviours. It was found that participants with less feelings of social loneliness reported more use of these adequate coping strategies. Similar correlations were found with the other subscales of the CPHI, but some correlations were specific to certain subgroups examined. Regular use of nonverbal strategies in communication (i.e. gestures) were more reported in participants with lower levels of social loneliness (and a paid job as per the subgroup whereby this was measured). Additionally, regular use of verbal strategies

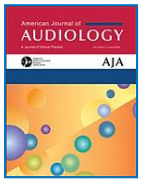
in communication (among participants with reported hearing loss of 5 years or less) was found to be associated with lower levels of social loneliness.

The results of this study emphasize the importance of psychosocial well-being among the hearing impaired. Measured responses corresponding to more adequate coping behaviours were associated with fewer reports of social loneliness. Moreover, the authors allude to the potential positive impacts that hearing care professionals can have on their patients by identifying and counselling regarding any inadequate coping behaviours.

Critical Note:

Psychosocial well-being should not be overlooked as it can potentially determine how well hearing aid users will adapt to their listening environments. This study suggests that adopting more adequate coping behaviours such as the use of communication strategies will likely positively impact an individual's reported limited social functioning due to their hearing loss. Counselling in audiology service provision about these coping behaviours is highly valuable as it can ultimately affect patient outcomes.

Discovering the unmet needs of people with difficulties understanding speech in noise and a normal or near-normal audiogram.



Mealings K. et al.

American Journal of Audiology (2020): 29, 329–355.

There is growing scientific evidence regarding a proportion of people with clinically normal hearing or mild hearing loss (NA-MHL) reported to have greater than expected difficulty hearing speech in noise. Because of the normal audiogram, clinicians are unable to manage this population efficiently, hence reassure the clients that they have no hearing problems and their issues are more psychological. This is because we follow a biomedical model in detecting and treating hearing loss, but to help individuals with normal or mild hearing loss, we need to follow a biopsychosocial approach which take into consideration the behavioural, psychological and social aspect of an illness. According to previous studies, reassuring the clients that their hearing is not impaired did not reduce distress rather increased the emotional distress and fear.

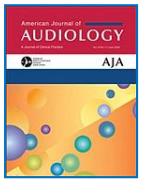
The current study used an exploratory survey on NA-MHL population and clinicians who had experience seeing NA-MHL population to better understand their concerns, the experience and the satisfaction and also an interview to gain more insight into this aspect. The clinicians of this study reported PTA, Speech in quiet, Speech in noise, OAEs, Tympanometry, APD test battery, Questionnaires, Hearing aids/ALDs, communication tactics, COSI, Behavioural counseling and IDA tools to be the useful clinical tools to be used with NA-MHL population. The NA-MHL group could recall getting an audiogram done (94%) in their appointment but only a very few subjects recalled getting a speech in quiet/speech in noise testing done. Majority of the NA-MHL population (62%) reported partial satisfaction or no satisfaction with the assessment appointment with the audiologist as they felt the test were incomplete and did not represent the difficulties, they were facing specifically speech in noise. Counseling about hearing and communication tactics, hearing aids, assistive listening devices, central auditory processing disorder assessment, auditory training was the recommendations the clinicians made based on the test results, but this was not in a uniform or standardized way. With respect to the treatments offered by the clinicians, NA-MHL group reported that the treatments options were limited or insufficient to solve their problems and felt that some clinicians were pushing them to buy hearing aids and the disinterest to buy hearing aids influenced clinician's decision to not offer a follow up appointment which was very important for the NA-MHL groups.

Hearing aids, other hearing devices, counseling, individual training, group training, hearables and remote microphone were the effective treatment options recommended by clinicians for the NA-MHL population. The Majority of the clinicians reported they are not trained or has inadequate knowledge/experience to deal with the NA-MHL population. They pointed out that they need evidence based clinical tools and guidelines, further training and education, improved counseling skills and resources to better manage the NA-MHL population.

Critical Note:

In this study the authors identified a significant discrepancy between the behavioural test results and self-reported hearing problems. Hence the future research should focus on developing speech in noise assessment, advanced hearing aid options, random control trials assessing the effectiveness of different treatment options and outcomes for this population. Doing so will significantly help us as clinicians to increase the clients' quality of life, diagnose, support and provide appropriate rehabilitation strategies adequate for this population.

Use of mild-gain hearing aid by middle-age normal-hearing adults who do and do not self-report trouble hearing in background noise.



Singh J. & Doherty K.

American Journal of Audiology (2020): 29, 419–428.

Nearly 5%-12% of the total clinical population has normal hearing but reported to have difficulty understanding speech in noise. Due to the unaidable hearing loss, such clients are advised to follow up when their hearing loss gets worse or when they have a measurable hearing loss which results in increased anxiety among such candidates. Some of the explanation for normal hearing middle age adults to have significant difficulty hearing speech is noise are due to a decreased hearing threshold within the normal hearing range, wider auditory filter shapes and extended high frequency thresholds. Previous studies have identified normal hearing adults who reported to have difficulty understanding speech in noise benefit with mild gain hearing aids. Hence the current study focused on understanding the effect of mild gain hearing aid on hearing handicap, motivation and attitudes toward hearing aids in individuals with normal hearing who self-report to have hearing difficulties (Group 1) and normal hearing individuals who did not report any hearing difficulties (Group 2).

The Current study used hearing handicap questionnaire (HHQ), University of Rhode Island Change Assessment (URICA), The Hearing Attitudes in Rehabilitation Questionnaire (HARQ) and Extended High Frequency (EHF) across both groups. HHQ measures the effect of hearing loss on personal and social domains of life. URICA determines how motivated the clients are in seeking help and categorize them into 3 stages of change (precontemplation, contemplation and action). HARQ measures the attitudes towards hearing and hearing aids. EHF thresholds were measured from 9 to 14 kHz.

Participants were seen 3 times over a 2-week period. Pure tone audiometry was done on the first visit. All the questionnaires and EHF were administered before fitting them with hearing aids. All the participants were also asked to say 'YES' or 'NO' to the question "Would you consider purchasing hearing aids?"

- *Standard audiometric threshold tests revealed Group 1 participants to have a significantly higher average standard audiometric threshold compared to Group 2.*
- *The EHF test showed Group 1 candidates having a significantly lower score when compared to Group 2 which is clinically insignificant.*
- *The HHQ revealed a significant reduction in hearing handicap for Group 1 after the 2 weeks of hearing aid trial but did not change for Group 2 candidates.*
- *Based on the URICA report it was understood that normal hearing participants who did not report any hearing concerns were in the precontemplation stage at both Week 0 and week 2 and majority who reported to have trouble hearing speech in*

background noise were in the contemplation stage (interested in knowing more about their hearing problems but not ready to do anything about it).

- *The HARQ results revealed that hearing loss stigma and hearing aid attitude score significantly reduced for both groups after wearing hearing aids for 2 weeks. After 2 weeks of hearing aid use, only 20% of the participants who reported to have difficulty hearing in background noise responded 'YES' to the question "Would you consider purchasing hearing aids?*

Critical Note:

The current study concluded that the use of mild gain hearing aid can only improve hearing handicap level for normal hearing candidates who self-report difficulty hearing speech in noise. These groups were more interested in learning about their hearing problems but not ready to take any actions by purchasing hearing aids. The reduction in hearing aid stigma will better prepare an individual towards considering the use of a hearing aid in the near future and with less negative thoughts about it.