

SoundingBoard

DECEMBER 2022

AUSTRALIAN
TINNITUS
ASSOCIATION

Research Update

*More Than 1
Billion Young
People at Risk of
Hearing Loss*

Meet Some of Your
HAASA Conference
Speakers

COVID-19 AND
TINNITUS

An Initiative to Improve
Tinnitus Care

THE OFFICIAL MAGAZINE OF THE HEARING AID
AUDIOLOGY SOCIETY OF AUSTRALIA LTD
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* Rumley et al., 2022. Oticon Own evidence. Oticon Whitepaper. Oticon Own 1 vs Opn 1 dual microphone hearing instrument.

** MoreSound Intelligence is available in Oticon Own 1, 2 and 3. Benefit may vary depending on technology level and style chosen.

*** Rumley et al. (2022). Oticon Own evidence. Oticon Whitepaper. Oticon Own 1 with dual microphones, MSI ON vs OFF. Benefit may vary depending on individual MSI settings.

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Board Report

Dear Members,

Welcome to the December issue of Sounding Board – our final issue of 2022.

During the year, we have continued our representation with various groups within the industry, including Glen Carter, Lyndon Williams and Helen King with the Practitioner Professional Body (PPB), Glen Carter and Lyndon Williams with the Business Reference Group (BRG), Helen King with the Hearing Health Sector Alliance (HHS) and Glen Carter and Helen King with TAFE meetings.

The PPB has met on several occasions with discussions and updates revolving around several areas of practice, both for practitioners and the Department of Health including, but not limited to, the online portal build which to date is a little behind schedule but will be coming to fruition in the coming year. The Hearing Services Program review, to which many of you contributed valuable feedback, unfortunately remains on hold due to the change of government.

As you will be aware there was a request for information from our Secretariat – Jacqui to update members information which was the result of discussions with the Department of Health and issues surrounding duplicate numbers for practitioners, practitioners who received practitioner numbers who were not qualified, practitioners who are no longer practicing or those who have change PPB membership.

The HSP is releasing new documents to assist hearing practices when an audit is either requested of the HSP Provider or a Provider Claims Review Audit – both of which make many practitioners and providers a little nervous as they feel they may be ill equipped in providing the correct information. These documents hope to provide some clarity around these audits.

During the past 12 months, the HHS has met on three occasions covering many important hearing issues within Aged Care, Aboriginal & Torres Strait Islander hearing health, hearing health research strategy, accessibility of hearing assistance for 26 to 65 year olds, and the National Awareness & Prevention campaign. These are currently the key priorities being pursued, however, with the change of government and lack of money in their kitty it appears the progress of

Board Report

these initiatives will take some time to implement or receive any necessary funding. However, as an impressive collegiate group we are confident we will succeed in many of our priorities over time. Other achievements include the Australian Teleaudiology Guidelines and Paediatric Competency Standards. Although the Paediatric Competency Standards are weighted more towards Audiologists (and we understand haven't pleased all members) it does not preclude us as Audiometrists or Hearing Health Clinicians from using these standards and developing similar competencies.

The Scope of Practice is still under review. We have appreciated comments from members, all of which have been collated and submitted for the review.

In September, a meeting was held with a number of industry stakeholders to discuss the current Diploma of Audiometry. We are aware that there are issues around the delivery and content of the course and at this time a review of the current Diploma had not been confirmed, however, it was agreed that it is well overdue. Any input from members is welcome and will be incorporated for discussion in future meetings.

Glen Carter has also been liaising with Macquarie University to help a group of Indigenous students residing in regional NSW complete their supervision. If you think you may be able to supervise or help locating potential supervisors for these students, please email us at haasa@haasa.org.au.

Helen King represented HAASA recently at the Hearing Australia (HA) and National Acoustic Laboratories (NAL) 75th Anniversary. Helen was honoured to attend and hear both HA and NAL share their long history, their achievements, and their plans for the future as well as some interesting research on aged care and dementia which will be made available to members in the new year. Interestingly, Brent Edwards the Director of NAL presented the earliest research paper by NAL from 1942 which stated:

“On account of the high values attained by ambient noise in planes and tanks...it is important to protect the ears from noise as far as possible because (i)intercommunication is interfered with (ii) mental fatigue is produced (iii) temporary or permanent high tone deafness may occur”.

Board Report

75 years later and this still rings true!

Kerrie has been continuing to work with ERC to ensure a smooth transition for HAASA to become an active member. We are still looking for representatives for the pool of assessors and the ERC committee. It is important that we achieve this to ensure we have our say. Please contact Jacqui if you can help out or if you have any questions.

We have held numerous competency exams in the last six months. Congratulations to the successful candidates. We are currently holding examinations “on call” so most candidates are only waiting a few weeks to sit the written exam and, if successful, a few more weeks for the case study presentation. Thank you to our panel of examiners this year – Kerrie Gibson, Glen Carter, Lyndon Williams, Helen King, Daniel Fechner, and Matthew Virgen.

Matthew Virgen is in the process of writing our new guidelines for the case study examination so there will be some slight changes as to how these are conducted in the new year. We will keep our associates and supervisors posted.

Josephine Khairy is chairing the conference committee and along with Helen King, Kerrie Gibson and our Administration Officer Jacqui Peters, is doing a fantastic job. Thank you especially to Jo and Jacqui as this has been a huge amount of work added to their already busy schedules. They have excellent speakers locked in and are just finalising the manufacturers display area. Registrations have been open for a little while now and spaces are filling quite fast so if you haven't secured your spot, make sure you register now at www.haasa.org.au/event-5000457. We are delighted to announce amazing support from our sponsors Starkey, Phonak, Signia, Widex, Unitron, Cochlear, Oticon and HBA. We hope you can all give the sponsors and organisers the support they deserve by attending our conference. It will be wonderful to catch up with everyone again in beautiful Darling Harbour. Remember to please join us for the conference dinner as well. This is complementary with the purchase of full conference admission, but you are able to add dinner tickets at \$99 per person for students, one day ticket holders or extra guests.

Tim Manski and Matthew Virgen have settled into their new roles as Directors very well and have been valuable additions to the Board. Thank you to Glen Carter, Helen King and Lyndon for their hard work

Board Report

representing HAASA at PPB, BRG, HHSA and TAFE meetings and to Kerrie Gibson for her work with the ERC and organising this year's fantastic CPED Day. To Gary Stevenson, for his contributions to HAASA Board meetings, thank you. To Daniel Fechner, although no longer a director, always willing to help when needed, thank you! To Lindsay Gillespie for his participation on the membership committee, thank you also. None of this would be possible without the amazing organisation and support of our Executive Administration Officer Jacqui Peters. Thank you to Jacqui.

Don't forget we welcome new faces with fresh ideas to the board, this is your organisation and your opportunity to support the industry, make change where needed and make a difference.

The entire Board would like to thank you for your continuous support over the past 12 months. Your input, emails, suggestions, and encouragement mean a lot. This input is valuable in directing the Board's future decisions.

The HAASA office will close from 23 December 2022 until 9 January 2023. Wishing you all a very Merry Christmas and a happy and healthy New Year. We're looking forward to 2023 and the journey it brings.

Kind Regards,

Kerrie, Helen, Glen, Lyndon, Gary, Matthew & Tim

HAASA Directors



Helen King at this month's HHSA Meeting

HEARING SERVICES PROGRAM NEWS

Free Interpreting Service Pilot for audiologists and audiometrists

The Australian Government Translation and Interpreting Service (TIS National) has announced it is piloting access to the Free Interpreting Service (FIS) for allied health including audiologists and audiometrists. The pilot will be available to allied health professionals working in targeted Local Government Areas based on areas of low English proficiency.

FIS Eligibility and Services Available

When registering for the service, TIS National will need to check that you are qualified by checking that you have the appropriate registration with the relevant professional association. Eligible private sector allied health professionals can access FIS when delivering services that are:

- delivered in private practice
- delivered by a suitably qualified professional
- provided to a patient or client who has a Medicare card.

The FIS can be used for arranging appointment times, undertaking consultations, providing therapy, and developing health plans. Private sector audiologists and audiometrists can use FIS to access immediate telephone interpreting, pre-booked telephone interpreting, on-site interpreting, and video remote interpreting.

How to access the Free Interpreting Service

Each audiologist and audiometrist operating in the pilot areas will need a unique client code to access the service. To register for a client code, complete the online application form on the TIS National website. All agencies registered with a TIS National client code are automatically registered to use TIS Online. You can easily request and manage all your pre-booked telephone, on-site and video remote interpreter bookings through TIS Online here.

Revalidated services

A voucher entitles clients to a range of services as outlined in the Schedule of Service Items and Fees (Services Schedule). The program recognises that clients may need additional services and these can be requested as a Revalidated Services Request. Revalidated services must not be delivered or claimed until the provider has received approval from the program in writing.

HEARING SERVICES PROGRAM NEWS

Ongoing reviews of revalidated service claims have identified a number of issues including:

- Revalidated services being completed prior to the approval of the service
- The requirements for the service not being completed in accordance with the Services Schedule
- Missing or incomplete evidence to support the revalidated service, including undated information
- Client records not matching the information provided in the revalidated service request

Prior to seeking approval for a revalidated service please consider:

- if requesting a revalidated Reassessment service, check if the client has a Client Review service available on their voucher. The Client Review service provides for a hearing screening. The likelihood of permanent hearing loss must be established before requesting revalidated Reassessments.
- Revalidated fitting services must meet the Eligibility Criteria for Refitting requirements as outlined in the Services Schedule.

Further information about revalidated services is available on the program website.

Lost and damaged devices

The client's primary devices can only be replaced through the program if the devices are lost or damaged beyond repair and the requirements for items 840 or 850 as outlined in the Schedule of Service Items and Fees are met.

A correctly completed Statutory Declaration, signed, and dated by the client, is required before replacing a lost device. The declaration must state which device was lost, and if known, when, where and how the device was lost. Please ensure that Statutory Declarations comply with Commonwealth and/or State/Territory statutory declaration legislation including who is authorised to witness the document.

If a device has been damaged, it must be sent to the manufacturer for repair. It is the manufacturer's responsibility to decide if the damage is beyond repair and the written confirmation should be held on the client record.



Pumping loud music is putting more than 1 billion young people at risk of hearing loss

by Robert Cowan

Professorial Research Fellow, Audiology and Speech Pathology, The University of Melbourne

THE CONVERSATION

Music is an integral part of human life. It's all around us, just like sunshine, lifting our mood. We enjoy it so much that many of us take it with us everywhere on our phones or we spend weekends hitting the club scene, live-music venues or concerts.

Meanwhile, many of us may have felt annoyed by loud sound from music venues or remarked on sound emanating from someone else's headphones. We're probably aware we should prevent hearing loss from loud industrial noise at work or from using power tools at home.

A systematic review

released last month in BMJ Global Health reports unsafe listening practices in adolescents and young adults from using personal listening devices (such as phones or digital music players) and going to loud clubs and gigs are common, and could be a major factor contributing to hearing loss.

In fact, the authors estimate the pumping tunes could be placing up to 1.35 billion young people at risk of hearing loss worldwide.

What the study looked at

Systematic analysis involves looking across

multiple studies to identify consistent findings. In this study, the authors included 33 peer-reviewed studies published between 2000 and 2021, involving over 19,000 people, aged 12–34.

In the study, unsafe listening was identified as listening at levels above 80 decibels for over 40 hours per week. For context, this is the level above which most Australian states require industry to implement noise protection processes such as use of hearing protectors.

The study confirms the rate of unsafe listening practices is high in adolescents and young adults: 23.81% of them were

listening to music on personal devices at unsafe levels and 48.2% at loud entertainment venues (though this rate is less certain). Based on global estimates of population, this translates to up to 1.35 billion young people at risk of hearing loss globally. The World Health Organization estimates over 430 million people worldwide already have a disabling hearing loss and prevalence could double if hearing loss prevention is not prioritised.

The results tally with our previous studies conducted by Australia's National Acoustic Laboratories and HEARing Cooperative Research Centre.

More than a decade ago we reported a high potential for hearing loss from attendance at nightclubs, pubs and live

concerts in young Australians aged between 18–35 years.

Back then, we found 13% of young Australians (aged 18–35) were getting a yearly noise dose from nightclubs, concerts and sporting activities that exceeded the maximum acceptable dose in industry. In 2015, the WHO launched the Make listening Safe initiative to encourage young people to protect their hearing.

Why it's bad for your hearing

So what's the problem with loud music? Like sunshine, overexposure can lead to harm.

Loud noise, including music, can kill off hair cells and membranes in the

inner ear (the cochlea). Once hearing is lost, a person mightn't be able to hear or understand speech or sounds around them.

Research shows hearing loss results from a combination of sound being too loud (and it doesn't need to be painful to cause hearing damage), listening to loud sound too long (and the louder the sound, the less time you can listen before your hearing is at risk) and how often you are exposed (and hearing damage is cumulative over time).

A good "rule of ear" is that if you hear ringing in your ears at or after listening, you are at risk of damaging your hearing. This type of hearing loss is permanent and may require use of hearing aids or cochlear implants.





Wait, so no loud music at all?

So what can we do, short of throwing away our headphones and avoiding clubbing and live music?

First, just like with the sun and skin, we need to be aware of the risks to our hearing and take the necessary steps to protect ourselves. We need to be aware of how loud sound is around us and how to keep our exposure within safe levels. We can do this by using personal hearing protection in clubs (such as ear muffs or ear plugs that are fit for purpose), or limiting how often we visit noisy music venues or how long we stay at really loud ones.

In Australia, people can

access a free noise risk calculator to calculate their personal risk using an online sound level meter, and to explore how changes in lifestyle could protect their hearing while still allowing them to enjoy music.

Most phones now come with software that can monitor safe listening levels and limit exposure.

Hearing protection at the venue level is more challenging and may require regulatory and industry-based approaches. Our 2020 research identified hazard controls for entertainment venues, such alternating volume between louder and softer levels, rotating staff, providing quiet rooms, and raising speaker

locations above head height. We also showed DJs and venues were open to initiatives aimed at reducing the risk of hearing loss for their patrons and staff.

Compromises are possible and they could enable enjoyment of music at live-music venues, while still protecting hearing. That way everyone will be able keep enjoying music for longer.

You can find the original article by Robert Cowan and more at:

THE CONVERSATION



Registrations Now Open

HAASA BIENNIAL CONFERENCE 2023

9-10 MARCH 2023
PARKROYAL DARLING HARBOUR
30 HAASA CPED POINTS



MEET A FEW OF OUR SPEAKERS

JEAN KITTSOON – KEYNOTE SPEAKER

Author, public speaker, actor and comedian.

Jean came to national attention on ABC TV's, 'The Big Gig', followed by Let the Blood Run Free, Kittson Fahey, Good News Week, the Glasshouse, Flat Chat, The Einstein Factor, and many more. She is also known for her comedy debates for the ABC, Channel 9 and Channel Ten.

She has also been a guest on Andy Lee's The One Hundred.

Most recently she was a participant on Celebrity Apprentice broadcast May 2022.

She is a regular panellist on ABC 702 radio drive program, Thank God It's Friday and a weekly panellist on Today Extra, Nine Network.

She has conversed twice with Richard Fidler on Conversations, presented twice for Women of Letters events and was invited to speak about menopause at the National Press Club.

She has been a regular columnist with New Weekly, Sunday Telegraph, the Sydney Morning Herald – Sydney Magazine, Inspire Magazine, the Readers Digest Health Smart Magazine and the on-line magazine, The Hoopla.

She is the author of three books, 'Tongue Lashing' and the best seller, 'You're still hot to me, the joys of menopause'. Her latest book, also a best seller, 'We need to talk about mum and dad' was published by Pan Macmillan and was launched in March 2020.

She was a founding Director of the National Cord Blood Bank, the inaugural chair of the Australian Gynaecological Cancer Foundation (AGCF) and a founding Ambassador for Ovarian Cancer Australia.

She currently the Patron of Palliative Care Nurses Australia, and an Ambassador for the Macular Disease Foundation, the Australian Gynaecological Foundation, the Raise Foundation and Taldumande Youth Services.



PROFESSOR RAJ SHEKHAWAT

Ph.D., MASLP, PGCert AP, CMALT, FHERDSA, SFHEA
Flinders University, University College London, Tinnitus Research Initiative

Professor Raj Shekhawat is an internationally recognized award-winning academic, mentor, keynote/TEDx speaker, and scientist. Raj is an inaugural professor in Audiology & Academic Lead at Flinders university. He holds conjoint appointments as Honorary Professor at Ear Institute, University College London and Public Relations Manager for Tinnitus Research Initiative, Germany. Raj has a diverse work experience spanning across four continents and six countries (USA, UK, Singapore, India, New Zealand & Australia), touching a plethora of cultural communities with his impeccable knowledge along the way.



He has a Ph.D. in Clinical Audiology from the University of Auckland, New Zealand which complements his outstanding international reputation for research and findings, which employ brain stimulation, sounds therapies & hearing aids for tinnitus management.

Raj is a passionate academic with several prestigious educational fellowships such as: a senior fellow of HEA, HERDSA, and CMALT, he is also an executive on Higher Education Research & Development Society of Australasia and Chair of the scientific advisory board on Horizon 2020 European Research Grant.

SUZANNE WALDRON

Behavioural Facilitator and Speaker for Social Good

Suzanne Waldron is a behavioural change facilitator, interviewer and curator. Working globally with influential leaders, her focus is on embedding healthy relationships within ethical systems. For business, community and culture.

She's an active ambassador for RUOK?, Nakuru Hope, she's a Creative Director for Museum of Freedom and Tolerance, former curator for TEDx.

A twice published author, Suzanne has also been nominated for Western Australian of the Year for her community work.



PROFESSOR HARVEY DILLON

PhD, AO
Professor in Audiology, Macquarie University
Professor of Auditory Science, University of Manchester

Professor Dillon has carried out research into many aspects of hearing aids, measurement of hearing rehabilitation effectiveness, electrophysiological assessment, and the diagnosis and treatment of auditory processing disorders. He was the Director of the National Acoustic Laboratories from 2000 to 2017.

Harvey Dillon is a part-time professor within audiology at Macquarie University (focused on auditory processing disorders) and a part-time professor of auditory science at the University of Manchester (focused on improving hearing rehabilitation methods).

He is the author of over 250 scientific publications and a widely used text book on hearing aids and is frequently invited to give keynote addresses at international conferences. He has been closely associated with the various NAL prescription rules, COSI outcomes evaluation, the trainable hearing aid, the LiSN-S test of spatial processing disorder, Sound Scouts automated online hearing testing of children, and the HEARLab clinical cortical response testing method.



ASSOCIATE PROFESSOR CHRISTINA BRYANT

Academic Clinical Psychologist

Associate Professor Christina Bryant has many years of clinical and research experience in psychology with a focus on managing long-term physical conditions, such as hearing impairments and their impact on psychological well-being and the mental health of older adults. Previous research has focused on the prevalence and treatment of anxiety and depression, the relationship between attitudes to ageing and anxiety, depression, and well-being; and the promotion of healthy ageing.

Current projects include enhancing well-being in people with hearing loss and interventions to support carers of older people leaving hospital. She collaborates extensively with other researchers within and outside psychology and has published widely in international journals and books.



DR EMMA LAIRD

Researcher, Educator and Clinical Audiologist

Dr Emma Laird is a researcher, educator, and clinical audiologist at Soundfair and the University of Melbourne. Her research interests focus on client mental health and illness within audiological rehabilitation and how to implement psychologically informed practice into hearing healthcare.

Dr Laird is also trained in Cognitive Behaviour Therapy, Acceptance and Commitment Therapy, and Mental Health First Aid.



REGISTRATION FEES

Member	Price	Early Bird	Non-Member	Price	Early Bird
Full (inc. Gala Dinner)	\$595	\$495	Full (inc. Gala Dinner)	\$695	\$595
Student (Gala Dinner not inc.)	\$0	\$0	Student (Gala Dinner not inc.)	\$375	\$275
One-Day (Gala Dinner not inc.)	\$345	\$295	One-Day (Gala Dinner not inc.)	\$395	\$345
Gala Dinner 9 March	\$99	\$99	Gala Dinner 9 March	\$99	\$99

EARLY BIRD PRICING AVAILABLE UNTIL 31 DECEMBER 2022

REGISTRATION CLOSING 28 FEB 2023

Introducing Phonak Lumity - Let conversations shine.

The new Phonak Lumity platform provides the sound quality you expect from an industry leader and focuses on illuminating speech understanding. Developed with SmartSpeech™ Technology, representing Phonak's dedication to designing features that improve speech understanding and reduce listening effort in various listening environments. Plus our heritage features including Speech Enhancer, Dynamic Noise Cancellation, Motion Sensor Hearing and the existing benefits of ActiveVent™ Receiver and RogerDirect™ Technology



Phonak Audéo™ L-R

Powered by the innovative technology of the Phonak Lumity platform, for mild to profound hearing losses and the ideal solution for clients that desire a discreet RIC housing.



Phonak Audéo™ L-RT

Packed with Lumity features and with a telecoil, for clients who want greater auditory access in public spaces equipped with loop systems.



Phonak Audéo Life™ Lumity

Our world's first waterproof† rechargeable hearing aid in its second generation. All Lumity features come packed in a waterproof and sweatproof housing!



Innovative speech understanding solutions: Lumity with Phonak SmartSpeech™ Technology

Phonak has developed innovative hearing solutions for over 75 years, supporting speech understanding in diverse listening environments, reduced listening effort, effective communication, and overall well-being.

Two new features continue this long tradition: StereoZoom 2.0 and SpeechSensor. These build on existing evidence-based features aiming to further improve speech understanding (Appleton, 2020; Thibodeau, 2020; Latzel, Mejia, Young & Hobi, 2022).

Phonak SmartSpeech™ Technology

SmartSpeech™ Technology is a collection of features, controlled by AutoSense OS 5.0. With Lumity two new features are added: StereoZoom 2.0 and SpeechSensor.

SmartSpeech™ Technology provides reduced listening effort thanks to features such as Speech enhancer and Dynamic Noise Cancellation¹, plus improved speech understanding in challenging environments thanks to StereoZoom 2.0 and SpeechSensor².

Key benefits



16% better speech understanding with StereoZoom 2.0²



15% better speech understanding with SpeechSensor^{**2}



Improved speech understanding by up to 10% with ActiveVent Receiver³



Exceptional speech understanding in group conversations and over a distance with Roger Technology⁴

StereoZoom 2.0: Smoother, Smarter, Stronger

StereoZoom 2.0 is a narrow binaural directional microphone mode, active in the Speech in Loud Noise program. With Lumity there is a gradual transition from Speech in Noise (UltraZoom) into Speech in Loud Noise (StereoZoom 2.0). The strength of StereoZoom 2.0 activates smoothly and smartly as the noise level increases and can now be personalised by the client via the myPhonak app.

As the level of noise surrounding the client increases, the microphone directionality gradually transitions from UltraZoom to StereoZoom 2.0. This provides a balance between providing more spatial awareness and speech focus to the front, depending on the listening environment.

Key benefits



Seamless activation of StereoZoom 2.0 for 16% better speech understanding^{^2}



3dB better Signal-to-Noise ratio^{^^}



Personalised, real-time adjustment with the myPhonak app

SpeechSensor: Accurate detection of the direction of speech

SpeechSensor is an automatic feature of Phonak SmartSpeech™ Technology, providing better access to speech from the side and rear in noisy environments. This results in an average of 15% better speech understanding when speech is from the side/behind.²

SpeechSensor automatically detects where the dominant speaker is located and sends this information to AutoSense OS 5.0 to adjust the directional microphone mode accordingly. If the speech is coming from the left/right it goes into fixed directional, if the speech is coming from behind it goes into Real Ear Sound.

Key benefits



17% better speech understanding when speech is from the side²⁺⁺



More access to sound not only provides clarity but reduces listening effort^{5,6,7}



11% reduced listening effort²



14% better speech understanding when speech is from behind²

1. Appleton, J. (2020). AutoSense OS 4.0 - significantly less listening effort and preferred for speech intelligibility. Phonak Field Study News retrieved from www.phonakpro.com/evidence, accessed August 23, 2022.
2. Woodward, J. & Latzel, M. (2022). New implementation of directional beamforming configurations show improved speech understanding and reduced listening effort. Phonak Field Study News in preparation. Expected end of 2022.
3. Latzel, M. & Hobi, S. (2022). ActiveVent™ Receiver provides benefit of open and closed acoustics for better speech understanding in noise and naturalness of own voice perception. Phonak Field Study News, retrieved from www.phonakpro.com/evidence accessed August 23, 2022.
4. Thibodeau L. M. (2020). Benefits in Speech Recognition in Noise with Remote Wireless Microphones in Group Settings. Journal of the American Academy of Audiology, 31(6), 404–411.
5. Latzel, M. & Hobi, S. (2022). ActiveVent™ Receiver provides benefit of open and closed acoustics for better speech understanding in noise and naturalness of own voice perception. Phonak Field Study News, retrieved from www.phonakpro.com/evidence accessed August 23, 2022.
6. Thibodeau L. M. (2020). Benefits in Speech Recognition in Noise with Remote Wireless Microphones in Group Settings. Journal of the American Academy of Audiology, 31(6), 404–411.
7. Pichora-Fuller, M.K., & Singh, G. (2006). Effects of Age on Auditory and Cognitive Processing: Implications for Hearing Aid Fitting and Audiologic Rehabilitation. Trends in Amplification, 10(1), 29–59.
[^]up to 50cm, ^{^^}compared to fixed directional, ⁺⁺compared to StereoZoom 2.0 when speech is from side/behind, ^{**}compared to StereoZoom 2.0 with power dome
^{*}for speech from front compared to fixed directional, ^{**}based on technical measures for speech from front compared to Real Ear Sound

Hearing Business Alliance: HSP Providers and Cashflow

Businesses delivering clinical hearing services and aural rehabilitation need a viable and sustainable business to enable them to continue to provide support to consumers. There are three scenarios currently having a negative impact on providers' cashflow.

It is almost eighteen months since implementation of the HSP changes that were announced in the 2020 federal budget, and many providers are reporting they are now feeling the financial impact. Since 1 July 2021, new vouchers expire after 5 years instead of 3, and existing vouchers were extended by 2 years, resulting in fewer reassessment claims.

Additionally, providers can no longer submit a maintenance claim within the first year after refittings, although they are still required to provide appointments to support these clients and to maintain their newly refitted devices. The reasoning for this was that all devices have a minimum 12-month warranty period. However, all providers recognise there are costs associated with maintaining devices outside of in-warranty repairs. These costs include supplying batteries and other consumables, as well as paying staff to see clients for appointments within that 12-months after refitting, which is often the

most crucial period for client-centred successful outcomes.

Providers are unable to submit maintenance claims until the client returns the signed Maintenance Agreement. Pre-COVID, many clients would return the signed maintenance claim form, when paying the co-payment in person, or they would post a cheque, along with the signed form. Client behaviour has changed, with a significant increase in clients paying their co-payments online, resulting in far fewer signed forms being returned in person than in past years.

Providers report that once the client pays online, it can then be impossible to get the client to return the signed Maintenance Agreement by post, as the client assumes that payment alone should indicate they consent to receiving maintenance services. Clients paying online sometimes ask for batteries to be posted to them, so not only is there a lost opportunity to gain a client signature, but there are also additional postage costs. It's difficult to refuse a client's request to post batteries when they promise to later return the form, but in the meantime urgently need more batteries. Providers are still providing the service but are unable to submit a claim for payment to

do so.

Providers are not permitted to submit the HSP claim until they have a signed Maintenance Agreement form, regardless of whether clients have already paid their co-payment. Even if providers can later secure a signature, maybe at a future appointment, the date of the claim must be delayed, to match the date of signature. This results in a delayed 'resetting' of the annual maintenance renewal date for that year and subsequent years.

Providers are permitted to set additional terms and conditions to the Maintenance Agreement for partially subsidised devices, providing these are detailed on the device quote and the Maintenance Agreement each year. These 'Ts & Cs' might include things like stating that the client will be charged an annual co-payment above the annual set-amount for free-to-client aids or may be charged the repair costs once their aids are outside the warranty period.

HSP states: "The maintenance agreement form serves to inform clients of any services, costs and conditions regarding maintenance of their hearing devices and we need evidence that this has been agreed by the client." HSP has allowed providers to also accept verbal consent or digital consent for maintenance. To gain verbal consent, providers must record the client being read the entire Maintenance Agreement, as well as recording the

client's acknowledgement to provide consent, and this recording needs to be retained as part of the client file. When clients relocate from one provider to another, the whole file needs to be sent to the new provider, including these verbal recordings. The different types of digital consent allowed by HSP include Digital signature, Digitised signature, Electronic signature, eSignature, Text Message or Email. Providers need to be able to demonstrate that these were sourced from the client.

It can be challenging for the smaller HSP providers to understand these different types of digitised consent and how to access them, or how to record and retain verbal recordings. For this reason, HBA's Business Seminar, being held at the RACV City Club, 501 Bourke Street, Melbourne on 16-18 February 2023, will address these issues, along with cyber security for providers.

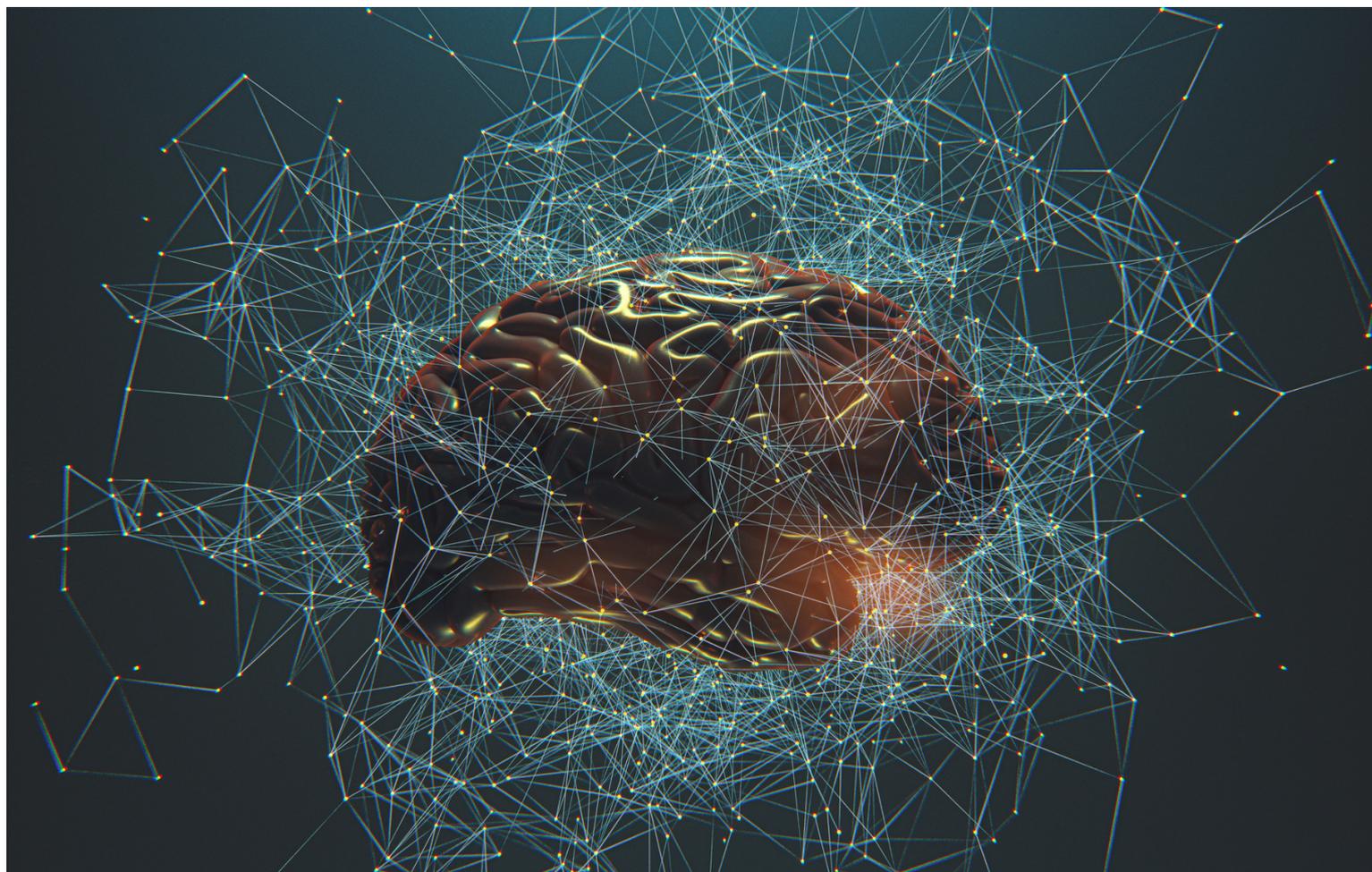
Jane MacDonald

Chief Executive Officer



TINNITUS RESEARCH UPDATE

By Australian Tinnitus Association



Constant Tinnitus is linked to Altered Brain Activity

The auditory brainstem response (ABR) test tells us how the inner ear, called the cochlea, and the brain pathways for hearing are working.

In the study, ABR measurements were carried out on 405 persons, 228 with tinnitus and 177 without tinnitus.

In people with constant tinnitus there was a clear difference in the measurements when compared to people without tinnitus or people who rated their tinnitus as occasional.

Risk of Developing Constant Tinnitus

The researchers also followed over 20,000 people with no or varying degrees of tinnitus in order to track how the symptoms develop over time.

Here, the researchers found that people with occasional tinnitus are at increased risk of developing constant tinnitus, especially if it recurs often.

The study also found that for those who already experience constant tinnitus, the chances are that the problem will persist.

The study was conducted in collaboration with the Karolinska University Hospital, Stockholm University in Sweden, the University of Bergen in Norway.

BREAKTHROUGH IN TINNITUS

University of Auckland scientists are excited by results from a trial of a new treatment for tinnitus by 'encouraging results' from a clinical trial of a mobile-phone-based therapy.

The study randomised 61 patients to one of two treatments, the prototype of the new 'digital polytherapeutic' or a popular self-help app producing white noise.

On average, the group with the polytherapeutic (31 people) showed clinically significant improvements at 12 weeks, while the other group (30 people) did not.

The results have just been published in *Frontiers in Neurology*. "This is more significant than some of our earlier work and is likely to have a direct impact on future treatment of tinnitus," Associate Professor in Audiology Grant Searchfield says.

Key to the new treatment is an initial assessment by an audiologist who develops the personalised treatment plan, combining a range of digital tools, based on the individual's experience of tinnitus. "Earlier trials have found white noise, goal-based counselling, goal-oriented games and other technology-based therapies are effective for some people some of the time," says Dr Searchfield.

"This is quicker and more effective, taking 12 weeks rather than 12 months for more individuals to gain some control."

There is no pill that can cure tinnitus. "What this therapy does is essentially rewire the brain in a way that de-emphasises the sound of the tinnitus to a background noise that has no meaning or relevance to the listener," Dr Searchfield says

Fellow researcher, Dr Phil Sanders says, "Sixty-five per cent of participants reported an improvement. For some people, it was life-changing - where tinnitus was taking over their lives and attention. Some people didn't notice an improvement and their feedback will inform further personalisation..



Tinnitus is a phantom noise and its causes are complex. It has so far defied successful treatment.

Dr Searchfield says seeing his patients' distress and having no effective treatment to offer inspired his research. "I wanted to make a difference."

The next step will be to refine the prototype and proceed to larger local and international trials with a view to FDA approval.

The researchers hope the app will be clinically available in around six months.

Dr Grant Searchfield is a world-renowned tinnitus researcher. He was a keynote speaker at a number of conferences, hosted by the Aust. Tinnitus Association, including a two-day conference of Tinnitus Clinicians and Researchers from around the world coming together to address healthcare professionals, our members and guests.

Articles courtesy of Australian Tinnitus Association – www.tinnitus.asn.au



Your referral could be life-changing

Finding out whether your clients are suitable for a cochlear implant assessment is simple. If the answer is YES to one or more of the screening criteria* in either ear, then your client may benefit from a referral for a cochlear implant evaluation.

Does your client experience any of the following with hearing aids?



- Struggling to hear on the phone
- Having difficulty understanding unfamiliar speakers
- Withdrawing from social events
- Often needing others to repeat themselves

Is your client's audibility



≥ 60 dB¹ Pure Tone Average (0.5, 1, 2 kHz)

Is your client's speech understanding



≤ 60 %² Aided Phoneme Score (conversation levels)

“My confidence has increased because I can hear things a lot better than I could before.”

Mark, Cochlear™ Nucleus® System Recipient

*Provides a recommendation only of when an adult may be referred for a cochlear implant evaluation, but does not guarantee candidacy based on indications.

References: 1. Zwolan TA et al. Otol Neurotol 2020 Aug;41(7):895-900. 2. Leigh JR et al. Int J Audiol 2016;55 Suppl 2:S3-8.

This material is intended for health professionals. If you are a consumer, please seek advice from your health professional about treatments for hearing loss. Views expressed are those of the individual.

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Contact the Cochlear Engagement Team for more information



hearinghelp@cochlear.com



1800 875 212

Get to know ^{new} your Director

Matthew Virgen

Hello, my name is Matthew Virgen. I'm a passionate Audiometrist who currently works for Audika in Queensland.

I started my journey in the industry straight out of high school, working in production at Bernafon where I have a lot of fond memories. I was lucky enough to have had the opportunity at Bernafon to start my Audiometry training.

In rehabilitation I have worked for Amplifon, BayAudio and Audika. I have been lucky enough to work in very busy locations as well as opening new locations, including visiting clinics in Singapore and Taiwan. I have been able work with a good variety of brands and products from all around the world. I have visited the Sivantos's manufacturing facility in Singapore and more recently I visited Oticon Global in Denmark where I spent time with the research and development teams and amplifier manufacturing.

At this point of my career, I work full time on Bribie Island with my trainee Audiometrist and I have recently joined the HAASA Board. I am inspired by all the hard work HAASA has completed over the years and feel it's my time to chip in. So far, I have enjoyed seeing the passion for our industry from the current board members and I want to have a positive

impact on the future.

Outside of work, I am just as busy with a wife and three boys that keep me on my toes. I am the local footy coach and I play social oztag, touch and old boys rugby league. I am lucky enough to live on the Sunshine coast with my family and we enjoy our sports, camping, fishing and the outdoors.

I am looking forward to the conference next year, lots of good things planned!!

I hope everyone has a happy and safe Christmas!

Matthew Virgen



COVID-19 AND TINNITUS: AN INITIATIVE TO IMPROVE TINNITUS CARE

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ABSTRACT

Objective: To investigate the effects of COVID-19 on individuals with tinnitus and their views to guide future tinnitus care.

Design: A mixed-methods cross-sectional research design.

Study sample: An online survey was completed by 365 individuals with tinnitus from Australia and other countries.

Results: Tinnitus was reported to be more bothersome during the pandemic by 36% of respondents, whereas 59% reported no change and 5% reported less bothersome tinnitus. Nearly half of the respondents had received COVID-19 vaccination(s) and 12% of them reported more bothersome tinnitus while 2% developed tinnitus post-vaccination. Australian respondents spent less time in self-isolation or quarantine and saw fewer change in in-person social contact than respondents from other countries. More than 70% of respondents thought that tinnitus care services were insufficient both before and during the pandemic. Regarding their opinions on how to improve tinnitus care in the future, five themes including alleviation of condition, government policies, reduced barriers, self- and public-awareness, and hearing devices were identified.

Conclusions: A majority of respondents did not perceive any change in tinnitus perception and one-third of respondents had worsened tinnitus during the pandemic. To improve tinnitus care, better awareness and more accessible resources and management are crucial.

Introduction

Tinnitus is the perception of sounds without an external stimulus (Baguley, McFerran, and Hall 2013). Its prevalence is estimated to be between 10% and 15% and it is more commonly experienced by males and the older population (Baguley, McFerran, and Hall 2013; Lockwood, Salvi, and Burkard 2002). Tinnitus is heterogeneous, with numerous aetiologies, but it is often accompanied by hearing loss (Tonkin 2002) and can be exacerbated by emotional distress and vice versa; chronic stress, anxiety, and depression are frequently reported among tinnitus patients (Mazurek, Boecking, and Brueggemann 2019; Salazar et al. 2019).

After the onset of the COVID-19 pandemic, most countries implemented some form of social restrictions and lockdown measures throughout 2020 and 2021, including temporary closure of public venues and workplaces and travel restrictions (Thome et al. 2020). Evidence suggests that social restriction measures increased unemployment, mental ill-health, poor sleep, and financial worries (Fisher et al. 2020; Vindegaard and Benros 2020). Medical resources were concentrated on treating COVID-19 patients and therefore significant disruption of non-urgent healthcare services was observed worldwide (Webb et al. 2022). Adoption of telehealth services surged in countries such as Australia, the UK, and the USA (Ohannessian, Duong, and Odone 2020).

There has been an increasing number of reports of tinnitus following COVID-19 exposure. A systematic review reported that from 18 studies which explored the effects of COVID-19 on individuals with tinnitus, the pooled prevalence of tinnitus in suspected and probable COVID-19 cases was 8% (Beukes et al. 2021c). As tinnitus is a prevalent and debilitating condition and individuals with tinnitus are likely to be exposed to pandemic-related emotional distress, there has been an urgent need to assess potential changes in their tinnitus experience during the pandemic to provide better support and care in the future.

A few studies have utilised surveys to explore the effects of COVID-19 on individuals with tinnitus. Beukes et al. (2020) conducted the first large-scale survey to address such issues and 3400 responses were collected across 48 countries. They measured the respondents' degree of tinnitus distress using the Tinnitus Handicap Inventory-Screening version (THI-S) and asked questions regarding COVID-19 symptoms and medication, social restrictions, and coping strategies. Thirty-two percent of respondents reported more bothersome tinnitus, potentially due to isolation, poorer sleep quality, and worsened mental health. Meanwhile, 67% of respondents reported no change in tinnitus and 1% reported less bothersome tinnitus. Fifteen percent to 34% of respondents showed higher level of anxiety, depression and/or irritability and tinnitus was reported to be significantly more bothersome in these individuals. For those who experienced COVID-19 symptoms, 40% reported tinnitus exacerbation and seven individuals mentioned initiation of tinnitus symptoms after being diagnosed with COVID-19. Schlee et al. (2020) conducted an online survey of tinnitus patients in Germany with an aim to measure the patients' tinnitus distress level and the impact of COVID-19 on their emotional state. Even though an elevated stress level was reported by those who perceived more bothersome tinnitus, only a slight increase in tinnitus distress was seen. Aazh, Danesh, and Moore (2021) conducted a retrospective survey study of tinnitus patients in the UK before and during the implementation of lockdown measures. The Visual Analog Scale (VAS) was used to measure patients' tinnitus loudness, annoyance, and effect on life. Data were collected from two groups of tinnitus patients, one during lockdown in 2020 and another one before lockdown in 2019. The authors concluded that the ratings of tinnitus severity between the two groups were not significantly different, and thus any change in mental health during lockdown was not a significant contributing factor to changes in tinnitus symptoms.

In these studies, vaccination-related questions were not asked and the Australian population was only marginally represented. Because there are international differences in duration of lockdown, degree of restrictions, and incidence and mortality rates related to COVID-19, this study aimed to examine the functional and emotional challenges of individuals with tinnitus in Australia throughout the pandemic and obtain their opinions on the accessibility and provision of tinnitus care.

Methods

Study design and ethics

This study adopted a mixed-methods approach and cross-sectional research design. Ethical approval was obtained from Flinders University Human Research Ethics Committee (Project ID: 2857) prior to the start of data collection.

Survey development

Survey questions were brainstormed by the research team (BM, NL, BK, DD, GSS) based on themes surrounding tinnitus, COVID-19 pandemic-related factors which could have changed respondents' tinnitus experience, and their suggestions on improving tinnitus care. Ninety-seven questions were generated for the final survey, 93 closed-ended and four open-ended. Although only four questions were completely open-ended, respondents were given opportunities to freely express their additional opinions in the text boxes when choosing answers to some of the closed-ended questions. The Ida Institute's Tinnitus Thermometer was included in the survey to gauge the extent to which the respondents were bothered by their tinnitus. The Tinnitus Thermometer is a visual analog scale numbered from 0 (no tinnitus) to 10 (worst possible tinnitus) complemented with five smiley face emoticons which is used to rate how much tinnitus is bothering the respondent at the time of assessment (Ida Institute 2021). The estimated time needed to complete the survey was approximately 20 to 25 minutes.

The questions in the survey were categorised as described below:

1. Demographic information including age, gender, and the country they spent the most time in over the past year (three questions).
2. Tinnitus history and characteristics as adapted from the Tinnitus Sample Case History Questionnaire (TSCHQ) (seven questions) (Landgrebe et al. 2010).
3. The severity and effects of tinnitus during the COVID-19 pandemic were evaluated with the use of the Tinnitus Functional Index (TFI) and the overall TFI score was used for analysis (Meikle et al. 2012). A higher score indicates greater tinnitus severity and the maximum possible score was 100. The Tinnitus Thermometer was integrated into the question "How bothered or upset have you been because of your tinnitus?" in the TFI (25 questions).
4. Change in tinnitus perception since the pandemic outbreak was investigated by asking respondents to compare their current tinnitus loudness, annoyance, and the extent they were bothered or upset by tinnitus to the start of the pandemic (three questions).
5. Anxiety and depression level during the pandemic was measured using the Hospital Anxiety and Depression Scale (HADS) (Zigmond and Snaith 1983). Anxiety and Depression scores were calculated separately. A higher score represents more anxiety or depression. For both subscale scores, the maximum possible score is 21 and a score below 8 indicates no risk of anxiety or depression disorders (14 questions).
6. Information regarding COVID-19 symptoms, medication, and vaccination (11 questions).
7. Pandemic-related lifestyle changes in multiple areas, such as self-isolation and social contact, employment status, diet and exercise, and access to healthcare (23 questions).
8. Experience on teleaudiology services and tinnitus

Table 1. Demographic Information of Respondents

	Total	Australia	Other countries
Number of respondents	365	260 (71.2%)	105 (28.8%)
Gender			
Female	179 (49.0%)	117 (45.0%)	62 (59.1%)
Male	185 (50.7%)	142 (54.6%)	43 (41.0%)
Gender neutral	1 (0.3%)	1 (0.4%)	0
Mean age (years)	57.4 (SD: 15.3)	59.4 (SD: 14.7)	52.6 (SD: 15.6)
Mean tinnitus duration (years)	14.5 (SD: 14.7)	15.3 (SD: 15.3)	11.9 (SD: 12.6)

9. smartphone apps (two open-ended questions).
 - a. You mentioned that you have tried tinnitus smartphone apps. Please tell us which app you used and if there is anything you would like to share with us about your experience? (e.g., Did you like it? Will you keep using this app? What features would you like to see included?)
 - b. You mentioned that you have had virtual meetings with an audiologist/clinician. Is there anything you would like to share with us about your experience?
10. Considerations before trying a tinnitus treatment (two questions).
11. Other untouched issues about tinnitus experience during the pandemic and how they would like tinnitus care to be improved (two open-ended questions).
 - a. Is there anything else you would like to share regarding your tinnitus experience during the COVID-19 pandemic?
 - b. How would you like to see tinnitus care improve in the future?

A two-stage review process was performed before launching the survey. The survey was first reviewed by three tinnitus researchers to determine the relevance and appropriateness of questions. It was subsequently reviewed by three tinnitus patients to check whether the questions were readily understandable. Both groups of reviewers were also asked to state the time taken to complete the survey and suggest any missing or duplicated items. The depth, logic and flow of the survey were improved after the review process.

The final survey was created using Qualtrics (<https://www.qualtrics.com>). Skip logic was applied to a screening question at the beginning to exclude individuals who did not experience tinnitus, and display logic was applied to follow-up questions so that they would be shown if specific conditions were met.

Survey distribution

This study targeted individuals experiencing tinnitus aged 18 years or above. The survey was distributed via tinnitus researchers and tinnitus organisations in Australia, the UK, and the USA via social media (Twitter, LinkedIn) and the organisations' newsletters. A flyer was designed to facilitate the recruitment process and its printed copies were displayed in Flinders University and a number of audiology clinics in Adelaide. The data collection period was from 7th April 2021 to 10th August 2021. Online written participant consent was sought before commencing the survey.

Data analysis

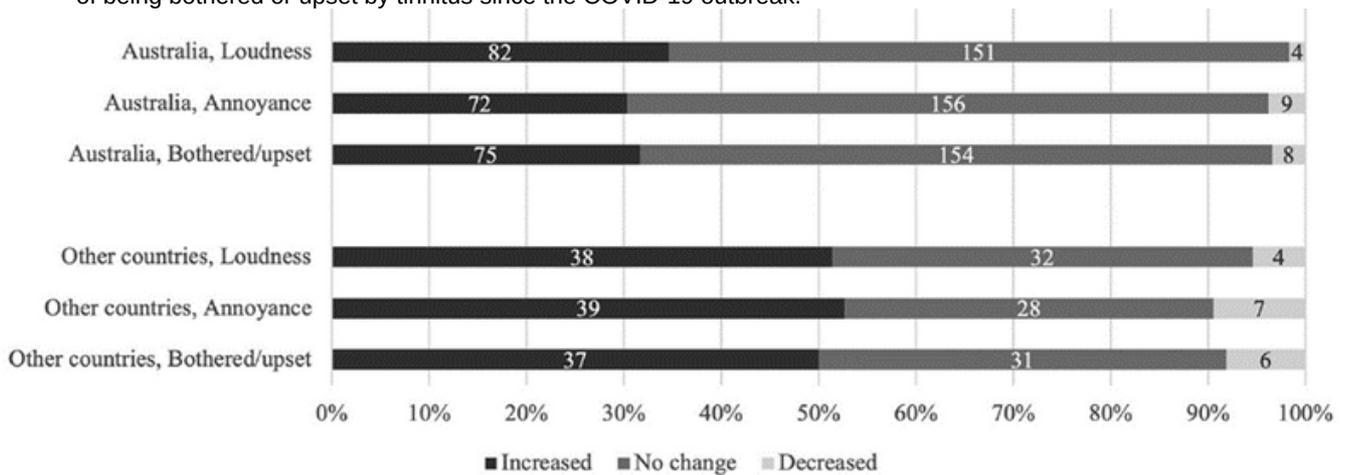
Responses that did not fit the inclusion criteria (i.e., not willing to give consent and/or not experiencing tinnitus) were excluded from data analysis. Both quantitative and qualitative analyses were conducted. Descriptive analysis (e.g., mean, standard deviation) was performed using IBM SPSS Statistics (Version 27). The χ^2 test was utilised to determine the relationships between categorical variables. Due to the use of multiple comparisons, the p-value was adjusted to 0.01 to be considered statistically significant and was derived via Bonferroni correction. Logistic regression analysis was performed using Stata/BE (Version 17) to establish the best predictors of worsened tinnitus perception during the pandemic from a range of factors including age, gender, country of residence, COVID-19 symptoms and vaccination, selfisolation duration, change in employment status, change in social contact, and access to regular tinnitus care. A two-stage analytic approach was used. Bootstrapped stepwise backwards logistic regression using 500 bootstrap samples was first undertaken to provide an initial set of potential candidate predictor variables. Any variable selected 250 times or more was then entered into the second stage. The second stage consisted of a standard stepwise backwards logistic regression. Thematic analysis was carried out following Graneheim and Lundman (2004) framework to analyse the qualitative data from the four open-ended questions as a complement to the quantitative data. The open-ended responses were first coded into meaning units. Meaning units related to the same subtheme were grouped and subthemes were further condensed into themes. Initial data coding was conducted by BM using Microsoft Excel (Version 16.58) and its consistency was cross-checked by NL, BK, and HD. Any inconsistencies identified were resolved by discussion.

Results

Demographic information and tinnitus characteristics Four hundred seventy-nine responses were collected. Among them, 114 did not fit the inclusion criteria as they neither consented to participate in the survey nor experienced tinnitus. Of the remaining 365 respondents, 329 answered all survey questions and the remaining 36 did not complete the full survey. The age of the 365 respondents ranged from 18 to 90 years with a mean age of 57years (SD: 15) and as shown in Table 1, there were roughly equal numbers of males and females. Regarding their country of residence over the past year, most respondents lived in Australia (71%), followed by the UK (18%) and the USA (4%). The remaining individuals (7%) resided in 19 countries across North America, South America, Europe, Asia, and Africa. Since this study aimed at providing an Australian perspective on how COVID-19 affected individuals with tinnitus, responses from Australia were compared to those from other countries.

The mean tinnitus duration was 14.5 years (SD: 15) with a range

Figure 1. Number of respondents reporting an increase, no change, or decrease in tinnitus loudness, annoyance, and the extent of being bothered or upset by tinnitus since the COVID-19 outbreak.



of 0.1 to 75 years, suggesting that the respondents generally had chronic tinnitus and 14% (N=51/365) developed tinnitus after the COVID-19 outbreak. Two percent (N=9/365) believed that the initial onset of their tinnitus was related to COVID-19 infection or vaccination. Sixty-three percent (N=225/356) and 23% (N=83/356) of respondents experienced bilateral and unilateral tinnitus respectively, with the remaining 14% (N=48/356) experiencing tinnitus either inside the head or both inside the ear(s) and the head. Eighty-two percent (N=293/356) of respondents heard their tinnitus constantly while 18% (N=63/356) heard it intermittently. Ringing was the most common description of the sound of their tinnitus (57%; N=203/356), followed by hissing (41%; N=146/356), buzzing (22%; N=80/356), and whistling (22%; N=78/356). On a scale of zero (very low pitch) to ten (very high pitch), the respondents on average rated the pitch of their tinnitus as 7.5.

Tinnitus severity and emotional state

The mean TFI score across all respondents was 50 (SD: 23; range: 0–99), which indicated mild-to-high tinnitus severity following the grading system proposed by Gos et al. (2021). No significant difference was observed between the mean TFI scores of respondents from Australia and other countries, $t(327) = 0.50$, $p=0.62$. The mean HADS Anxiety score across all respondents was 7 (SD: 4; range: 0–19) and the mean HADS Depression score was 5 (SD: 4; range: 0–21). No significant difference was observed between the mean HADS Anxiety scores of respondents from Australia (7) and other countries (8), $t(322) = [1]2.20$, $p=0.028$. However, for the mean HADS Depression score, Australian respondents had a significantly lower score (4) than those from other countries (6), $t(322) = [1]3.38$, $p<0.001$.

Change in tinnitus perception since COVID-19 outbreak

Compared to the start of the COVID-19 pandemic, 35% to 38% of respondents reported an increase in tinnitus loudness, annoyance, or how much they were bothered or upset by their tinnitus as illustrated in Figure 1. No change in tinnitus loudness, annoyance, or how much they were bothered or upset by tinnitus was reported by 58% to 59% of respondents, whereas 4% to 6% reported a decrease in these three aspects. The proportions of

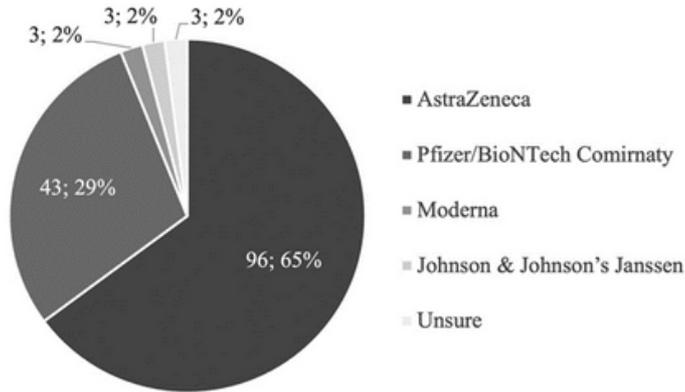
Table 2. Logistic regression analysis of best predictors of worsened tinnitus perception.

	Odds ratio	95% CI	<i>p</i>
Increased tinnitus loudness			
Gender			
Male	1.00	/	/
Female	1.82	1.14–2.90	0.012
Decreased social contact (colleagues)			
No	1.00	/	/
Yes	2.34	1.43–3.82	0.001
Increased tinnitus annoyance			
Age (years)	0.97	0.95–0.99	0.002
Decreased social contact (colleagues)			
No	1.00	/	/
Yes	2.35	1.41–3.91	0.001
More bothered/upset by tinnitus			
Age (years)	0.98	0.96–0.99	0.005
Decreased social contact (colleagues)			
No	1.00	/	/
Yes	2.16	1.30–3.59	0.003
Decreased access to regular tinnitus care			
No	1.00	/	/
Yes	2.50	1.18–5.29	0.017

respondents reporting an increase in tinnitus loudness [$\chi^2(2, N=332) = 151.63$, $p<0.001$], annoyance [$\chi^2(2, N=332) = 140.34$, $p<0.001$], and how much they were bothered or upset by tinnitus [$\chi^2(2, N=332) = 143.88$, $p<0.001$] were significantly greater than those reporting a decrease. Their country of residence was related to the change in tinnitus loudness [$\chi^2(2, N=311) = 11.15$, $p=0.004$], annoyance [$\chi^2(2, N=311) = 18.85$, $p<0.001$], and the extent of being bothered or upset [$\chi^2(2, N=311) = 13.13$, $p=0.001$]. In general, Australian respondents were less affected than those from other countries in terms of change in tinnitus perception.

Table 2 summarises the outcome of the logistic regression analysis for establishing the best predictors of worsened tinnitus perception during the pandemic. Only the variables which entered the second stage (i.e., standard stepwise backwards logistic regression) and were statistically significant were included in the table. Having decreased social contact with colleagues was a best predictor for all three outcomes (i.e., increased tinnitus loudness, annoyance, and the extent of being bothered or upset). Female respondents had 1.8 times the odds of experiencing louder tinnitus during the pandemic than male respondents. For each one-year increase of age, there was approximately a 3% decrease in the odds of the respondents showing increase in being annoyed, bothered or upset by their tinnitus. Those with reduced access to regular tinnitus care also

Figure 2. Types of COVID-19 vaccines received by 148 respondents.



had 2.5 times the odds of being more bothered or upset by their tinnitus than those whose regular tinnitus care was not affected.

COVID-19 symptoms and vaccination

Twenty-six percent (N=84/327) experienced COVID-19 symptoms such as fever, dry cough, difficulty breathing, and loss of taste or smell. Nineteen percent (N=16/84) of those had more bothersome tinnitus, as a respondent explained: “blocked ears/eustachian tubes make it worse” (female, 55 years, Australia), and 8% (N=7/84) reported tinnitus initiation since experiencing such symptoms. Two percent of all respondents (N=7/365) tested positive for COVID-19 and of those three had more bothersome tinnitus, two developed tinnitus after experiencing COVID-19 symptoms, and two perceived no change in tinnitus.

As shown in Figure 2, COVID-19 vaccination was received by 45% (N=148/327) and most of them received the AstraZeneca vaccine (65%; N=96/148). Of those who were vaccinated, 12% (N=18/148) had more bothersome tinnitus and a majority of those received the AstraZeneca vaccine (N=11/18). Post-vaccination tinnitus initiation was reported by three individuals (2% of vaccinated respondents) and one each received Pfizer/BioNTech, Moderna, and Johnson & Johnson's Janssen vaccine. Improvement of tinnitus was noted by two respondents.

Impact on social contact and employment

Respondents from other countries spent more time in self-isolation or quarantine (Mean: 15.0 weeks; SD: 22) than Australian respondents (Mean: 3.5 weeks; SD: 5.4). Fifteen percent (N=12/78) of all respondents who were required to self-isolate or quarantine described their tinnitus as more bothersome because of self-isolation or quarantine, e.g., “quieter area at home, it became easier to focus more heavily on tinnitus” (male, 25 years, Australia).

As seen in Figure 3, the amount of in-person social contact with family, friends, and colleagues was more greatly reduced for those living in other countries. Of all respondents who reported changes in social contact, 16% (N=41/257) reported more bothersome tinnitus and this was supported by statements such as “I used seeing friends and going out as a distraction” (female, 21 years, Canada).

Forty-eight percent (N=157/326) of respondents experienced changes in employment situation due to COVID-19. Twenty-five

percent (N=81/326) were unemployed, furloughed, worked more remotely, or had reduced working hours. More bothersome tinnitus was reported by 20% (N=31/157) of those who experienced changes in employment situation, with the most mentioned reasons being changes in soundscape and more frequent use of headsets for meetings. Five respondents (3%) indicated an improvement in tinnitus because of reduced stress and workplace noise.

Experience of teleaudiology services and tinnitus smartphone apps

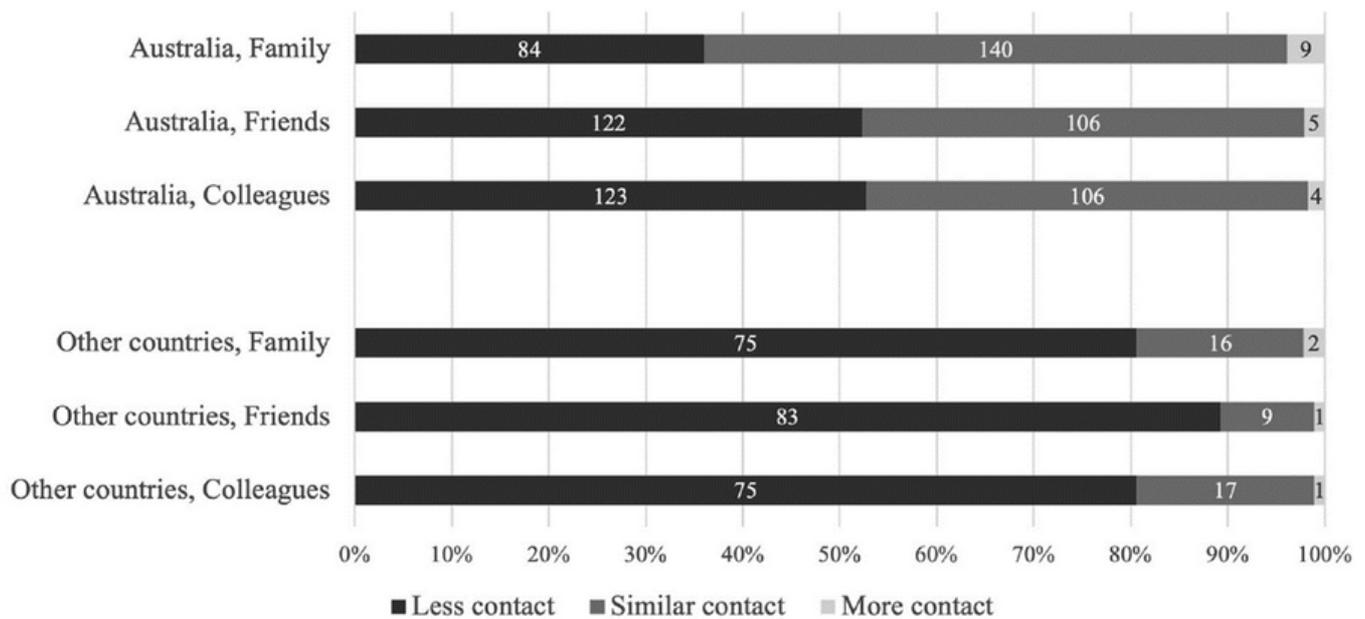
Only 11% (N=35/322) of respondents had experience attending virtual appointments with audiologists or clinicians and 37% (N=13/35) of them thought it was helpful. Examples of positive experience included “it was helpful to understand my hearing loss” (male, 61 years, The UK) and “excellent support from audiologist through Phonak app and appropriate adjustments to hearing aids (were) done remotely” (female, 66 years, The UK). Regarding tinnitus smartphone apps, 16% (N=50/322) of respondents used this approach to manage their tinnitus and, of these, 66% (N=33/50) found the apps helpful. From the 45 open-ended responses collected, Resound Tinnitus Relief was the most mentioned app (N=14), followed by Calm (N=4) and Rain Sleep Sounds (N=3). Those who had positive experience using the apps appreciated the apps' effectiveness in masking tinnitus and facilitating sleep, and their sound personalisation feature. Conversely, negative experience included tinnitus aggravation, lack of suitable sounds for their tinnitus, constant advertising, and high price, e.g., “since my tinnitus is quite broad spectrum rather than a single or very few frequencies, this did not prove particularly useful” (male, 40 years, The UK).

Availability of tinnitus care before/during pandemic

Even though non-urgent healthcare services were disrupted during the pandemic, 78% (N=249/321) of respondents did not believe that their regular tinnitus care had changed due to the pandemic. Only 5% (N=16/321) found tinnitus care less accessible and 11 of them reported more bothersome tinnitus, for example: “hospital audiologists not arranging appointments and local British Tinnitus Association group support not being able to hold face-to-face meetings” (Male, 70 years, The UK). Besides, 73% (N=233/320) and 71% (N=227/320) of respondents thought that there were insufficient tinnitus care services before and during the pandemic respectively, e.g., a respondent said he had “never heard of any programs” before the pandemic (male, 60 years, Australia). Another respondent said that during the pandemic, “it was near impossible to get a doctor's appointment for anything, let alone tinnitus” (female, 57 years, The UK).

Tinnitus information accessibility

Overall, 57% (N=181/320) of respondents were unaware of where they could go to access reliable tinnitus information. Their country of residence was related to whether they knew where to access such information, $\chi^2(1, N=320) = 33.01, p < 0.001$. A large proportion of Australian respondents did not know where to get reliable tinnitus information (67%; N=153/230), while only 31% (N=28/90) of those from other countries did not know where

Figure 3. Change in in-person social contact with family, friends, and colleagues during the pandemic.

to find such information. The most mentioned reliable sources the respondents had accessed were the British Tinnitus Association (BTA) (N=67), government health websites (N=50), and information brochures (N=46). They mostly found those sources via Internet search (N=104) and clinicians' suggestions (N=43).

Tinnitus treatment uptake factors

When the respondents were asked to select from a list of factors which might affect their consideration of choosing a tinnitus treatment, the top considerations were the credibility of clinician (N=184), cost (N=175), and good reviews from others who have tried the treatment (N=175). They were also encouraged to suggest factors that were not included in the provided list and four additional factors were identified, as shown in supplementary material Table 1. Professional recommendations based on research evidence, clinicians, and tinnitus associations were deemed important. One participant suggested: "I would like to see good scientific evidence for effectiveness" (Male, 64 years, Australia). The treatment's ability to effectively relieve or even cure their tinnitus was also important. For example: "Efficacy of treatment is the most important thing. I would pay quite a bit and expend effort if something had a decent chance of reducing my tinnitus" (Female, 48 years, The USA). Some barriers, such as the respondents' insufficient awareness of new treatments and heavy cost, which prevented them from receiving treatments, needed to be overcome first, e.g., "no idea what is out there really" (Male, 51 years, Australia). Additionally, they were concerned about whether the treatment would cause physical or psychological damage. For example, side effects were mentioned by a respondent who would consider "how natural it is, or if it involves drugs that are going to put pressure into other organs (i.e., kidneys)" (Female, 33 years, Mexico).

Future of tinnitus care

A total of 250 open-ended responses (180 from Australia and 70 from other countries) were collected regarding respondents'

perceptions on how tinnitus care could be improved. Supplementary material Table 2 shows the five themes generated from the thematic analysis of the respondents' responses. A considerable number of respondents (N=67) hoped that a cure could be developed. Many of them thought government policies could be implemented to support scientific research and prohibit scientifically unproven treatments. A need for eliminating barriers such as unsupportive clinicians and low accessibility was indicated, e.g., "every GP and ENT in Australia needs to be trained in how to successfully triage, support and help manage their distressed tinnitus patients. This is not happening at the moment" (female, 63 years, Australia). More tinnitus information should be accessible to patients and the general public in order to raise their awareness and promote prevention of hearing loss and tinnitus. Concerns about hearing devices including patient willingness to use the devices, device appearance, and cost should be addressed as well.

Compared to other countries (19%; N=13/70), more Australian respondents wished a cure could be developed (30%; N=54/180). Similarly, more respondents from Australia (19%; N=35/180) mentioned the need for more information and self-awareness of treatment than those from other countries (10%; N=7/70). In contrast, less emphasis was put on more funded research (17%), more supportive and knowledgeable clinicians (18%), and more government support (2%) by Australian respondents than those from other countries (27%, 31%, and 10%, respectively).

Discussion

The aim of the current study was to examine the perspectives of individuals with tinnitus on their functional and emotional challenges throughout the pandemic and to obtain their opinions on the provision of new and accessible tinnitus care. In this study, 36% of respondents reported more bothersome tinnitus since the COVID-19 outbreak, 59% reported no change and 5% reported less bothersome tinnitus. This is consistent with the findings of

Beukes et al. (2020) that 32% of respondents reported more

bothersome tinnitus during the pandemic, 67% reported no change and 1% reported less bothersome tinnitus. However, Aazh, Danesh, and Moore (2021) reported different results as the ratings of tinnitus loudness, annoyance, and effect on life between the groups of patients seen before and during COVID-19 lockdown did not differ significantly. The authors questioned the reliability of the results reported by Beukes et al. (2020) as respondents might be unable to judge whether their changes in tinnitus perception were due to changes in tinnitus itself, or changes in tinnitus-related symptoms, e.g., poorer sleep quality. Aazh, Danesh, and Moore (2021) suggested that tinnitus-related symptoms could be worsened by the pandemic even for individuals without tinnitus (e.g., having sleep disturbances). Therefore, respondents might have mistakenly attributed their worsened tinnitus to worsened tinnitus-related symptoms instead of tinnitus itself. The authors also suggested that bias might be introduced as respondents were asked to compare their tinnitus severity before and during the pandemic, and it might have made them believe that there were expected to be differences, and to answer accordingly. Taking these suggestions into consideration, readers should be mindful that caution is needed in the interpretation of the results of this study.

A relationship between respondents' country of residence and change in tinnitus perception was revealed in our study. Nevertheless, logistic regression analysis suggested that country of residence was not the best predictor of worsened tinnitus perception during the pandemic. Instead, female gender, younger age, less access to regular tinnitus care, and less social contact with colleagues were the best predictors of worsened tinnitus perception during the pandemic. Despite the above findings, Australian respondents were found to be less affected than those living in other countries. Some of the factors that might have contributed to this difference between countries are the nationwide pandemic severity, duration of self-isolation, and amount of social contact, and these factors are discussed below. Compared to other developed countries, such as the UK or the USA, Australia had a remarkably slower spread of the virus and a lower death toll (i.e., 30 deaths per 100,000 population in Australia versus 260 per 100,000 in the UK and 300 per 100,000 in the USA as at May 2022) (World Health Organization 2022). Furthermore, in this study, the duration of self-isolation or quarantine was on average four times longer in other countries than in Australia. Australian respondents were also less affected in terms of reduction in in-person social contact. Self-isolation has been associated with loneliness, stress, depression, and anxiety-induced insomnia (Brooks et al. 2020). These psychological factors are known to have a bidirectional relationship with tinnitus and tinnitus can be exacerbated by worsening emotional state during isolation (Wallh ausser-Franke et al. 2012). With less emotional burden stemming from worries about the pandemic and self-isolation, Australians could have perceived less change in their tinnitus. Despite the low mean HADS Anxiety and Depression scores measured among the Australian respondents, they indicated that there should be more focus on wellbeing and quality of life and more mental health support, and the importance of this finding should not be overlooked.

Reports of hearing loss and tinnitus after COVID-19 infection have been emerging (Beukes et al. 2021c; Saniasiaya 2021).

Proposed mechanisms behind such observations include infection-induced inflammation and structural damage to the cochlea (Maharaj et al. 2020). Among the seven respondents in this study who had tested positive for COVID-19, three had more bothersome tinnitus and two developed tinnitus after experiencing COVID-19 symptoms. Beukes et al. (2020) also presented seven anecdotal reports of tinnitus emerging as a new symptom after COVID-19 contraction. Given COVID-19's high infection rate and virulence, substantial efforts have been directed to clinical trials and deployment of COVID-19 vaccines within a year since it was declared a global pandemic (Lo Re et al. 2021). With such a short development period, the side effects of the vaccines were not fully understood and this might be reflected by the post-vaccination tinnitus reports in this study as well as previous literature. Of the 148 vaccinated respondents, 18 had more bothersome tinnitus and three developed tinnitus following vaccinations. Parrino et al. (2022) described three cases of sudden unilateral tinnitus after receiving Pfizer vaccines. Report from Taiwan also indicated a case of temporary tinnitus following AstraZeneca vaccination (Tseng et al. 2021). Post-vaccination tinnitus is rare and has only been reported as a secondary symptom of sensorineural hearing loss after receiving measles, hepatitis B, swine flu, and rabies vaccines (Okhovat et al. 2015). The hypersensitivity reaction triggered by the vaccines and the resultant inner ear inflammation and damage was postulated to be the cause of sensorineural hearing loss and tinnitus (Okhovat et al. 2015). According to published pharmacosurveillance reports of various COVID-19 vaccines, the occurrence rate of tinnitus was 0.006% to 0.03% which was much lower than the observed rate in this study (2%) (Parrino et al. 2022). Such a difference in the occurrence of post-vaccination tinnitus could be due to this study's small sample size and recruitment pathways. Caution is needed in the interpretation of this finding as postvaccination tinnitus exacerbation and initiation was reported by a small number of respondents. Nevertheless, given the debilitating consequences of tinnitus, further investigation is required to elucidate the pathogenesis of tinnitus symptoms following vaccination.

In this study, a greater proportion of Australian respondents (67%) were unaware of where they could go to access reliable tinnitus information than respondents from other countries (31%) and this was supported by statements such as "more frequent information in news, TV, radio, etc." (male, 62 years, Australia). This finding reflects the fact that currently Australian tinnitus associations are not gaining enough publicity and although tinnitus information is available on their websites, it is not effectively conveyed to individuals with tinnitus. Australian tinnitus healthcare service providers need to more often direct tinnitus patients to tinnitus associations for information and support should the patients need it. Australian tinnitus associations may increase the available tinnitus information both online and in print to suit individuals with different technology competence. As suggested by the respondents, such associations can also increase media exposure to help individuals with tinnitus find available support.

More than 70% of respondents indicated that tinnitus care services were insufficient regardless of the presence of a pandemic. Similar reports have been made by individuals with tinnitus in the USA (Beukes et al. 2021b). This finding suggests

that the availability and accessibility of tinnitus treatments was inadequate before COVID-19, and from the qualitative data collected, individuals with tinnitus would like to see improvement in this aspect. Teleaudiology services delivered via virtual appointments and smartphone apps might be useful to enhance treatment accessibility. Although an increased uptake of Teleaudiology was seen in some countries after the COVID-19 outbreak (Saunders and Roughley 2021), only 11% and 16% of respondents tried virtual appointments and tinnitus smartphone apps, respectively. As a study demonstrated that there has been a post-pandemic positive change of patients' attitudes towards Teleaudiology (Aazh, Swanepoel, and Moore 2021), continuous implementation and promotion of teleaudiology services is important to bridge the gap between service supply and patient demand.

Patients' views on the future of tinnitus care were studied by Beukes et al. (2021a). They generated five themes of suggestions, which mostly overlapped with this study's findings, i.e., experts, therapies, information, research, and prevention. However, the importance of hearing devices was highlighted in this study. Respondents raised concerns about being pressured into buying hearing aids, insufficient hearing aid tinnitus management features, hearing device appearance, cost, and social stigma. These themes provide invaluable information for stakeholders (e.g., clinicians, manufacturers, etc.) to refine service and product delivery and eventually increase patient satisfaction. There is also a need for awareness campaigns targeting stigma of hearing conditions so that stigma barriers are minimised and individuals with tinnitus may be more motivated to choose device-related options that could be beneficial for them. From the open-ended responses collected in this study, the significance of a systematic approach to tinnitus was underscored. More funding for tinnitus services is required to minimise cost barriers. More training and higher awareness among general practitioners and other health practitioners can facilitate the improvement of referral pathways. More attention should be paid to public health policies and support mechanisms such as tinnitus associations, particularly those in Australia. Public awareness of tinnitus prevention and how to support individuals with tinnitus should be raised. Furthermore, tinnitus-specific research funding is essential for generating scientific evidence to best inform tinnitus care. The systematic approach suggested above is especially important during the pandemic, as individuals with tinnitus may more likely experience worsened tinnitus symptoms and their accessibility to in-person tinnitus services may have been reduced.

Limitations

Some study limitations should be noted. Firstly, there was possible sampling bias as the survey needed to be filled online and only an English version was available. This might have excluded individuals who were unfamiliar with technology or English language. Also, those whose tinnitus had improved may have been less likely to participate in the survey than those whose tinnitus had worsened. Moreover, the survey was relatively long and most of the respondents required 20 to 25 minutes to complete it. The length of survey might have deterred

respondents from answering all questions and reduced the amount of data collected. Additionally, survey distribution was conducted mainly through tinnitus associations and clinics so the sample might be inadequate to represent the general public, especially those who were not in contact with those associations and clinics.

Future directions

Further investigation is required to elucidate the association between receiving the COVID-19 vaccine and tinnitus symptoms. This study provides insights into the needs and concerns of individuals with tinnitus. Hearing healthcare stakeholders including the government, hearing device manufacturers, and clinicians should strive for better tinnitus care focusing on the needs and concerns of individuals with tinnitus. Development of better self- and public-awareness and higher accessibility to tinnitus resources and management are pivotal in the provision of better tinnitus care. Focus groups and semi-structured interviews of consenting respondents in this study will be organised as a continuation to collect more in-depth opinions regarding their tinnitus experience during COVID-19 and future tinnitus care in Australia and we recommend a similar exercise globally. This step will ensure embedding patient voices in research co-design and transforming tinnitus care globally.

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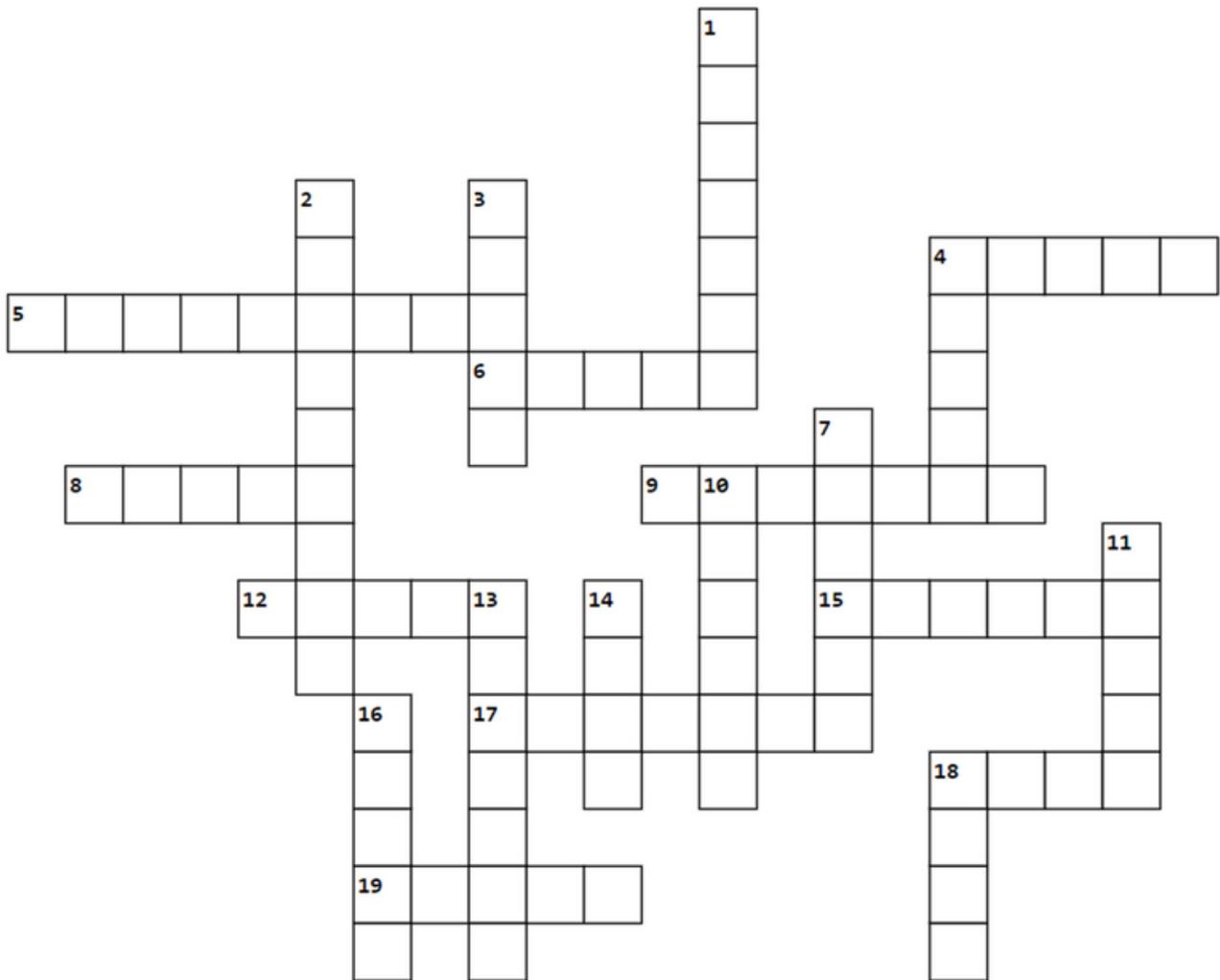
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Across:

- 4. The Family _____
- 5. It's A _____ Life
- 6. Meet Me In St. _____
- 8. The _____mare Before Christmas
- 9. The _____
- I2. A Christmas _____
- I5. The _____
- I7. _____ On 34th Street
- I8. _____ Actually
- I9. Home _____

Down:

- I. Just _____
- 2. This _____
- 3. Deck The _____
- 4. The _____ Clause
- 7. _____ All The Way
- I0. _____ Christmas Party
- II. _____ Christmas
- I3. National _____'s Christmas Vacation
- I4. Die _____
- I6. The _____ Express
- I8. _____ Christmas



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