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KEY INSIGHTS FROM THE III WORLD TINNITUS CONGRESS AND XIV INTERNATIONAL TINNITUS SEMINAR: TOWARD STRATIFIED AND MULTIMODAL TINNITUS CARE

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Abstract

The 2025 World Tinnitus Congress (WTC) and XIV International Tinnitus Seminar (ITS), held in Warsaw, Poland, brought together leading researchers and clinicians to share the latest advances in tinnitus and hyperacusis care. This article reviews key developments presented at the conference and explores the implications for research and clinical practice. Major themes included progress in cognitive behavioural therapy (CBT), neurophysiological mechanisms, somatosensory modulation, pharmacology, and digital health interventions. Highlights included validated paediatric assessment tools, stratified pharmacotherapy, and precision surgery for pulsatile tinnitus. Presentations underscored the expanding role of tele-audiology and digital self-help platforms, reflecting a shift toward decentralised and personalised care. The need for biomarker-guided trials, improved patient stratification, and wider access to psychological therapies are priorities for both research and clinical delivery.

Keywords: neuromodulation • cognitive behavioural therapy • hyperacusis • tinnitus

NAJWAŻNIEJSZE WNIOSKI Z III WORLD TINNITUS CONGRESS I XIV INTERNATIONAL TINNITUS SEMINAR – W KIERUNKU ZRÓŻNICOWANEJ I WIELOKIERUNKOWEJ OPIEKI NAD PACJENTAMI CIERPIĄCYMI NA SZUMY USZNE

Streszczenie

World Tinnitus Congress (WTC) 2025 i XIV International Tinnitus Seminar (ITS), które odbyły się w Warszawie (Polska), zgromadziły czołowych naukowców i klinicystów, którzy podzielili się najnowszymi osiągnięciami w zakresie leczenia szumów usznych i nadwrażliwości słuchowej. Niniejszy artykuł zawiera przegląd kluczowych osiągnięć przedstawionych podczas ww. wydarzeń oraz ich implikacje dla badań naukowych i praktyki klinicznej. Główne tematy obejmowały: postępy w terapii poznawczo-behawioralnej (CBT), mechanizmy neurofizjologiczne, modulację somatosensoryczną, farmakoterapię oraz cyfrowe interwencje zdrowotne. Najważniejsze zagadnienia dotyczyły sprawdzonych narzędzi służących do oceny szumów usznych u pacjentów pediatrycznych, farmakoterapii wyodrębnionych grup pacjentów oraz leczenia operacyjnego pulsujących szumów usznych. Prezentacje podkreślały rosnącą rolę teleaudiologii i cyfrowych narzędzi do samopomocy, odzwierciedlając przejście w kierunku zdecentralizowanych i spersonalizowanych modeli opieki. Podczas sesji jako priorytety – zarówno dla badań naukowych, jak i praktyki klinicznej – wskazano potrzebę przeprowadzania badań opartych na biomarkerach, lepszej stratyfikacji pacjentów oraz szerszego dostępu do psychoterapii.

Słowa kluczowe: neuromodulacja • terapia poznawczo-behawioralna • nadwrażliwość słuchowa, szumy uszne

Key to abbreviations	
ACT	acceptance and commitment therapy
AI	artificial intelligence
BBs	binaural beats
BOLD fMRI	blood oxygenation level dependent functional magnetic resonance imaging
CBT	cognitive behavioural therapy
CT	computed tomography
CTQ	Children's Tinnitus Questionnaire
DAVF	dural arteriovenous fistula
EMG	electromyography
high-SR	high-spontaneous-rate
iSHUSH	internet Self-Help, Understanding, and Support for Hyperacusis
ITS	International Tinnitus Seminar
MEG-OPM	magnetoencephalography with optically pumped magnetometers

Key to abbreviations (continued)	
MRA	magnetic resonance angiography
OAEs	otoacoustic emissions
PT	pulsatile tinnitus
SOAEs	spontaneous otoacoustic emissions
ST	somatosensory tinnitus
SSWAs	sigmoid sinus wall anomalies

Key to abbreviations (continued)	
tDCS	transcranial direct current stimulation
THI	Tinnitus Handicap Inventory
TMD	temporomandibular disorder
U-VNS	ultrasound vagus nerve stimulation
UCL	uncomfortable loudness level
WTC	World Tinnitus Congress

Introduction

Tinnitus is the perception of sound without an identifiable external or internal acoustic source – commonly experienced as ringing, buzzing, or hissing – and is often linked to distress, sleep disruption, difficulty concentrating, and a reduced quality of life. When accompanied by hyperacusis – the perception of certain everyday sounds as being too loud or painful – the impact on daily functioning can be even more severe [1]. The 3rd World Tinnitus Congress and XIV International Tinnitus Seminar brought together clinicians and researchers from around the world in Warsaw, Poland, from 13 to 15 April, 2025. This report summarises the key scientific presentations and emerging themes discussed during the meeting and highlights their implications for future research and clinical innovation [2].

We survey all oral presentations from the congress, along with selected poster presentations that reflected the core scientific themes. Highlights were chosen based on their relevance to emerging trends in tinnitus and hyperacusis research, clinical developments, and future directions in the field.

The topics discussed at the 2025 Congress covered seven main areas, as follows.

1) Cognitive-behavioural therapy (CBT) and psychological factors related to tinnitus, with a focus on diverse delivery models, mechanisms such as cognitive fusion, and the role of mindfulness and personality traits.

2) Neurophysiological mechanisms and emerging interventions, including brain imaging, non-invasive neuromodulation, and electrophysiological tools for refining treatment and diagnosis.

3) Somatosensory and sleep-related modulation of tinnitus, highlighting the influence of musculoskeletal dysfunctions and infradian sleep rhythms on tinnitus perception and the potential for personalised care pathways.

4) Psychologically and aetiologically guided drug therapy, presenting evidence for precision pharmacology based on psychological profiling, targeted drug delivery, and rigorous diagnostic processes.

5) Precision diagnosis and surgical advances in pulsatile tinnitus, introducing improved imaging techniques, new diagnostic markers, and minimally invasive surgical strategies with high resolution rates.

6) Paediatric and population-level innovations, including the development of validated assessment tools like the Children's Tinnitus Questionnaire and calls for more coordinated multidisciplinary care.

7) Digital therapies and accessibility, showcasing mobile apps, internet-based self-help platforms, and tele-audiology as scalable approaches to enhance tinnitus and hyperacusis care, especially in underserved regions.

Summary **Tables 1–7** outlining key presentations, findings, and clinical or research implications.

Conference sections

CBT and Psychological Factors

CBT is an evidence-based intervention for managing distress associated with tinnitus, hyperacusis, and misophonia. The 2025 Tonndorf Lecture, presented by Aazh (UK) [3], discussed three aspects of CBT for auditory conditions comprising the theoretical foundations; clinical evidence on CBT delivered by psychologists, audiologists, and digital platforms; and the estimated proportion of patients who may benefit from CBT. The lecture underlined that CBT is effective in reducing distress for patients experiencing tinnitus, hyperacusis, and misophonia. Both psychologist- and audiologist-delivered CBT protocols have demonstrated significant clinical improvements, while guided internet-based CBT has also yielded promising results [4–6]. Unguided internet-based CBT, though effective, is associated with higher dropout rates and variable engagement [7,8].

The lecture emphasized that not all patients benefit equally – some continue to experience significant distress even after completing CBT [9,10]. This underlines the importance of developing alternative or adjunctive therapies, as well as offering long-term follow-up and support. A key takeaway was the estimation that approximately 1 in 52 individuals with tinnitus requires CBT. This suggests that while tinnitus is a common condition, the need for intensive therapy is more targeted. To advance care, future research should compare the effectiveness of psychologist- and audiologist-delivered CBT, test hybrid delivery models, and explore improvements in digital platforms, especially for managing hyperacusis and misophonia. The lecture further advocated for the inclusion of neuroimaging and physiological markers in future clinical trials to understand neural mechanisms of improvement, and for characterizing non-responders to guide the development of tailored interventions.

Table 1. Summary of presentations on CBT and psychological mechanisms. This table summarises presentations exploring the effectiveness, delivery models, and underlying psychological mechanisms of CBT for tinnitus, hyperacusis, and misophonia. Included are cognitive-behavioural, mindfulness-based, and psychodynamic perspectives, as well as patient stratification and mechanisms of non-response

Presenter/ Author	Topic/ Study	Main Findings/ Perspective	Clinical or Research Implications
Aazh (UK)	CBT for tinnitus, hyperacusis, misophonia (Tonndorf Lecture)	CBT effective across delivery models; some patients require adjunctive therapies	compare psychologist- and audiologist-delivered CBT; integrate biomarkers and support long-term care
Fludra (Poland)	cognitive fusion and tinnitus distress	cognitive fusion correlated with higher distress, especially in men	supports ACT-based techniques in CBT
Gos (Poland)	trait mindfulness and tinnitus distress	higher mindfulness linked to lower distress	encourages inclusion of mindfulness strategies in CBT
Bastos (Brazil)	psychodynamic model of tinnitus	personality traits and unconscious processes influence distress	psychodynamic insights may enhance therapeutic models

Note: CBT = cognitive behavioural therapy; ACT = acceptance and commitment therapy

Complementing the cognitive framework presented in the Tonndorf Lecture, Fludra (Poland) investigated the role of cognitive fusion – the tendency to over-identify with distressing thoughts – as a psychological mechanism contributing to tinnitus-related distress. In a clinical sample of 105 patients, higher levels of cognitive fusion were significantly correlated with increased tinnitus severity, with particularly strong associations observed among male participants. These findings support core principles of CBT, which emphasise identifying and restructuring rigid, maladaptive thought patterns. They also resonate with third-wave CBT approaches such as Acceptance and Commitment Therapy (ACT), which target cognitive fusion through processes like mindfulness and cognitive diffusion) [11].

Adding further nuance, Gos (Poland) presented data linking trait mindfulness to reduced tinnitus distress. Higher scores on dimensions such as "acting with awareness" and "non-reactivity to inner experience" were associated with lower scores on the Tinnitus Handicap Inventory (THI) [12], suggesting that dispositional mindfulness may serve as a protective psychological resource.

Bastos (Brazil) introduced a psychodynamic tinnitus model that emphasises the role of personality traits and unconscious processes, including psychological trauma, in the development and exacerbation of tinnitus-related distress.

Together, these presentations reinforce CBT's role as a foundational approach in managing tinnitus and sound intolerance. They also underscore the value of diversifying delivery models, integrating new technologies, and refining patient stratification strategies to maximise therapeutic impact across varied populations. Key presentations on CBT, cognitive fusion, mindfulness, and psychodynamic models are summarised in **Table 1**.

Neurophysiological Mechanisms and Emerging Interventions

Advancing the understanding of tinnitus at the neural systems level, several presentations at the 2025 Congress provided compelling insights into both the neurobiology of tinnitus and hyperacusis, and the development of non-invasive therapeutic approaches.

Knipper (Germany) focused on the critical distinction between tinnitus with and without hyperacusis, arguing that failure to differentiate these subtypes has hindered the identification of reliable neuronal correlates. Her research – supported by data from audiometry – makes it possible to identify an auditory transfer function from the stimulus-onset, evoked, and resting state BOLD fMRI. The newest findings from MEG-OPM imaging technology (magnetoencephalography with optically pumped magnetometers) point to impaired fast auditory processing (specifically involving high spontaneous rate auditory fibres and subsequent loss of tonic inhibition in cortical protein parvalbumin interneuron networks) as a possible mechanism for persistent auditory phantom percepts [13].

In tinnitus patients with hyperacusis, such disinhibition might further increase attention to internal noise in certain frequency-specific cortical regions (through central hyperexcitability possibly driven by impaired efferent/afferent outer hair cell fibres) which would steepen the dynamic range of loudness perception up to painful sensation of loudness [14]. In this model, the intracortical response to elevated internal noise (tinnitus) and elevated loudness (hyperacusis) might lead to more or less strong emotional burdens and stress responses, depending on the individual. Such corticofugal feedback circuits could be a promising target for cognitive therapies.

In addition to Knipper's focus on distinguishing subtypes of tinnitus and hyperacusis through baseline neural differences, Sereda (UK) presented work from the NIHR Nottingham Biomedical Research Centre examining how non-invasive brain stimulation can modulate tinnitus-associated brain activity. This program has investigated interventions such as transcranial direct current stimulation (tDCS) and ultrasound vagus nerve stimulation (U-VNS), with the aim of altering atypical activity patterns and reducing the tinnitus percept. She explained that systematic reviews have identified tDCS as the most promising approach, with MEG revealing stimulation-induced changes in both frontal and temporal regions [15]. Variability in current delivery across individuals highlights the potential for developing personalised protocols. These findings mark a step toward a targeted, non-invasive therapy informed by a mechanistic insight.

Extending the focus on neuro-modulatory approaches, Szczepek (Germany) reported on a clinical study evaluating the immediate effects of non-invasive electrical stimulation of the ear canal on tinnitus loudness and distress [16]. Over 3 days, 66 chronic tinnitus patients received short-duration stimulation, and nearly half reported reduced loudness and more than one-third experienced less distress. Women and patients with bilateral or compensated tinnitus responded more positively, while age was not a factor. The findings suggest that non-invasive electrical stimulation via the ear canal may support both symptom management and patient stratification for advanced therapeutic options, such as extracochlear implants.

Waraczewski (Poland) evaluated the efficacy of bimodal stimulation using the Lenire device, which pairs sound stimulation with electrical stimulation of somatosensory pathways. In a cohort of 30 patients, 76% showed significant reductions in THI scores, with mean improvements of 17 to 21 points over two follow-up visits. The results are consistent with findings reported from other centres [17].

Yaman (Turkey) conducted a 6-week trial in tinnitus patients of theta-band binaural beats (BBs). Some 18 participants received 20 minutes of daily BB stimulation designed to entrain neural oscillations. The THI scores dropped significantly – from an average of approximately 53 to 34. These findings support the use of BBs as a non-invasive neuro-modulatory tool, particularly in patients with comorbid depressive symptoms.

As a general point, interventions for tinnitus would benefit from more rigorous research designs, such as randomised controlled trials, to minimise the risk of various forms of bias.

Hatzopoulos (Italy) reviewed many years of efforts to identify the mechanisms underlying tinnitus through the use of evoked and spontaneous otoacoustic emissions (OAEs) [18]. His presentation outlined several key challenges. First, pinpointing the precise origin and location of tinnitus within the auditory pathway remains inherently difficult on a case-by-case basis. Second, the recording of spontaneous otoacoustic emissions (SOAEs) – which are most frequently investigated in this context – becomes increasingly unreliable with age, particularly beyond the second decade of life. Hatzopoulos provided a comprehensive review of both historical and contemporary research, presenting a balanced perspective on the ongoing debate: whether or not a meaningful relationship between OAEs and tinnitus can be reliably established.

Azevedo (Brazil) reviewed research on the use of objective measures such as event-related potentials in the assessment of tinnitus, highlighting the potential of electrophysiological techniques to inform both diagnosis and treatment [19,20]. She presented examples where such measures have helped clarify underlying aetiologies, reinforcing the clinical value of integrating objective assessments into tinnitus care. Emphasising a key gap in the field, Azevedo called for future research to prioritise the development of reliable objective examinations, noting that such tools are urgently needed to advance understanding and management.

To conclude, this section highlighted significant advances in our understanding of tinnitus neurophysiology and the development of novel non-invasive interventions. From efforts to differentiate tinnitus subtypes to emerging evidence on neuro-modulatory techniques (such as tDCS, bimodal stimulation, and electrical stimulation of the ear canal), the field is steadily progressing toward more precise and personalised treatment approaches.

Moving forward, a key question is whether these interventions can benefit individuals who continue to experience significant tinnitus-related distress even after having completed established treatments such as CBT or sound therapy. Future research should specifically investigate the potential of these techniques as adjuncts for this subpopulation of non-responders, which would help to close an important gap in current tinnitus care pathways.

Table 2 is an overview of presentations on the neurobiology of tinnitus and non-invasive neuromodulatory techniques.

Somatosensory and Sleep-Related Modulation of Tinnitus: Towards Personalised, Mechanism-Based Care

In some individuals, tinnitus can be modulated by a range of factors, including somatosensory inputs, sound, stress, physical activity, sleep, and diet. When input from the head and neck region affects the tinnitus percept, this is referred to as somatosensory tinnitus (ST). Michiels (Belgium) presented recent advances in the diagnosis and treatment of ST, introducing a validated clinical decision tree based on four diagnostic criteria [21]. Her model demonstrated a sensitivity of 82% and specificity of 79%, offering a promising framework for differential diagnosis. Treatment strategies centred on musculoskeletal physiotherapy addressing dysfunctions in the cervical spine and temporomandibular joint, with interventions including manual therapy, targeted exercises, and patient education – together forming a structured and non-invasive management pathway for ST.

Expanding on this theme, van der Wal (Netherlands) provided a critical overview of temporomandibular disorder (TMD)-related somatic tinnitus, advocating for diagnostic and therapeutic approaches grounded in evidence. She highlighted the neural connectivity between the dorsal cochlear nucleus and somatosensory systems, which helps explain how somatic dysfunctions can affect tinnitus perception [22]. She emphasised the importance of coordinated, interdisciplinary care to ensure such patients receive timely and effective support.

Krasnodębska (Poland) proposed palatal electromyography (EMG) as a novel tool for assessing somatosensory modulation in tinnitus. In a case study of a patient with unilateral tinnitus, EMG revealed abnormal activity in

Table 2. Summary of neurophysiological mechanisms and emerging interventions. This table presents studies on the neural basis of tinnitus and hyperacusis, including advances in imaging, electrophysiology, and neuromodulation techniques such as tDCS, U-VNS, bimodal stimulation, and binaural beats. Findings also address diagnostic challenges and subgroup differentiation based on neural markers

Presenter/ Author	Topic/ Study	Main Findings/ Perspective	Clinical or Research Implications
Knipper (Germany)	tinnitus with/without hyperacusis	high-SR fibre loss and disinhibition in cortex	subtype-specific neural pathways to guide personalised care
Sereda (UK)	tDCS and U-VNS	tDCS alters activity in frontal/ temporal regions	personalised brain stimulation protocols needed
Szczepek (Germany)	ear canal electrical stimulation	nearly half showed loudness reduction	supports short-term symptom relief and stratification
Waraczewski (Poland)	Lenire bimodal stimulation	76% improved on THI	reinforces bimodal treatment protocols
Yaman (Turkey)	binaural beats	significant improvement in THI	binaural beats may help patients with depression
Hatzopoulos (Italy)	otoacoustic emissions	diagnostic value limited by age and variability	highlights limitations and future refinement needs
Azevedo (Brazil)	event-related potentials	useful in clarifying tinnitus aetiology	supports use of electrophysiological markers in clinics

Note: tDCS = transcranial direct current stimulation; U-VNS = ultrasound vagus nerve stimulation; THI = Tinnitus Handicap Inventory; SR = spontaneous rate

the tensor palatini muscle. These preliminary findings invite further research into the diagnostic potential of palatal EMG in ST.

Sleep difficulties are among the most common complaints reported by individuals with tinnitus, with approximately 70% of those seeking help also experiencing symptoms of insomnia [23–26]. Compared to those without sleep problems, tinnitus patients with insomnia tend to report greater overall distress, reduced quality of life, and increased pain-related comorbidities [27], along with a heightened risk of depression [24] and hyperacusis [28]. Against this background, Guillard (France) presented novel findings on the interplay between sleep and tinnitus, with a particular focus on a subgroup of patients whose tinnitus fluctuates in relation to sleep patterns [29–31]. In one study, 17 individuals reported periods of complete remission or increased tinnitus loudness following sleep. Longitudinal data revealed infradian rhythms – typically 2.5 to 4.5 days – suggesting these fluctuations may be governed by underlying physiological cycles such as sleep pressure or sleep debt.

In another study, Guillard [32] examined patients whose tinnitus worsens following naps – a phenomenon frequently observed in clinical settings and reported by approximately 1 in 5 individuals with tinnitus. His findings confirmed the reliability of these post-nap exacerbations. He proposed that the mechanism may involve covert somatosensory influences, such as dysfunction of the tensor veli palatini muscle – often implicated in snoring or sleep apnoea – or broader autonomic or central nervous system processes. This last study is particularly relevant to the field of somatosensory tinnitus, as it suggests that sleep-related musculoskeletal and autonomic factors may rhythmically modulate tinnitus perception in a subset of patients. Both studies point to the need for further research exploring the interaction between sleep physiology, somatosensory pathways, and tinnitus modulation – potentially opening up new diagnostic and therapeutic approaches for sleep-sensitive and somatically influenced tinnitus.

Together, these presentations underscore the growing recognition of physiotherapy as a way to manage ST [33]. This work highlights a shift toward a structured, interdisciplinary approach that integrates musculoskeletal, neurological, and sleep-related factors. **Table 3** summarises studies exploring somatosensory modulation and sleep-related effects on tinnitus.

Psychologically and Aetiologically Guided Drug Therapy for Tinnitus

Pharmacological treatment of tinnitus remains an area of cautious exploration, with numerous agents trialled and few demonstrating consistent effectiveness. At the 2025 Congress, new insights were presented that bridged clinical pharmacology, psychological profiling, and drug delivery innovation.

Azevedo (Brazil) presented results from a double-blind, placebo-controlled trial examining the efficacy of olanzapine, an antipsychotic medication, in individuals with chronic tinnitus. The study included 50 participants and used the THI to assess tinnitus-related distress. Findings revealed that individuals with higher levels of neuroticism and conscientiousness experienced greater improvements with olanzapine, suggesting that personality traits may moderate treatment outcomes. These results highlight the potential of psychologically stratified pharmacotherapy, where individual psychological profiles inform medication selection. Future research should further explore the differential effects of psychotropic medication on tinnitus distress, particularly by distinguishing between patients whose distress is directly driven by the tinnitus percept itself and those whose distress stems from broader psychological comorbidities.

Table 3. Summary of work on somatosensory and sleep-related modulation of tinnitus. Topics cover somatosensory tinnitus diagnosis, physiotherapy, temporomandibular involvement, palatal muscle activity, and infradian sleep rhythms. Emphasis is on personalised care and interdisciplinary approaches

Presenter/ Author	Topic/ Study	Main Findings/ Perspective	Clinical or Research Implications
Michiels (Belgium)	somatosensory tinnitus (ST)	validated decision tree; physiotherapy effective	ST screening and treatment should be standard
van der Wal (Netherlands)	TMD-related tinnitus	emphasised neural links and interdisciplinary care	supports evidence-based diagnosis and treatment
Krasnodębska (Poland)	palatal EMG	abnormal tensor palatini activity	EMG may support somatic tinnitus diagnosis
Guillard (France)	sleep-related modulation	tinnitus fluctuates with infradian rhythms or naps	supports exploring sleep–tinnitus interactions and physiology

Note: T = somatosensory tinnitus; TMD = temporomandibular disorder; EMG = electromyography

Table 4. Summary of presentations on psychologically and aetiologically guided pharmacotherapy. Topics include psychotropic trials, intratympanic therapy, and systematic reviews of efficacy across commonly used agents, with calls for better stratification and trial design

Presenter/ Author	Topic/ Study	Main Findings/ Perspective	Clinical or Research Implications
Azevedo (Brazil)	olanzapine and personality	neuroticism and conscientiousness predicted better outcomes	psychological profiling to guide pharmacotherapy
Skarzynska (Poland)	systematic review of drugs	support for amitriptyline, gabapentin, dexamethasone	need stratified and biomarker-driven trials
Figueiredo (Brazil)	aetiologically informed prescribing	medication only after ruling out medical causes	emphasises diagnostics-first approach
Elzayat (Egypt)	intratympanic steroid trials	mild-to-moderate improvement in some cases	consider local/ systemic combinations for selected patients

Skarzynska (Poland) led a systematic review examining the efficacy and safety of various pharmacological agents used in tinnitus management. They reviewed randomized controlled trials on antidepressants (e.g. amitriptyline), anticonvulsants (e.g. gabapentin), corticosteroids (e.g. dexamethasone), melatonin, *Ginkgo biloba*, and several nootropic compounds. The strongest support was found for amitriptyline, gabapentin, or topically applied steroid (dexamethasone) with the simultaneous use of oral melatonin. However, heterogeneity in trial design and tinnitus subtypes makes generalization difficult. The review concluded with a call for better patient phenotyping and biomarker-driven clinical trials to enhance future research validity.

Figueiredo (Brazil) stressed that tinnitus is inherently multifactorial, and pharmacological treatment should only be considered after ruling out (or managing) contributory medical causes such as metabolic conditions, tumours, or noise trauma. His talk highlighted the limitations of off-label medication use and recommended aetiologically guided prescribing supported by robust diagnostic processes.

Addressing direct drug delivery, Elzayat (Egypt) reported on intratympanic injection trials using corticosteroids in patients with treatment-resistant tinnitus. Results from two small-scale studies suggested mild-to-moderate improvement in tinnitus loudness and annoyance, but variability in outcomes indicated that stratification by tinnitus subtype is essential. Elzayat further advocated for combining local drug application with systemic treatment in selected cases, particularly when inner ear pathology or inflammation is suspected.

Together, these presentations point to a more refined role for pharmacotherapy in tinnitus care – one that emphasises precision over generalisation. Psychological profiling, aetiological clarity, and targeted drug delivery are shaping a future where medications support, rather than replace, personalised and multidisciplinary treatment. For selected patients, especially those with well-defined subtypes, pharmacological approaches may offer meaningful benefit when integrated thoughtfully into a broader care framework. **Table 4** outlines pharmacological approaches to tinnitus, including stratified prescribing and drug delivery methods.

Precision Diagnosis and Surgical Advances in Pulsatile Tinnitus

Pulsatile tinnitus (PT), often caused by vascular anomalies, represents a clinically distinct subtype of tinnitus with specific diagnostic and surgical considerations. At the 2025 Congress, Hsieh (China) presented extensive work on sigmoid sinus wall anomalies (SSWAs), one of the most common causes of venous PT [34–39]. Their

Table 5. Summary of presentations on diagnostic and surgical innovations in pulsatile tinnitus, with emphasis on venous causes, radiological markers, and surgical precision. It includes new intraoperative techniques, longitudinal imaging data, and the potential use of spontaneous otoacoustic emissions as a diagnostic tool

Presenter/ Author	Topic/ Study	Main Findings/ Perspective	Clinical or Research Implications
Hsieh (China)	surgical innovations and radiology	cement thickness optimisation, "moth-eaten" marker	multimodal diagnostics and precise surgery required
Hsieh (China)	SOAEs in PT diagnosis	elevated SOAEs reduced with jugular compression	SOAEs may aid non-invasive PT diagnosis

Note: PT = pulsatile tinnitus; SOAE = spontaneous otoacoustic emission

research challenged the assumption that SSWA is always congenital, showing through serial CT imaging in 42 patients that 29% had progressive bony erosion or diverticulum expansion – emphasising the value of longitudinal radiologic monitoring in suspected cases.

Hsieh also detailed a refined surgical approach using bone cement to dampen vascular sound transmission. Impedance tube testing revealed an optimal cement thickness of 5.0–7.5 mm, balancing effective sound attenuation with surgical safety. Thinner applications were insufficient, while thicker ones added risk without further benefit. These findings now inform surgical standards for minimally invasive resurfacing.

The team introduced a new radiological marker (termed the "moth-eaten sigmoid plate") observed in over 78% of patients with dural arteriovenous fistula (DAVF)-related PT. They advocated for multimodal diagnostics, including CT, MRA, and retro-auricular compression testing, noting that a sigmoid sinus anomaly alone is not diagnostic. Coexisting structural anomalies, such as DAVFs or jugular bulb defects, are necessary to distinguish treatable from benign variants.

In a surgical cohort of 253 patients, Hsieh's team reported a 90% resolution rate for PT following transtemporal resurfacing. Most recurrences stemmed from incomplete coverage, underscoring the critical need for comprehensive anatomical correction.

A novel diagnostic addition was the use of spontaneous otoacoustic emissions (SOAEs), which were elevated in affected ears and reduced with jugular vein compression. This suggests SOAE testing may serve as a non-invasive diagnostic tool for vascular involvement in PT.

Taken together, these advances illustrate the emergence of a precision framework for pulsatile tinnitus – one that combines targeted imaging, functional acoustic diagnostics, and evidence-based surgical techniques. As anatomical and pathophysiological understanding deepens, outcomes for this challenging tinnitus subtype are poised to improve substantially. Diagnostic and surgical innovations for pulsatile tinnitus are detailed in **Table 5**.

Paediatric and Population-Level Innovations

Once considered rare, paediatric tinnitus and hyperacusis are now recognised as more prevalent than previously thought, affecting an estimated 3–6% of children. Data presented at the 2025 Congress highlighted the significant impact of these conditions on emotional wellbeing, academic performance, and social participation [40,41]. Yet, despite their prevalence, diagnostic and treatment pathways for children remain underdeveloped and inconsistently applied.

Raj-Koziak (Poland) introduced the Children's Tinnitus Questionnaire (CTQ), an 11-item instrument developed through a rigorous multi-phase validation study involving nearly 200 children [42]. The CTQ demonstrated high internal consistency ($\alpha = 0.82$) and strong correlations with visual analogue scales measuring tinnitus loudness, annoyance, and coping. As the first fully validated, tinnitus-specific questionnaire for paediatric populations, the CTQ represents a critical step forward in improving assessment and guiding tailored interventions. Further research is needed to validate its use in English-speaking contexts. In addition, Aazh (UK), during a pre-conference workshop, suggested that the use of uncomfortable loudness levels [43] and parent questionnaires for assessment of tinnitus and hyperacusis distress for children should be explored [44].

The overarching message from these sessions was unequivocal: children with tinnitus and hyperacusis urgently need developmentally appropriate assessment tools and access to specialist, multidisciplinary care. Systemic gaps remain widespread – not only in mental health provision but also in coordinated services involving speech and language therapists, specialist audiologists, and child-focused psychological support [45]. Addressing these deficits will require scaling up access to evidence-based audiological and psychological therapies, embedding validated tools like the CTQ into routine practice, and integrating child-friendly digital and mindfulness-based interventions within public healthcare systems. **Table 6** summarises paediatric-focused presentations, including validated tools and population-level service needs.

Digital Therapies and Accessibility

Digital health interventions for tinnitus and hyperacusis were highlighted at the 2025 Congress as scalable, cost-effective tools for reaching underserved populations. Several contributions outlined promising platforms that blend self-help strategies, app-based diagnostics, and remote therapeutic support.

Table 6. Summary of presentations on paediatric and population-level innovations in the diagnosis and management of tinnitus and hyperacusis in children. Key developments include validated questionnaires, parent-reported outcome measures, and the need for multidisciplinary care pathways and age-appropriate tools

Presenter/ Author	Topic/ Study	Main Findings/ Perspective	Clinical or Research Implications
Raj-Koziak (Poland)	Children's Tinnitus Questionnaire (CTQ)	validated 11-item instrument	enables standardised assessment in children
Aazh (UK)	UCL and parent-reported tools	proposed use in assessing distress	further development and validation needed

Note: UCL = uncomfortable loudness level

Table 7. Summary of work on digital therapies and remote care innovations for tinnitus and hyperacusis. It includes mobile apps, internet-based self-help tools, and tele-audiology. Presentations explored technological feasibility, user engagement, and the role of digital tools in expanding access to care in underserved populations

Presenter/ Author	Topic/ Study	Main Findings/ Perspective	Clinical or Research Implications
Fackrell (UK)	iSHUSH for hyperacusis	co-developed digital platform	supports low-intensity access to hyperacusis support
Siller & de la Cruz Avila (Mexico)	AI mobile app for tinnitus	reduced symptoms with personalisation	supports AI and mobile tools for underserved areas
Nizamuddin (Malaysia)	tele-audiology in Malaysia	high perceived usefulness; reliability concerns	investment needed in infrastructure and policy support

Note: iSHUSH = Internet Self-Help, Understanding, and Support for Hyperacusis; AI = artificial intelligence

Siller and de la Cruz Avila (Mexico) introduced an innovative mobile app that combines AI-driven diagnostics, interactive hearing tests, and a user-centred treatment program featuring sound therapy, nutritional guidance, and use of hearing aids. Following an AI-based tinnitus classification, the app offers personalised sound masking using a dynamic therapeutic sound library and tracks the patient's progress via THI and other self-report measures. Preliminary data indicate significant reductions in symptom burden, particularly when the app's sound therapy matched the tinnitus pitch and was complemented by appropriate amplification.

Fackrell (UK) presented remotely on the development of iSHUSH – internet Self-Help, Understanding, and Support for Hyperacusis – an unguided digital intervention designed to support individuals living with hyperacusis [46]. The program was developed using qualitative interviews, meta-ethnographic evidence, and iterative patient feedback. iSHUSH provides psychoeducational content, practical coping tools, and behavioural strategies targeting avoidance, safety behaviours, and emotional regulation [47,48]. Particular emphasis is placed on validating patients' experiences and addressing common fears related to sound exposure, with input from both patients and clinicians informing the design and usability of the platform. A parallel remote counselling program for hyperacusis is also under development in the United States [49]. Future studies should evaluate the comparative effectiveness of these digital interventions against targeted CBT for hyperacusis delivered by trained audiologists [9] and psychologists [50].

From a systems-level perspective, Nizamuddin (Malaysia) evaluated the acceptance of tele-audiology in tinnitus care across Malaysia. Surveying 42 audiologists and 84 patients, the study found high levels of perceived usefulness but moderate concern around reliability. While tele-audiology is gaining momentum, particularly for initial consultations and counselling, infrastructure gaps and digital literacy remain barriers. Nonetheless, both groups viewed tele-audiology as a viable complement to in-person care, particularly in rural or resource-limited settings.

These digital innovations reflect a growing shift toward decentralised, accessible tinnitus and hyperacusis care – enabling support regardless of geographical location or socioeconomic status. Yet important challenges remain. User engagement with unguided platforms like iSHUSH can be inconsistent, and long-term adherence is not yet well understood. In parallel, regulatory and reimbursement systems must adapt to support the wider adoption of tele-audiology. Crucially, digital health interventions are no longer peripheral; they are becoming central to the future of tinnitus management. As these tools continue to evolve, the integration of neurophysiological data, behavioural analytics, and personalised feedback mechanisms may significantly enhance their effectiveness – paving the way for more adaptive, scalable, and responsive care for individuals with sound intolerance disorders. Digital health and tele-audiology innovations are summarised in **Table 7**.

Conclusion and Implications for Research and Clinical Practice

The 2025 World Tinnitus Congress and International Tinnitus Seminar revealed a field undergoing rapid transformation – moving toward precision, personalisation, and integration across disciplines. Across diverse presentations, a consistent message emerged: effective tinnitus and hyperacusis care must be stratified, multimodal, and guided by both clinical evidence and patient-centred insight. Clinically, CBT remains a foundational approach, with growing support for delivery by audiologists and through digital platforms. However, variability in response – particularly among individuals with comorbid conditions – underscores the need for enhanced stratification and alternative pathways.

Neurophysiological findings are beginning to clarify subtypes and mechanisms, opening doors to targeted interventions like brain stimulation, bimodal therapies, and somatosensory modulation. Innovations in pharmacology highlight the potential of psychologically and aetiologically guided prescribing, while surgical techniques for pulsatile tinnitus are becoming more refined and evidence-based. From a systems perspective, paediatric tinnitus and hyperacusis remain under-recognised and under-treated, calling for greater investment in age-appropriate tools and services. Meanwhile, digital and tele-audiological solutions are redefining accessibility, especially for underserved populations – but sustained engagement, regulatory support, and clinical integration remain critical challenges.

Implications for research include the need for:

- Stratified trials that differentiate subtypes and assess personalised treatment combinations;
- Biomarker and neuroimaging validation to clarify mechanisms and track treatment response;
- Longitudinal studies to assess durability of treatment effects, particularly for digital and neuro-modulatory interventions;
- Comparative effectiveness research to evaluate psychologist-, audiologist-, and internet-delivered therapies across populations;
- Adaptation of tools for children and other underrepresented groups.

Implications for clinical practice centre on:
- Expanding CBT access through audiologist training and digital scaling;
- Embedding diagnostic innovations (e.g. EMG, OAEs, neurophysiology) into routine workups;
- Recognising and treating somatosensory and sleep-modulated tinnitus subtypes;
- Systematically incorporating psychological profiling into treatment planning;
- Building integrated care pathways that align with patient needs across age, geography, and health systems.

As tinnitus science and care continue to evolve, the integration of multidisciplinary knowledge, patient-specific insights, and digital innovation will be essential in delivering more effective, equitable, and sustainable solutions for individuals living with sound intolerance disorders.

Looking ahead, it was announced that, following a competitive bidding process, the IV World Tinnitus Congress and XV International Tinnitus Seminar will be held in London in 2027. There is growing momentum and international collaboration driving tinnitus research and care.

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References

1. Schecklmann M, Landgrebe M, Langguth B, TRI Database Study Group. Phenotypic characteristics of hyperacusis in tinnitus. PLoS One 2014; 9: e86944. https://doi.org/10.1371/journal.pone.0086944
2. XIV International Tinnitus Seminar and 3rd World Tinnitus Congress, 13–15.04.2025, Warsaw/Kajetany, Poland (Book of Abstracts). J Hear Sci, 2025; 15: 125–147. https://doi.org/10.17430/jhs/203341
3. Aazh H. Cognitive behavioural therapy (CBT) for managing tinnitus, hyperacusis, and misophonia: the 2025 Tonndorf Lecture. Brain Sci, 2025; 15: 1–26. https://doi.org/10.3390/brainsci15050526
4. Fuller T, Cima R, Langguth B, Mazurek B, Vlaeyen JW, Hoare DJ. Cognitive behavioural therapy for tinnitus. Cochrane Database Syst Rev, 2020; 1(1): CD012614. https://doi.org/10.1002/14651858.CD012614.pub2
5. Burke LA, El Refaie A. The current state of evidence regarding audiologist-provided cognitive behavioural therapy for the management of tinnitus: a scoping review. Audiol Res, 2024; 14: 412–31. https://doi.org/10.3390/audiolres14030035
6. Mehta S, Peynenburg VA, Hadjistavropoulos HD. Internet-delivered cognitive behaviour therapy for chronic health conditions: a systematic review and meta-analysis. J Behav Med, 2019; 42: 169–187. https://doi.org/10.1007/s10865-018-9984-x
7. Walter U, Pennig S, Bleckmann L, Röschmann-Doose K, Wittig T, Thomsen J, et al. Continuous improvement of chronic tinnitus through a 9-month smartphone-based cognitive behavioral therapy: randomized controlled trial. J Med Internet Res, 2025; 27: e59575. https://doi.org/10.2196/59575
8. Aazh H, Taylor L, Danesh AA, Moore BCJ. The effectiveness of unguided internet-based cognitive behavioral therapy for tinnitus for patients with tinnitus alone or combined with hyperacusis and/or misophonia: a preliminary analysis. J Am Acad Audiol, 2022; 33(7–8): 405–16. https://doi.org/10.1055/a-2087-0262
9. Aazh H, Najjari A, Moore BCJ. A preliminary analysis of the clinical effectiveness of audiologist-delivered cognitive behavioral therapy delivered via video calls for rehabilitation of misophonia, hyperacusis, and tinnitus. Am J Audiol, 2024; 33(2): 559–74. https://doi.org/10.1044/2024_AJA-23-00254
10. Beukes EW, Andersson G, Allen PM, Manchaiah V, Baguley DM. Effectiveness of guided internet-based cognitive behavioral therapy vs face-to-face clinical care for treatment of tinnitus: a randomized clinical trial. JAMA Otolaryngol Head Neck Surg, 2018; 144(12): 1126–33. https://doi.org/10.1001/jamaoto.2018.2238

11. Barrera TL, Szafranski DD, Ratcliff CG, Garnaat SL, Norton PJ. An experimental comparison of techniques: cognitive defusion, cognitive restructuring, and in-vivo exposure for social anxiety. Behav Cogn Psychother, 2016; 44(2): 249–54. https://doi.org/10.1017/S1352465814000630
12. Newman CW, Jacobson GP, Spitzer JB. Development of the Tinnitus Handicap Inventory. Arch Otolaryngol Head Neck Surg, 1996; 122(2): 143–8. https://doi.org/10.1001/archotol.1996.01890140029007
13. Knipper M, Singer W, Schwabe K, Hagberg GE, Li Hegner Y, Rüttiger L, et al. Disturbed balance of inhibitory signaling links hearing loss and cognition. Front Neural Circuits, 2021; 15: 785603. https://doi.org/10.3389/fncir.2021.785603
14. Knipper M, van Dijk P, Schulze H, Mazurek B, Krauss P, Scheper V, et al. The neural bases of tinnitus: lessons from deafness and cochlear implants. J Neurosci, 2020; 40(38): 7190–7202. https://doi.org/10.1523/JNEUROSCI.1314-19.2020
15. Hoare DJ, Shorter GW, Shekhawat GS, El Refaie A, Labree B, Sereda M. Neuromodulation treatments targeting pathological synchrony for tinnitus in adults: a systematic review. Brain Sci, 2024; 14(8): 748. https://doi.org/10.3390/brainsci14080748
16. Vater J, Gröschel M, Szczepek AJ, Olze H. Electrical ear canal stimulation as a therapeutic approach for tinnitus: a proof of concept study. J Clin Med, 2024; 13(9): 2663. https://doi.org/10.3390/jcm13092663
17. Conlon B, Langguth B, Hamilton C, Hughes S, Meade E, Connor CO, et al. Bimodal neuromodulation combining sound and tongue stimulation reduces tinnitus symptoms in a large randomized clinical study. Sci Transl Med, 2020; 12(564): eabb2830. https://doi.org/10.1126/scitranslmed.abb2830
18. Fabijańska A, Smurzyński J, Hatzopoulos S, Kochanek K, Bartnik G, Raj-Koziak D, et al. The relationship between distortion product otoacoustic emissions and extended high-frequency audiometry in tinnitus patients. Part 1: normally hearing patients with unilateral tinnitus. Med Sci Monit, 2012; 18(12): CR765–70. https://doi.org/10.12659/msm.883606
19. Azevedo AA, Figueiredo RR, Penido NO. Tinnitus and event related potentials: a systematic review. Braz J Otorhinolaryngol, 2020; 86(1): 119–26. https://doi.org/10.1016/j.bjorl.2019.09.005
20. de Azevedo AA, Penido NO, Figueiredo RR. Event related potentials (ERPs) to assess the tinnitus complaint during drug treatment. Prog Brain Res, 2021; 262: 175–87. https://doi.org/10.1016/bs.pbr.2020.07.017
21. Michiels S. Somatosensory tinnitus: recent developments in diagnosis and treatment. J Assoc Res Otolaryngol, 2023; 24(5): 465–72. https://doi.org/10.1007/s10162-023-00912-3
22. van der Wal AC. [A PhD completed. Positive effects for multidisciplinary orofacial treatment on tinnitus complaints]. Ned Tijdschr Tandheelkd, 2023; 130: 368–72.
23. Aazh H, Lammaing K, Moore BCJ. Factors related to tinnitus and hyperacusis handicap in older people. Int J Audiol, 2017; 56(9): 677–84. https://doi.org/10.1080/14992027.2017.1335887
24. Aazh H, Moore BCJ. Factors associated with depression in patients with tinnitus and hyperacusis. Am J Audiol, 2017; 26: 562–69. https://doi.org/10.1080/14992027.2017.1335887
25. Aazh H, Moore BCJ, Lammaing K, Cropley M. Tinnitus and hyperacusis therapy in a UK National Health Service audiology department: patients' evaluations of the effectiveness of treatments. Int J Audiol, 2016; 55: 514–22. https://doi.org/10.1080/14992027.2016.1178400
26. Schecklmann M, Pregler M, Kreuzer PM, Poeppl TB, Lehner A, Cronlein T, et al. Psychophysiological associations between chronic tinnitus and sleep: a cross validation of tinnitus and insomnia questionnaires. Biomed Res Int, 2015; 2015: 461090. https://doi.org/10.1155/2015/461090
27. Weber FC, Schlee W, Langguth B, Schecklmann M, Schoisswohl S, Wetter TC, et al. Low sleep satisfaction is related to high disease burden in tinnitus. Int J Environ Res Public Health, 2022; 19(17): 11005. https://doi.org/10.3390/ijerph191711005
28. Aazh H, Moore BCJ. Incidence of discomfort during pure-tone audiometry and measurement of uncomfortable loudness levels among people seeking help for tinnitus and/or hyperacusis. Am J Audiol, 2017; 26: 226–32. https://doi.org/10.1044/2017_AJA-17-0011
29. Guillard R, Dauman N, Cadix A, Glabasnia Linck C, Congedo M, De Ridder D, et al. Tinnitus, lucid dreaming and awakening. An online survey and theoretical implications. Hear Res, 2025; 458: 109204. https://doi.org/10.1016/j.heares.2025.109204
30. Guillard R, Korczowski L, Léger D, Congedo M, Londero A. REM sleep impairment may underlie sleep-driven modulations of tinnitus in sleep intermittent tinnitus subjects: a controlled study. Int J Environ Res Public Health, 2023; 20(8): 5509. https://doi.org/10.3390/ijerph20085509
31. Guillard R, Philippe V, Hessas A, Faraut B, Michiels S, Park M, et al. Why does tinnitus vary with naps? A polysomnographic prospective study exploring the somatosensory hypothesis. Hear Res, 2025; 455: 109152. https://doi.org/10.1016/j.heares.2024.109152
32. Guillard R, Schecklmann M, Simoes J, Langguth B, Londero A, Congedo M, et al. Results of two cross-sectional database analyses regarding nap-induced modulations of tinnitus. Sci Rep, 2024; 14(1): 20111. https://doi.org/10.1038/s41598-024-70871-z
33. Michiels S, Wölflick S, Simões J, Schlee W. Exploring app-based physiotherapy for somatic tinnitus: results from a pilot study. J Clin Med, 2024; 13(23): 7203. https://doi.org/10.3390/jcm13237203
34. Hsieh YL, Gao X, Chen X, Wang S, Wang W. Resurfacing dehiscence(s) without reducing diverticulum effectively silences pulsatile tinnitus: novel surgical techniques for diverticulum and intraoperative microphone monitoring. Otol Neurotol, 2024; 45(2): 154–62. https://doi.org/10.1097/MAO.0000000000004075
35. Hsieh YL, Liu X, Dai F, Wang S, Gao X, Wen D, et al. Aberrant Sylvian vein diverticulum and tegmen dehiscence-induced venous pulsatile tinnitus phenotype can be treated via transtemporal surgery: a case report with 4D-flow magnetic resonance imaging. Otol Neurotol, 2025; 46(1): e28–e33. https://doi.org/10.1097/MAO.0000000000004383
36. Hsieh YL, Wang W. Case report: novel transtemporal transverse sinus decompression surgery to alleviate transverse sinus stenosis in a pulsatile tinnitus patient with restricted bilateral venous outflow. Front Surg, 2023; 10: 1268829. https://doi.org/10.3389/fsurg.2023.1268829
37. Hsieh YL, Zhong J, Chen X, Wang W. Case report: sphenoid wing dural arteriovenous fistula draining into ophthalmic veins inducing pulsatile tinnitus as the sole symptom and its spontaneous closure. Front Neurol, 2023; 14: 1293899. https://doi.org/10.3389/fneur.2023.1293899
38. Hsieh YL, Zuo B, Shi Y, Wang S, Wang W. Dynamics of cerebrospinal fluid pressure alterations and bilateral transverse-sigmoid sinus morphologies in Asian patients with venous pulsatile tinnitus. J Int Med Res, 2023; 51: 3000605231187949. https://doi.org/10.1177/03000605231187949

39. Liu X, Hsieh YL, Wang Y, Wang W. Spontaneous otoacoustic emission as a novel method to screen pulsatile tinnitus caused by sigmoid sinus wall abnormalities: a prospective study. Eur Arch Otorhinolaryngol, 2025; 282(6): 3027–3035. https://doi.org/10.1007/s00405-024-09197-5
40. Piotrowska A, Raj-Koziak D, Lorens A, Skarżyński H. Tinnitus reported by children aged 7 and 12 years. Int J Pediatr Otorhinolaryngol, 2015; 79(8): 1346–50. https://doi.org/10.1016/j.ijporl.2015.06.008
41. Hoare DJ, Smith H, Kennedy V, Fackrell K. Tinnitus in children. J Assoc Res Otolaryngol, 2024; 25(3): 239–47. https://doi.org/10.1007/s10162-024-00944-3
42. Raj-Koziak D, Gos E, Porowski M, Skarzynski PH, Skarzynski H. Children's Tinnitus Questionnaire: a novel tool for assessing the impact of tinnitus on a child's everyday life. Int J Pediatr Otorhinolaryngol, 2024; 182: 112024. https://doi.org/10.1016/j.ijporl.2024.112024
43. Aazh H, McFerran D, Moore BCJ. Uncomfortable loudness levels among children and adolescents seeking help for tinnitus and/or hyperacusis. Int J Audiol, 2018; 57(8): 618–23. https://doi.org/10.1080/14992027.2018.1453617
44. Aazh H, Hayes C, Erfanian M, Moore BCJ, Vitoratou S. Confirmatory factor analysis of the Hyperacusis Impact Questionnaire, Sound Sensitivity Symptoms Questionnaire, and Screening for Anxiety and Depression in Tinnitus, including preliminary analyses of the parent versions for use with children. J Am Acad Audiol, 2024; 35(3–04): 81–92. https://doi.org/10.1055/a-2255-7643
45. Bahramian E, Gohari N, Aazh H. Preliminary study on speech in noise training in children with sensory processing disorder and hyperacusis. Indian J Otolaryngol Head Neck Surg, 2024; 76(1): 344–50. https://doi.org/10.1007/s12070-023-04160-y
46. Fackrell K. Development and evaluation of a complex needs digital intervention for education and self-management of hyperacusis, 2018. NIHR, https://www.fundingawards.nihr.ac.uk/award/PDF-2018-11-ST2-003 [Accessed: 20.07.2025].
47. Potgieter I, Fackrell K, Kennedy V, Crunkhorn R, Hoare DJ. Hyperacusis in children: a scoping review. BMC Pediatr, 2020; 20: 319. https://doi.org/10.1186/s12887-020-02223-5
48. Potgieter I, Hoare DJ, Fackrell K. Hyperacusis in children: a thematic analysis of discussions in online forums. Am J Audiol, 2022; 31(1): 166–74. https://doi.org/10.1044/2021_AJA-21-00137
49. Perreau A, Williamson JA, Tyler RS. Rationale and development of a remote counseling program for hyperacusis. Am J Audiol, 2025; 34(2): 227–36. https://doi.org/10.1044/2025_AJA-24-00229
50. Juris L, Andersson G, Larsen HC, Ekselius L. Cognitive behaviour therapy for hyperacusis: A randomized controlled trial. Behaviour Research and Therapy, 2014; 54: 30–7. https://doi.org/10.1016/j.brat.2014.01.001

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