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Original Research Article

Digital therapeutics for tinnitus in emerging markets: a content analysis and quality assessment using the mobile app rating scale

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ABSTRACT

Background: Chronic subjective tinnitus remains a significant clinical challenge globally, characterized by the phantom perception of sound in the absence of external stimuli. While its etiology is multifactorial, the transition from acute perception to chronic distress is increasingly understood through the lens of maladaptive neuroplasticity and increased central gain.
Methods: A systematic prospective analysis and quality assessment were conducted on ten leading mHealth applications. Evaluation was performed using the 23-item Mobile app rating scale (MARS), which provides an objective framework across four objective subscales: engagement, functionality, aesthetics, and information quality, alongside a subjective quality subscale.
Results: The assessment revealed a highly capable but subscription-heavy landscape. Inter-rater reliability was strong (κ=0.86). Oto achieved the highest overall MARS score (4.52), followed closely by MindEar (4.43) and Tinnitus Pro (4.33). While apps like myNoise led in technical functionality (4.8), others like T-minus excelled in visual aesthetics (4.9). Clinical data integrated into the reviews highlighted that AI-driven interventions, such as MindEar, can result in significant reductions in Tinnitus functional index (TFI) scores for 64% of users.
Conclusions: Digital therapeutics offer transformative potential for tinnitus habituation through cognitive behavioral therapy (CBT), sound enrichment, and AI-driven coaching. However, significant socio-technical barriers persist in rural Indian contexts, particularly within the Karnataka region, including linguistic limitations and low digital literacy among seniors. Future adoption in emerging markets requires integrating mHealth into the primary health center (PHC) framework and utilizing community health workers (CHWs) as digital mediators.

Keywords: Mobile applications, Digital therapeutics, Tinnitus, Neural plasticity, Telemedicine

INTRODUCTION

In emerging markets like India, there is a growing need for scalable, cost-effective interventions to bridge the gap in specialized audiological care.

Recent epidemiological data supports this need, with studies indicating a significant prevalence of tinnitus characteristics among the Indian adult population that requires attention.[1]

The pathophysiology of subjective tinnitus

Subjective tinnitus is defined as a conscious phantom auditory perception-ringing, buzzing, or hissing-that lacks an external or internal physical source.[2,3]

While its etiology is heterogeneous, the transition from acute perception to chronic distress is now understood through the lens of maladaptive neuroplasticity.[4,5]

Cochlear (Peripheral) mechanisms

The genesis of tinnitus typically begins in the peripheral auditory system. Sensorineural hearing loss (SNHL) resulting from noise trauma, ototoxicity, or presbycusis is the primary trigger.[6] A critical advancement in this field is the identification of "hidden hearing loss" or cochlear synaptopathy-the loss of synapses between inner hair cells (IHC) and spiral ganglion neurons-even when traditional audiometric thresholds appear normal.[7]

In the acute phase, damage to the outer hair cells (OHCs) reduces the inhibitory feedback to the auditory nerve. Noise trauma can also activate *N*-methyl-D-aspartate (NMDA) receptors in the cochlea, increasing the spontaneous firing rate of the auditory nerve.[8] This peripheral de-afferentation creates a sensory deficit that the brain attempts to rectify.

Central mechanisms and neuroplasticity

Chronic tinnitus is maintained by the central nervous system (CNS).[6] When deprived of peripheral input, the brain engages in "increased central gain".[4] This reorganization occurs across several levels:

Dorsal cochlear nucleus

Often the first site of central hyperactivity, the dorsal cochlear nucleus exhibits increased spontaneous firing and neural synchrony following SNHL.[9]

Thalamocortical dysrhythmia

In the medial geniculate body (MGB) of the thalamus, a lack of input leads to hyperpolarization and low-frequency "bursting" mode firing. This abnormal activity triggers gamma-band synchronization (γ>30 Hz) in the auditory cortex, which serves as the physiological substrate for conscious sound perception.[4,6]

Limbic and autonomic involvement

The distress associated with tinnitus is mediated by the amygdala, hippocampus, and anterior cingulate cortex (ACC).[10,11] Distressed patients show higher synchronization in these limbic regions.[12] The vagus nerve also plays a modulatory role, influencing the autonomic state and the "emotional charge" of the tinnitus signal. This relationship is bidirectional; external stressors, such as those documented during the COVID-19 pandemic, have been shown to significantly exacerbate tinnitus experiences, highlighting the role of anxiety in symptom maintenance.[13]

Because chronic tinnitus is sustained by these centralized neural and emotional networks, traditional pharmacological interventions often fall short. Instead, the gold standard of management relies on auditory habituation, typically achieved through CBT and sound therapy. However, in resource-constrained settings, access to the specialized audiologists and psychotherapists required for these interventions is severely limited, creating a critical gap in care.

Despite the rapid proliferation of mobile health (mHealth) applications aiming to fill this void for tinnitus management, there remains a distinct lack of rigorous, peer-reviewed evaluation regarding their clinical validity, safety, and pedagogical quality-especially concerning their applicability in low- and middle-income countries. Therefore, the primary objective of this study was to systematically evaluate the quality, user engagement, and clinical reliability of the top-performing digital therapeutics for tinnitus using the objective MARS. Furthermore, this study aimed to identify evidence-based mHealth solutions and outline the necessary socio-technical strategies required to implement them effectively within the primary public health infrastructure of emerging markets.

METHODS

A systematic prospective audit of the app marketplace was conducted between April 1, 2026, and June 15, 2026, on the Apple App Store and Google Play Store to identify potential digital therapeutics for tinnitus management. To ensure reproducibility and minimize algorithmic bias, the search was conducted using a clean browser cache in incognito mode, with regional settings localized to the India storefront. The search utilized the specific keywords "tinnitus," "tinnitus relief," and "sound therapy" to capture a broad spectrum of relevant applications. Initial screening identified a total of 32 applications. These results were filtered based on popularity and user satisfaction metrics to ensure the analysis focused on market-leading solutions.

Applications were included in the final analysis if they met the following eligibility criteria: the primary function was tinnitus management or sound therapy; the application maintained a user star rating of >4.0; and the app ranked within the top tier of download counts.

Applications were excluded if they were: purely diagnostic (e.g., audiometry tools without therapeutic features); non-functional without specific proprietary hardware (unless a standalone mode was available); or duplicate entries across the two platforms.

Following this screening process, a final cohort of 10 applications was selected for quality assessment using the MARS by two independent expert raters (co-authors).[14] One rater is an experienced otorhinolaryngologist and the other rater is an experienced paediatrician with an expertise in tinnitus evaluation. To establish an initial baseline, a pilot rating was conducted on one app not included in the final sample.

Independent evaluations were then completed for the 10

included applications. To ensure statistical robustness, a Cohen's kappa coefficient was calculated to quantify the inter-rater reliability between the two experts prior to reconciliation. Following this quantitative assessment, any discrepancies in scoring were resolved through discussion and consensus to arrive at the final MARS score (Figure 1).

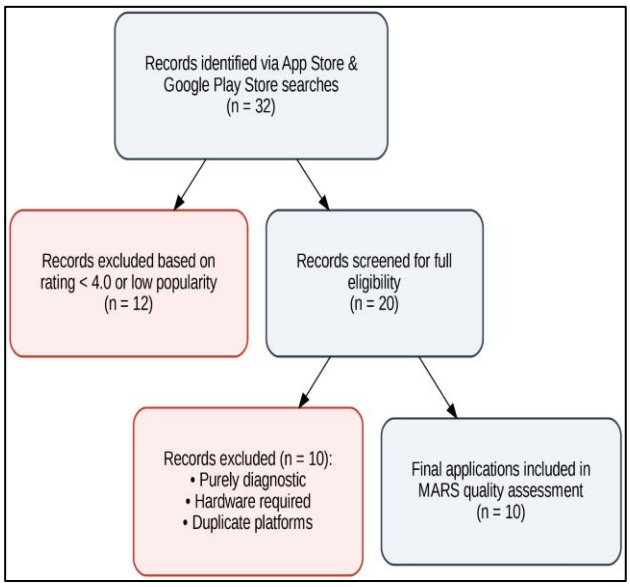

Figure 1: PRISMA flow diagram: app selection process.

The 23-item MARS provides an objective and reliable framework for assessing mHealth quality.

Engagement subscale (Items 1-5)

This section assesses the app's ability to motivate users for long-term habituation.

Entertainment

Measures if the app uses gamification to avoid dullness.

Interest

Evaluates if the content stimulates repeat use.

Customization

Checks for tailoring of sounds, content, and notifications.

Interactivity

Assesses feedback loops, reminders, and responsiveness.

Target group

Ensures language and design are appropriate for the audience.

Functionality subscale (Items 6-9)

Focuses on technical performance and ease of navigation.

Performance

Evaluates loading speeds and the presence of glitches.

Ease of use

Measures how intuitive the interface is for new users.

Navigation

Checks the logical flow between screens and menu clarity.

Gestural design

Ensures taps and swipes are consistent across all screens.

Aesthetics subscale (Items 10-12)

Examines the visual quality and arrangement of elements.

Layout

Evaluates the professional arrangement of icons and text.

Graphics

Rates the resolution and stylistic consistency of buttons.

Visual appeal

A subjective rating of the app's overall look and color use.

Information quality subscale (Items 13-19)

Crucial for clinical apps, this assesses the credibility and accuracy of medical content.

Accuracy of description

Does the app match its store claims?

Goals

Are clear, achievable goals specified within the app?

Quality of information

Evaluates the correctness of therapeutic content.

Quantity of information

Checks if information is comprehensive yet concise.

Visual information

Rates charts and graphs for clarity and logic.

Credibility

Asks if the app is from a legitimate health organization.

Evidence base

Checks if the app is trialled in published scientific literature.

Subjective quality subscale (Items 20-23)

Records the evaluator's personal endorsement.

Recommendation

Would the rater recommend this to a patient?

Future use

How many times would the rater use this app?

Willingness to pay

Evaluates the perceived value of the tool.

Overall star rating

A summary score on a 1-5 scale.

Statistical analysis

Descriptive statistical analysis was performed to calculate the mean MARS scores for each subscale and the overall quality rating for each application. Data were tabulated to facilitate comparative analysis.

RESULTS

A total of ten applications met the final inclusion criteria and underwent comprehensive quality assessment using the MARS.

Prior to the final consensus, the independent evaluations conducted by the two expert raters demonstrated strong inter-rater reliability, yielding a Cohen's kappa κ of 0.86 ($p<0.001$). All minor discrepancies in the individual subscale scores were successfully resolved through mutual discussion, resulting in the final averaged scores. The following tinnitus applications were profiled to evaluate their clinical relevance and user experience.

MindEar (formerly Tinnibot)

MindEar represents the forefront of AI-integrated tinnitus management, utilizing a sophisticated chatbot to deliver an 8-week structured program. Rebranded from Tinnibot, it focuses on CBT and mindfulness, addressing the emotional distress cycle of tinnitus. Clinical trials demonstrate that 64% of users achieve a significant reduction in TFI scores after consistent use.[15,16] The app's conversational AI acts as a 24/7 companion, guiding users through sound therapy and habituation exercises while significantly reducing per-patient therapy costs compared to traditional clinic-based interventions. Its win at the 2022 Hearing Technology Innovator Awards underscores its status as a robust digital therapeutic. By teaching users to reframe their psychological reactions to phantom sounds, MindEar facilitates long-term habituation, making it an ideal choice for patients seeking a structured, science-backed management protocol without the high cost of specialized in-person counseling.

Oto

Oto is distinguished by its highly structured, expert-led 10-minute daily therapy sessions, designed by audiologists and doctors who personally experience tinnitus. The program is grounded in neuroscience, focusing on the concept of habituation-training the brain to tune out unwanted sounds. Oto boasts an 86% success rate in improving user quality of life through a library of over 100 curated sounds, mindfulness courses, and sleep-specific content. The interface is meticulously designed to reduce cognitive load, emphasizing ease of use for individuals experiencing acute distress. Beyond the app, Oto offers exclusive access to webinars with world-leading specialists, bridging the gap between automated digital care and professional audiological expertise. For users looking for a professional-grade, science-backed approach that requires a minimal daily time investment, Oto remains the premier "best-in-class" digital therapeutic on the market.

ReSound Tinnitus Relief

ReSound Tinnitus Relief is a versatile sound therapy application that allows users to create highly personalized "Soundscapes" by layering up to five diverse sounds, including environmental noises and therapeutic tones. A key feature is the "My Plan" tool, which constructs a customized weekly program of sound enrichment and relaxation exercises based on the user's specific tinnitus profile. Clinical studies indicate that six months of consistent use results in a measurable decrease in tinnitus severity, particularly within the emotional and catastrophic reaction subscales.

While it integrates seamlessly with ReSound wireless hearing aids, the app is free and accessible for all users regardless of their hardware. By providing educational resources on tinnitus causes and coping strategies, ReSound Relief empowers patients to take an active role in their habituation journey, offering a comprehensive toolkit for managing symptoms during both daytime activities and sleep.

myNoise

myNoise stands out as a precision acoustic tool for users who demand total control over their masking environment. Unlike apps with static recordings, myNoise features a unique 10-slider equalizer for every soundscape, enabling users to fine-tune specific frequency bands to exactly match their tinnitus pitch. This functionality is vital for patients with high-frequency tinnitus who may find broad-spectrum white noise unhelpful or irritating. The app offers over 300 diverse soundscapes, ranging from binaural beats to industrial drones and natural environments. Its one-time purchase model for additional features is highly preferred by users who are weary of subscription-based mHealth models. In professional audiology, myNoise is frequently recommended for "tinnitus retraining therapy" (TRT) due to its scientific approach to sound enrichment, allowing for exact calibration to the decibel and frequency needs of each unique user.

BetterSleep (formerly Relax Melodies)

BetterSleep focuses on the critical intersection of tinnitus and sleep quality, targeting the high percentage of sufferers who experience nighttime distress. Tinnitus is often most noticeable in quiet environments, and the silence of a bedroom can trigger anxiety that prevents sleep onset. BetterSleep addresses this with a vast library of "Sleep Stories," hypnosis sessions, and guided meditations that utilize auditory distraction to quiet the mind. The app includes a sleep tracker that uses AI to analyze patterns and determine which sound mixes most effectively improve rest. By reducing the "emotional charge" of tinnitus during the night, BetterSleep facilitates the neurological process of habituation, eventually teaching the brain to perceive the phantom sound as a non-threatening background noise. It is the ideal companion for individuals whose primary tinnitus challenge is insomnia or nighttime anxiety.

Widex Zen

Widex Zen utilizes patented "fractal technology" to manage tinnitus through unpredictable, chime-like sounds.[17,18] Inspired by the relaxing effects of music, these tones are designed to be melodic but random; the brain cannot easily habituate to the fractal tone itself, ensuring the background sound remains an effective distracting stimulus.[17] The app provides four easy-to-navigate modes: Sounds, Relaxation, Sleep, and Learn, with the "Learn" section offering vital psychoeducation on tinnitus causes. A significant benefit for those with asymmetrical tinnitus is the ability to adjust volume and left-right ear balance directly within the interface. Widex Zen is entirely free and does not require Widex hearing aids for use, though it streams seamlessly to them for a professional experience. It is widely praised for its "Zen Dreams" soundscape, which users find more calming than traditional broadband or white noise maskers.

Beltone tinnitus calmer

Beltone Tinnitus Calmer is an evidence-based tool providing a robust mix of sound therapy and psychological exercises. Mirroring its sister app from ReSound, it allows users to blend multiple sounds to create custom relief environments. The app includes structured relaxation activities such as deep breathing and guided meditation, helping users manage the autonomic arousal triggered by tinnitus spikes. A key clinical feature is the usage tracker, which allows patients to monitor their progress and share data with their audiologist to fine-tune treatment plans. For users of Beltone wireless hearing aids, app streams audio directly, automatically adjusting frequency response to compensate for the user's specific hearing loss profile. This makes it powerful component of a comprehensive TRT program, providing both immediate masking relief and long-term habituation strategies through a professional-grade user interface.

AudioCardio

AudioCardio takes a physiological "physical therapy" approach to tinnitus management using Threshold Sound Conditioning (TSC). Rather than drowning out tinnitus with loud maskers, AudioCardio is designed to strengthen hearing cells at their specific damaged frequencies. Users perform a frequency-specific assessment within the app, and the system generates personalized 60-minute therapy sessions of inaudible tones played at the user's hearing threshold. The goal is to stimulate auditory neurons at these frequencies to promote neuroplastic recovery and reduce the neural gain that causes tinnitus perception. Clinical studies at institutions like Stanford University indicate that over 70% of users report positive changes in their hearing or tinnitus after 30 sessions. This app is best suited for individuals seeking a corrective physiological intervention to treat the underlying source of their tinnitus rather than a psychological coping mechanism.

Tinnitus Pro (Neurotone AI)

Tinnitus Pro by Neurotone AI is a premium, clinician-connected platform that integrates precision sound therapy with expert-led CBT. It features a unique "Therapeutic Tone Finder" that allows patients to recreate the exact pitch and noise of their unique tinnitus. This enables "notched-noise therapy," which removes energy from soundscapes at user's specific tinnitus frequency to reduce its perceived loudness over time. Tinnitus Pro also offers habituation and relief modes, keeping patients and providers connected through ‘pro portal’ where audiologists can monitor engagement via integrated surveys. Developed in collaboration with top researcher’s app carries lifetime license and works alongside LACE AI Pro for comprehensive auditory training. This platform is designed for individuals working closely with hearing care professionals to manage severe cases through combination of precision masking and cognitive reframing.

T-Minus

T-Minus is a musician-led sound therapy app created by professional producer Rupert Brown, who developed the library to manage his own severe tinnitus. The app features "Mind Environments"-unique music tracks that incorporate broadband sounds and fractal tones meticulously crafted for long-term listening without "sound fatigue". T-Minus stands out for its beautiful, artistic interface and a robust "News Hub" that provides the latest research from global tinnitus charities. It also includes a "Gratitude Diary" to help users track their emotional responses and identify daily triggers. Users can link their Spotify or Apple Music accounts to stream therapy tracks directly through the app. It is highly regarded for its empathetic approach, providing a calming and non-clinical experience for users who may be overwhelmed by standard medical applications, while remaining grounded in the principles of auditory retraining and masking.

The results of the content analysis performed on ten applications by two independent raters are summarized in Table 1, Figure 2.

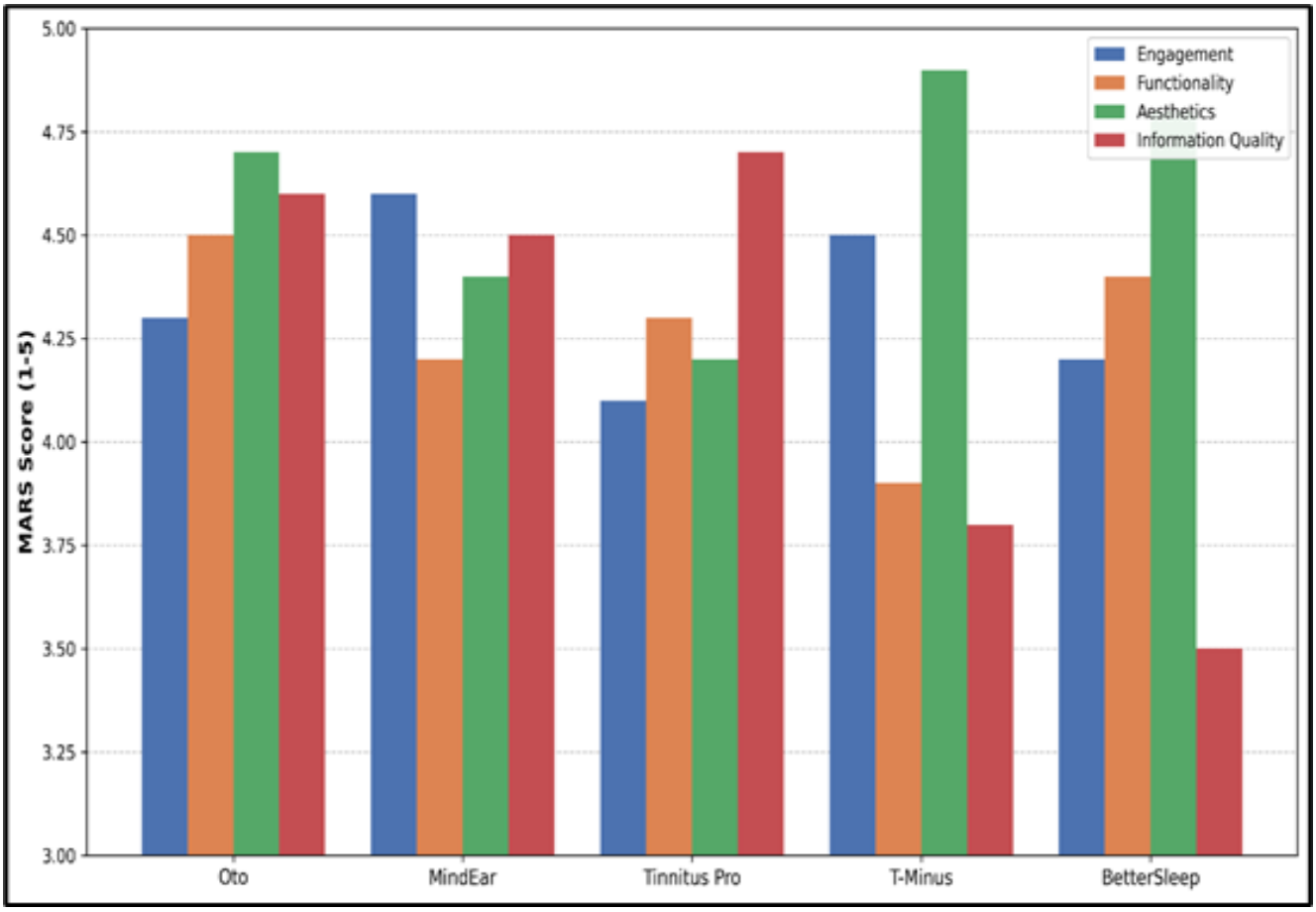

Figure 2: Comparison of MARS subscales across top digital therapeutics.

Table 1: Comparative analysis of mHealth applications based on MARS framework.

App Name	Engagement (1-5)	Functionality (1-5)	Aesthetics (1-5)	Information (1-5)	Total MARS
Oto	4.3	4.5	4.7	4.6	4.52
MindEar	4.6	4.2	4.4	4.5	4.43
Tinnitus Pro	4.1	4.3	4.2	4.7	4.33
T-Minus	4.5	3.9	4.9	3.8	4.28
BetterSleep	4.2	4.4	4.8	3.5	4.23
ReSound	3.8	4.6	3.9	4.1	4.10
Beltone	3.7	4.6	3.9	4.1	4.08
Widex Zen	3.2	4.1	4.0	4.4	3.93
AudioCardio	3.9	4.0	3.5	4.2	3.90
myNoise	3.5	4.8	3.2	3.9	3.85

DISCUSSION

The primary objective of this study was to systematically evaluate the quality, clinical validity, and user experience of ten leading digital therapeutics for tinnitus management, addressing a critical need given the growing burden of audiological disorders in emerging markets. Our assessment utilizing the objective MARS framework revealed a highly capable and rapidly evolving landscape of mHealth interventions. Platforms such as Oto and MindEar achieved the highest overall quality scores (4.52 and 4.43, respectively), driven largely by their successful integration of evidence-based CBT, AI-assisted coaching, and structured habituation protocols.

Furthermore, our subscale analysis highlighted that while technical functionality and visual aesthetics are currently robust across the top-tier cohort-exemplified by precision acoustic tools like myNoise (4.8 for Functionality) and artistically designed interfaces like T-Minus (4.9 for Aesthetics)-scores for targeted user engagement and comprehensive information quality exhibited greater variability. This suggests that while developers have largely mastered the technical delivery of sound therapy, the pedagogical and motivational aspects of digital habituation still present opportunities for refinement.

Crucially, these high baseline scores validate the transformative clinical potential of smartphone-based therapeutics to democratize specialized tinnitus care, shifting the paradigm from resource-intensive clinical visits to continuous, accessible management. However, despite this strong technological foundation, our study identifies that the real-world scalability of these interventions in emerging markets is severely constrained. As we transition from software evaluation to public health application, it becomes evident that significant socio-technical barriers to adoption remain, particularly in rural Indian contexts like Karnataka. Despite the celebrated status of Bengaluru as an ICT hub, rural districts such as Mandya and Mysuru lag significantly behind, with health-related ICT usage accounting for only 8% of total digital activity.[19]

Infrastructural instability

The foundational requirement for any digital therapeutic is consistent connectivity. However, rural Karnataka frequently struggles with unstable power grids and intermittent internet access.[19] For tinnitus apps that require real-time streaming of masking sounds or cloud-based AI processing, these interruptions prevent consistent therapeutic use, rendering the intervention unreliable.

Linguistic exclusion

A critical limitation of current market-leading apps is the lack of vernacular support. Most CBT modules are delivered exclusively in English. For the rural population in Mandya and Mysuru, where Kannada is the primary language, these sophisticated psychological interventions are linguistically inaccessible, stripping the apps of their core therapeutic value.[19]

Cognitive and digital literacy

Tinnitus prevalence often correlates with age, yet the senior demographic in rural India typically possesses low digital literacy.[20,21]

Complex user interfaces (UI) and navigation flows that seem intuitive to younger, urban users can be insurmountable obstacles for elderly sufferers, preventing them from effectively accessing relief features.[21]

Socio-cultural trust deficits

There remains a strong cultural preference for "face-to-face" medical interactions in rural communities. Automated medical tools often face skepticism or distrust, as patients may view them as inferior substitutes for a doctor's direct care.[21] This "trust gap" significantly reduces the likelihood of patients adhering to a purely digital treatment plan.

Economic constraints

The economic model of many top-tier apps-relying on monthly subscriptions-is misaligned with the financial reality of rural patients. Combined with the high initial cost of smartphones capable of running these advanced applications, the financial barrier makes sustained access to digital therapeutics unaffordable for the majority of the rural population.

Strategic path forward

To bridge this divide, mHealth cannot operate in isolation. It must be integrated into the existing public health infrastructure, specifically the PHC framework. By utilizing CHWs as "digital mediators," we can humanize the technology, offer guided assistance for low-literacy users, and build the necessary trust to the facilitate adoption.

In rural Karnataka, only 8% of ICT usage is health-related. To reach these populations, mHealth must be integrated into the PHC framework, utilizing CHWs as digital mediators.[22]

Policy recommendations for mHealth integration in rural Karnataka

To effectively bridge the digital divide and ensure equitable access to tinnitus care in rural districts like Mandya and Mysuru, this study proposes a multi-pronged policy framework:

Integration with public health infrastructure

The most critical step is the formal integration of digital therapeutics into the PHC network. Rather than relying on direct-to-consumer downloads, valid mHealth tools should be prescribed at the PHC level. This legitimizes the software and overcomes the "trust deficit" by associating the app with established medical authority.

The "digital mediator" model

Given the low digital literacy among senior sufferers, reliance on self-administered care is insufficient. We recommend empowering CHWs and ASHA workers to act as "digital mediators". These frontline workers can be trained to set up the apps, configure sound therapy profiles, and monitor usage during routine home visits, effectively bypassing the cognitive barrier of complex user interfaces.

Mandate for vernacular localization

State health policy should incentivize or mandate that digital health interventions deployed in Karnataka include full Kannada language support. This extends beyond simple menu translation to include localized CBT content, ensuring that psychological reframing exercises are culturally and linguistically resonant.

Offline-first technical standards

To counter infrastructural instability, developers must prioritize "offline-first" architecture. Apps should be required to download core therapeutic assets (masking tracks, CBT modules) upon initial installation, ensuring that daily therapy is not interrupted by the frequent power and internet outages characteristic of the region.

Subsidized access models

To address economic exclusion, a public-private partnership model is recommended. The state government could subsidize subscriptions for verified BPL (Below poverty line) patients, or developers could offer "lite" versions of their therapeutics-stripping away high-bandwidth features like 4K video coaching while retaining essential sound therapy and educational text-at a significantly reduced cost.

The future of AI in tinnitus apps

The transition from static to adaptive digital therapeutics is underway. AI is poised to revolutionize this space through:

Precision diagnostics

Machine learning models have achieved over 94% accuracy in distinguishing tinnitus from non-tinnitus cases using high-frequency audiometry data.

Adaptive sound therapy

AI-driven apps will use real-time feedback loops to adjust masking tones based on heart rate variability or shifts in tinnitus pitch.

Virtual NLP coaching

Advanced Natural Language Processing will allow virtual coaches to provide empathetic, 24/7 CBT intervention, identifying and challenging catastrophic thinking patterns instantly.

Limitations

The present study has certain limitations. The selection of applications was restricted to those available on the Apple app store and Google Play store with specific English keywords, which may have excluded regionally developed apps in native languages.

Additionally, while the MARS provides an objective framework, the scoring inherently involves a degree of subjective judgment by the raters. Furthermore, the efficacy data cited for individual apps relies on existing literature and clinical claims made by developers, rather than a direct clinical trial conducted as part of this study.

CONCLUSION

The integration of digital therapeutics into tinnitus management represents a critical paradigm shift, effectively moving care from resource-intensive specialized clinics to accessible, smartphone-based interventions. Our assessment using the MARS confirms that current market leaders, such as Oto and MindEar, deliver high-quality, evidence-based cognitive and sound therapies capable of inducing significant neuroplastic habituation. However, the scalability of these tools in emerging markets is currently limited by substantial socio-technical impediments, particularly the linguistic voids and infrastructural instability observed in rural Karnataka. Ultimately, bridging this "digital divide" requires more than technological innovation; it demands a hybrid model of care where AI-driven personalization is delivered through vernacular interfaces and integrated into the PHC framework via CHWs, ensuring equitable access for the populations that need it most.

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