Review Article

The Impact of Tinnitus on Mental Health

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Article info:
Received: 6 Feb 2025
Accepted: 28 Apr 2025

Citation: Naji BA, Alnajar AH. The Impact of Tinnitus on Mental Health. Journal of Modern Rehabilitation. 2025;19(4):?-?

Running title: The impact of tinnitus on mental health

Abstract

Background: Tinnitus, the perception of sound without external stimuli, affects approximately 14.4% of adults globally and significantly impacts mental health. It is commonly associated with anxiety, depression, and cognitive dysfunction, contributing to a decreased quality of life. Tinnitus can be classified as subjective or objective, and its severity and associated psychological distress vary widely among individuals.

Methods: A comprehensive review of the literature published between 2010 and 2024 was conducted using databases such as PubMed, Scopus, Web of Science, and Google Scholar. Keywords related to tinnitus and mental health (e.g., anxiety, depression, mood disorders) were used to identify human studies exploring the psychological impact of tinnitus.

Results: Research consistently demonstrates that individuals with tinnitus experience varying rates of anxiety and depression, with prevalence rates ranging from 18.5% to 48.33% for anxiety and 6% to 84% for depression. Shared neural pathways, including the anterior cingulate cortex, insula, and amygdala, contribute to both tinnitus and mental health conditions. Psychological interventions such as cognitive behavioral therapy (CBT) and mindfulness-based interventions (MBIs) have shown effectiveness in reducing tinnitus distress and improving mental well-being.

Conclusion: Tinnitus has a significant impact on mental health, contributing to anxiety, depression, and sleep disturbances. A multidisciplinary approach addressing both auditory and psychological aspects of tinnitus is crucial for effective management. Further research is needed

to optimize treatment strategies and understand the complex interplay between tinnitus and mental health.

Keywords: Tinnitus; Anxiety; Depression; Mental Health

Introduction

Tinnitus is a common auditory condition characterized by the perception of sound, such as ringing, in the absence of an external auditory stimulus. It affects a significant portion of the population and can vary in severity and impact on quality of life. Two primary categories of tinnitus exist: subjective and objective. Subjective tinnitus, the most common form, is only audible to the affected individual. In contrast, objective tinnitus can be heard by both the individual and an examiner and is relatively rare. Additionally, tinnitus can be classified as primary (idiopathic) or secondary (associated with a specific underlying cause) (1). Tinnitus affects approximately 14.4% of adults globally, with prevalence rates varying widely from 4.1% to 37.2% across different populations. The condition becomes more common with age, affecting about 23.6% of individuals aged 65 and older. Women, individuals with a history of smoking, those experiencing stress, and those with certain medical conditions such as hearing loss, hyperlipidemia, and depression are more likely to experience tinnitus (2).

Research consistently demonstrates an increased risk of anxiety and depression among individuals experiencing tinnitus. A population-based study revealed significantly higher odds of depression and anxiety in participants with tinnitus, with odds ratios of 2.033 (95% CI: 1.584–2.601, $p < 0.0001$) and 1.841 (95% CI: 1.228–2.728, $p = 0.0027$), respectively (3). Furthermore, another study observed elevated anxiety and depression scores, alongside lower self-esteem and well-being, in individuals with tinnitus (4).

Given the substantial impact that tinnitus appears to have on mental health, the aim of this study is to review the existing literature on the relationship between tinnitus and mental health, focusing on its effects on anxiety, depression, self-esteem, and overall well-being. This review aims to provide a comprehensive understanding of how tinnitus influences mental health, which is crucial for developing effective management strategies for individuals suffering from this condition.

Method

A comprehensive literature search was conducted using electronic databases, including PubMed, Scopus, Web of Science, and Google Scholar. A combination of keywords related to tinnitus (e.g., "tinnitus," "auditory phantom perception") and mental health (e.g., "anxiety," "depression," "anxiety disorders," "mood disorders," "psychological distress") was used. Filters were applied to limit the search to human studies published in English between 2010 and 2024.

Tinnitus and Anxiety

The prevalence of anxiety disorders in individuals with tinnitus is notably high. Research indicates that individuals with tinnitus frequently experience anxiety disorders, with prevalence rates ranging from 18.5% to 48.33% across different studies (5,6). Factors such as female gender, hearing loss, and sleep disturbances are associated with increased anxiety in individuals with tinnitus. The COVID-19 pandemic has further exacerbated this anxiety (6,7).

Generalized Anxiety Disorder (GAD), characterized by persistent, excessive, and uncontrollable worry about various aspects of life, is one of the most prevalent anxiety subtypes among individuals with tinnitus. The severity of tinnitus is often correlated with the presence of GAD,

indicating that as tinnitus becomes more severe, the likelihood of experiencing generalized anxiety increases (3). Panic disorder, characterized by recurrent, unexpected panic attacks and anticipatory anxiety, is another anxiety subtype linked to tinnitus. Research indicates that the intensity of tinnitus is also correlated with an increased prevalence of panic disorder. Agoraphobia, characterized by avoidance behaviors and fear of certain situations, while less common, is also present in some tinnitus sufferers, affecting about 5% of patients (8). Anxiety in tinnitus patients often manifests as both excessive worry and physical symptoms like restlessness (somatic symptoms). These anxiety dimensions are significantly linked to the perceived severity of tinnitus. Sixty percent and 48% of tinnitus sufferers experience clinically significant levels of cognitive and somatic anxiety, respectively (9).

Both tinnitus and anxiety involve similar brain areas, including the anterior cingulate cortex, insula, and amygdala, which are associated with attention and distress. These areas are part of the emotional component of the pain matrix and are implicated in the perception of distress in both conditions. The hippocampus, which plays a role in memory, shows abnormal connectivity in tinnitus patients, particularly in relation to the duration and distress of tinnitus. This suggests that memory traces may contribute to the chronic nature of tinnitus and potentially associated complications, such as anxiety disorders. There is also, an overlap in cortico-subcortical networks involved in both tinnitus and anxiety, which are linked to the hypothalamic-pituitary-adrenal axis, although the direction of dysfunction in comorbidity is unclear (10,11).

Commonly used tools for assessing anxiety in tinnitus patients include the State Trait Anxiety Inventory, Beck Anxiety Inventory (BAI), and the Self-Rating Anxiety Scale. These tools have been validated for their psychometric properties and are effective in identifying anxiety levels in tinnitus patients (12).

Tinnitus and Depression

Depression is a common comorbidity among individuals with tinnitus, with prevalence rates varying significantly across studies. A systematic review reported a median prevalence of depression in tinnitus patients of 33%, with estimates ranging from 6% to 84%, reflecting variability in study populations and methodologies (13). Another review found clinically relevant depression scores in 4.6% to 41.7% of tinnitus patients, highlighting the psychological burden of the condition (14). A cohort study further demonstrated that depression was nearly twice as prevalent in individuals with tinnitus (7.9%) compared to those without (4.6%) (3). Both tinnitus and depression activate similar neural circuits. Neuroimaging studies have shown that these conditions share common pathways, suggesting a complex interplay rather than a mere comorbidity by chance. Alterations in the hypothalamic-pituitary-adrenal axis, commonly seen in depression, have also been observed in tinnitus, indicating a shared neuroendocrine dysfunction. The dorsal cochlear nucleus, which is hyperactive in tinnitus, is involved in controlling attention and emotional responses, linking it to mood regulation and depressive symptoms (15). Tinnitus can impair cognitive control and attention-switching, which are also affected in depression. This cognitive dysfunction can exacerbate emotional distress, creating a feedback loop that maintains both conditions (16). Emotional distress from tinnitus can lead to depressive symptoms, with studies showing a significant correlation between tinnitus distress and depression severity (17). There is some evidence suggesting that genetic factors, such as variants in the brain-derived neurotrophic factor, may predispose individuals to both tinnitus and depression, indicating a potential common genetic susceptibility (15). Tinnitus-induced distress and depression are associated with different neural activities. Distress correlates with activity in the right frontopolar

and orbitofrontal cortex, while depression is linked to the left frontopolar and orbitofrontal cortex, suggesting distinct yet interconnected pathways (18). Shared risk factors for tinnitus and depression include socioeconomic and health-related variables, with perceived stress levels mediating the relationship between tinnitus and depressive symptoms (19). Tinnitus severity is linked to depressive symptoms, with the somatic component of depression significantly predicting tinnitus severity, although this may be due to content overlap in assessment tools (20). Various psychometric tools, such as the Beck Depression Inventory (BDI) and the Hospital Anxiety and Depression Scale, are used to assess depression in tinnitus patients. Additionally, machine learning models have been developed to predict depression severity in tinnitus patients, using socio-demographic and questionnaire data, achieving high predictive performance (21).
Tinnitus alone serves as a significant predictor of depression and anxiety. This impact is further amplified when tinnitus is combined with hearing loss. The presence of both conditions tends to exacerbate symptoms of depression and anxiety, with tinnitus having a more pronounced effect on depression compared to hearing loss alone. However, hearing loss can increase the severity of the mental health impact caused by tinnitus. Moreover, the severity of both tinnitus and hearing loss is positively correlated with levels of anxiety and depression, with more severe cases associated with higher levels of psychological distress (22–25).

Tinnitus and other Mental Health Conditions

Insomnia is highly prevalent among tinnitus patients, with studies indicating that over 40% of individuals with tinnitus experience clinically significant insomnia symptoms. This sleep disturbance is often severe enough to affect daily functioning and quality of life, contributing to psychiatric issues such as anxiety and depression (26). Patients with chronic tinnitus often experience heightened anxiety and depression, both of which correlate with the severity of insomnia. The distress caused by tinnitus can exacerbate sleep problems, creating a vicious cycle of worsening tinnitus and insomnia (27). Men with tinnitus tend to report higher levels of depressive symptoms, while women are more likely to experience psychosomatic symptoms such as headaches and stress-related increases in tinnitus loudness (28).
Burnout, a state of emotional, physical, and mental exhaustion caused by prolonged stress, is a significant mediator in the relationship between stress and tinnitus. Studies suggest that burnout symptoms can exacerbate tinnitus, and addressing burnout may help alleviate tinnitus-related distress (29). Emotional exhaustion (EE) is a strong predictor of tinnitus prevalence and severity. Studies have shown that individuals with higher levels of EE are more likely to report tinnitus, and this relationship is consistent across different demographic groups. The presence of burnout symptoms, such as EE, can exacerbate the perception of tinnitus, increasing its severity for those affected (30).

Tinnitus and post-traumatic stress disorder (PTSD) also share symptoms, such as hyperarousal, anxiety, and sleep disturbances. These shared symptoms suggest that tinnitus can exacerbate PTSD symptoms and vice versa, leading to increased distress and impairment in affected individuals (31). The interaction between tinnitus and PTSD may be attributed to shared neural mechanisms and pathways. Both conditions involve alterations in brain areas related to attention, distress, and memory functions, as well as dysregulation of the hypothalamic-pituitary-adrenal axis (32).

Current treatment approaches for tinnitus-related mental health issues

Cognitive behavioral therapy (CBT) is a widely used psychological treatment for managing tinnitus-related distress. This approach aims to reduce the emotional impact of tinnitus by modifying negative thought patterns and behaviors. Studies have shown that CBT can significantly improve tinnitus-related quality of life compared to no treatment, standard audiological care, or other active interventions. Both face-to-face and guided self-help formats have proven effective, although face-to-face delivery tends to yield more robust improvements (33). CBT not only reduces tinnitus-related distress, but also leads to modest reductions in comorbid depression and anxiety symptoms (34). A key mechanism involves the reduction of negatively biased interpretations of tinnitus, which amplifies the distress experienced by patients (35).

The MBIs, including mindfulness-based cognitive therapy and mindfulness-based stress reduction, have also shown promise in reducing tinnitus distress. Evidence suggests that MBIs lead to meaningful reductions in tinnitus severity and associated psychological distress, with benefits that may persist over time (36). The effectiveness of mindfulness appears to stem from promoting acceptance and helping patients reframe tinnitus as a non-threatening sensation, thereby reducing its emotional salience.

The role of antidepressants in tinnitus treatment is unclear. Some studies suggest that tricyclic antidepressants may offer limited benefits, but methodological issues weaken the reliability of these findings. A trial of a selective serotonin reuptake inhibitor showed no overall improvement, although higher doses might offer some benefit. Trazodone, an atypical antidepressant, also showed minimal and statistically non-significant improvements. While antidepressants may alleviate comorbid depression and anxiety, their direct effect on tinnitus remains unclear. Proposed mechanisms include serotonergic modulation, but adverse effects—such as sedation, sexual dysfunction, and dry mouth—limit their clinical utility (37).

In summary, a multidisciplinary approach is often the most effective strategy for addressing tinnitus-related mental health issues. Optimal care may involve a combination of psychological therapies such as CBT or MBIs, sound therapy, and—in selected cases—neuromodulation techniques. Continued research is essential to refine treatment protocols, identify the most effective therapy combinations, and tailor interventions to meet individual patient needs and preferences.

Discussion

The findings of this manuscript highlight the intricate relationship between tinnitus and mental health conditions such as anxiety, depression, insomnia, burnout, and PTSD. These results confirm the hypothesis that tinnitus does not exist in isolation as a physiological condition but instead interacts profoundly with psychological factors, exacerbating the distress experienced by affected individuals.

The high prevalence of anxiety and depression among tinnitus patients, combined with the shared neural and cognitive mechanisms identified, underscores the bidirectional nature of these comorbidities (3, 13). This aligns with existing literature suggesting that tinnitus exacerbates psychological distress, while emotional dysfunctions, in turn, intensify the perception of tinnitus (10, 15). Similarly, the findings on insomnia and burnout reinforce the cyclical dynamics in which stress and emotional exhaustion not only worsen tinnitus symptoms but are also perpetuated by the distressing nature of tinnitus itself (26, 29). The distinct neural and hormonal pathways implicated in these interactions, including the dysregulation of the hypothalamic-pituitary-adrenal axis and abnormal brain connectivity patterns, reveal potential underlying

mechanisms (11, 32). These mechanisms help explain why tinnitus is closely associated with disorders such as PTSD, which shares overlapping symptoms like hyperarousal and impaired memory (31). Such insights emphasize the importance of approaching tinnitus as a condition influenced by both auditory and psychological systems.

From a clinical perspective, the results underscore the need for a multidisciplinary approach to tinnitus management. Interventions like CBT and mindfulness-based practices, which address both the auditory and emotional dimensions of the condition, emerge as key therapeutic tools (33, 36). Although pharmacological treatments may have limited direct effects on tinnitus perception], they may serve as adjuncts in treating comorbid depression and anxiety, helping to alleviate the overall psychological burden (37). These findings expand the understanding of tinnitus as a multifactorial condition and provide a robust foundation for future research. Integrating psychological, physiological, and cognitive dimensions, the study supports the development of tailored, evidence-based interventions that address the unique needs of patients struggling with both tinnitus and its mental health impacts. These implications carry significant promise for improving patient outcomes and enhancing their quality of life.

The results of this study align with prior research confirming the high prevalence of depression and anxiety among tinnitus patients, with rates consistent with reported medians of 33% (range: 6–84%) (38). Consistent with earlier studies, these results highlight the cyclical relationship between tinnitus and psychological distress, where emotional dysfunctions worsen tinnitus perception, reinforcing patterns noted in previous reviews (39). This study expands upon earlier insights by highlighting additional factors such as burnout and emotional exhaustion as key contributors to tinnitus severity. This adds depth to the understanding of stress-related impacts. Consistent with prior work, it confirms shared neural mechanisms, including dysregulation of the hypothalamic-pituitary-adrenal axis (39,40). Therapeutically, these findings are in line with previous reviews that support the effectiveness of interventions like CBT and mindfulness-based practices (41), while reinforcing the limited efficacy of pharmacological treatments. The study enhances existing knowledge by promoting multidisciplinary approaches and establishing a basis for future research to clarify causality and improve patient care strategies.

In conclusion, the profound connection between tinnitus and mental health underscores the necessity for multidisciplinary care. By addressing auditory and psychological aspects, this study highlights the value of holistic treatment strategies. Although progress has been made in understanding shared mechanisms and effective interventions, further research is needed to resolve questions of causality and refine approaches, ultimately improving patient outcomes and quality of life.

Limitation

This review has several limitations. Firstly, while the review suggests potential mechanisms, it does not definitively establish causality between tinnitus and mental health conditions. It is possible that some mental health issues pre-exist tinnitus or that other factors contribute to both conditions. Secondly, the review may not adequately consider how cultural factors, socioeconomic status, and access to healthcare resources influence the experience of tinnitus and its impact on mental health. Thirdly, the review's dependence on behavioral questionnaires as the principal assessment tool limits the investigation of physiological and neurological foundations. Incorporating functional neuroimaging, electrophysiological evaluations (e.g., EEG), or cortisol testing may yield a more thorough understanding.

Acknowledgements:
No acknowledgements.

Authors' contributions:
A.H.A: Conceptualization, literature search and selection, critical analysis of the literature, and writing – original draft.
B.A.N: Conceptualization, literature search and selection, critical analysis of the literature, writing – review & editing, and final approval of the manuscript.

Funding:
The authors declare that no funding was received for this research.

Conflict of interest:
The authors declare that they have no conflicts of interest.

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