

Current Validated Medical Treatments for Tinnitus

Cognitive Behavioral Therapy



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- Tinnitus • Cognitive behavioral therapy • Mindfulness • MBCT • Acceptance
- Insomnia

KEY POINTS

- Cognitive behavioral therapy (CBT) is an effective treatment for tinnitus distress and endorsed by governing bodies.
- CBT is not widely available to people suffering from tinnitus despite a variety of modalities having been shown to be beneficial; service provision should change to reflect the evidence base.
- New acceptance-based treatments grounded in cognitive and behavioral processes are promising to be additional treatments.

INTRODUCTION

The overall experience of distressing tinnitus represents a weave among physical, cognitive, attentional, and emotional threads. The interconnected nature of these threads means that a reduction in one element might be expected to reduce the overall suffering. Interestingly, however, observations show that the physical/acoustic characteristics of tinnitus do not predict tinnitus-related disability, nor do the acoustic characteristics tend to change following successful therapy.¹ This lends support to the suggestion that psychological therapies focusing on cognitive, behavioral, and emotional aspects of tinnitus will be valuable in the care of people with distressing tinnitus.

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The best evidence for psychological approaches to tinnitus exists for cognitive behavioral therapies (CBT). CBT developed from 2 main schools of psychological thinking: behavioral therapy and psychoanalysis. Behavioral therapy grew from the learning theories of Pavlov and Skinner, and used techniques for changing behavioral responses to situations (eg, desensitization and counterconditioning) as a way of changing emotional responses.^{2,3} Later, Ellis⁴ and Beck⁵ expanded on this understanding of psychology to recognize the role of cognition, based on the fundamental premise that individuals are affected not only by external events but also by the way they perceive and interpret such events. Thus, an individual's response to any situation depends more on how they think about that situation than on the situation itself.

THE COGNITIVE BEHAVIORAL THERAPY MODEL

A simple way to understand this is the “ABC model.” An Activating Event (A) leads to Beliefs (cognitions and interpretations) about the event (B) that in turn result in emotional, behavioral, physical, and attentional Consequences (C). Examples of how this might relate to tinnitus are shown in [Table 1](#).

Interpretations of tinnitus that are more negative and threatening will lead to greater levels of distress compared with more neutral interpretations. The Consequences themselves will feed back into the tinnitus and beliefs. The individual who becomes increasingly anxious and focused on tinnitus, and who adopts behavioral excesses or limitations to fit around tinnitus, will become increasingly distressed by tinnitus. This leads to further negative beliefs and the individual is caught in a vicious cycle that perpetuates distress.⁶ An example of this formulation of tinnitus is shown in [Fig. 1](#).

INFORMATION PROCESSING BIASES AND THINKING STYLES

We are all prone to information processing biases that tend to intensify in a context of threat and loss. Thoughts arise in our mind automatically and quickly and are often taken to reflect a “truth” of a situation to which we then react. Such automatic thinking can allow us to navigate the world intuitively with little effort and using judgments based on heuristics.⁷ This “quick thinking” approach becomes unhelpful when it involves particular thinking styles. For example, a focus on threat will lead to more anxiety-filled thoughts; a focus on loss or negative self-evaluation will lead to more

Table 1

Different cognitive responses to tinnitus lead to different emotional, attentional, physical, and behavioral consequences

A Activating Event	B Belief (Thoughts)	C Consequences
Tinnitus enters awareness	This noise means there's something wrong with my body. It will get worse and I won't be able to concentrate. I'll have to stop work.	Emotional: Anxiety. Physical: Bodily tension, increase in tinnitus. Attentional: Focus more on tinnitus. Behavioral: Take time off work.
Tinnitus enters awareness	This noise is a bit annoying, but I know it's just tinnitus and is not dangerous. I have work stress at the moment, and I know tinnitus gets worse when I'm stressed.	Minimal emotional, physical or attentional changes. Behavioral: Take action to reduce stress levels.

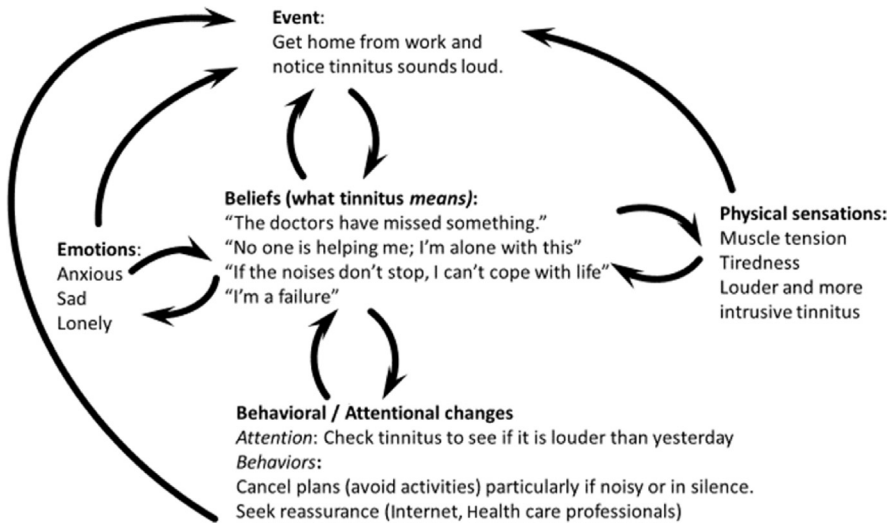


Fig. 1. Cognitive behavioral formulation of persistent tinnitus distress (a "vicious flower").

negative and depressive thoughts. Thus, the biases in information processing intrinsic to our brains often result in interpretations that do not match the available evidence.⁷

Thinking styles affect how we perceive physical sensations. Although most people would prefer not to have tinnitus, profound distress emerges only in approximately 10% of people with tinnitus. A CBT approach postulates that suffering is worsened through information processing biases that lead to *overly* negative interpretations of tinnitus.

CBT was originally developed to treat psychiatric disorders.^{8,9} It is also effective at alleviating distress and improving quality of life across a range of other distressing long-term physical health conditions, such as chronic pain,¹⁰ somatic complaints,¹¹ insomnia,¹² and tinnitus.¹³

THE COGNITIVE BEHAVIORAL TREATMENT MODEL AND ITS RATIONALE IN TINNITUS CARE

The use of CBT in a tinnitus context has been proposed by several investigators.^{14–18} This was underpinned by the suggestion that the natural history of tinnitus is characterized by the process of habituation¹⁹ and that successful management of tinnitus will support habituation and remove factors that impede it. Thus treatment should reduce physiologic arousal, encourage exposure, and reduce the negative emotional significance of the tinnitus. This inspired the use of CBT in the management of tinnitus before the development of a fully coherent conceptual CBT model of tinnitus distress.

In 2014, McKenna and colleagues²⁰ posited the cognitive behavioral model of tinnitus whereby an overly negative interpretation of tinnitus leads to increased sympathetic autonomic arousal, selective attention, and monitoring of tinnitus. This results in greater detection of tinnitus and becomes an iterative process. When overly negative thinking and stress arousal are sustained, they may cause increased levels of anxiety or low mood that, in turn, worsen the negative cognition. To try to cope with the impact of tinnitus, the individual engages in behaviors that attempt to keep them safe, and usually involve avoidance, suppression, and escape. These "safety-seeking

behaviors” reduce anxiety immediately but are maladaptive in the long-term, as they prevent the person from realizing that their thoughts are *overly* negative.

Selective attention is known to distort perception in other areas of life,²¹ and the model suggests that it can distort the perception of tinnitus sufficiently to account for the catastrophic descriptions of tinnitus commonly heard in a clinic. There is good evidence pointing to the existence of the component parts of this model, although stronger evidence is needed for the idea that perception is distorted.²⁰ The model involves both psychosomatic and somatopsychic processes. It differs slightly from the focus of Hallam and colleagues¹⁹ in that a greater emphasis is placed on vigilance and orientation to tinnitus rather than simply a failure of habituation. A similar model has been proposed by Cima and colleagues.^{22,23} This model, however, attributes a more central role to fear-avoidance processes.

The ultimate goal of therapy is to reduce or eliminate suffering rather than to cure tinnitus. Although it might be supposed that a reduction in tinnitus is a prerequisite for a reduction in suffering, the interplay of psychic and somatic processes indicate that this is not so. It is commonly observed that reducing psychological distress results in a reduction in the intrusiveness of tinnitus and in the pervasiveness of its impact. Indeed, one possible implication of the model of tinnitus suffering of McKenna and colleagues²⁰ is that removal of tinnitus *per se* might not even be sufficient to remove suffering if the iterative processes have become chronic and patients begin worrying about tinnitus returning.

A change in cognition is key to reducing tinnitus suffering.²⁴ A standard CBT package has been described,²⁵ but there is no precise prescription about how cognitive change should be achieved. Indeed, Cima and colleagues²³ emphasize the diversity of techniques used in CBT. Nonetheless, cognitive restructuring, behavioral experiments, and relaxation exercises are well recognized and commonly used components of CBT. Some of these elements are also found in other approaches.²³ The directive counseling element of Tinnitus Retraining Therapy (TRT) could be said to be a cognitive manipulation, albeit a “one-size-fits-all” manipulation. With this in mind, CBT should work carefully alongside other interventions, such as sound therapy. For some, sound therapy may offer a “stepping stone” that at first reduces distress. It can, however, become an unhelpful behavior if the patient believes that he or she will be unable to cope without constant use of a sound device. This represents a form of avoidance maintaining overly negative thoughts. The cognitive context is key, as the same behavior might serve different functions.

THIRD-WAVE COGNITIVE BEHAVIORAL THERAPY: MINDFULNESS AND ACCEPTANCE

In recent decades, “acceptance-based” approaches developed and extended existing CBT while continuing to recognize that distress is maintained by cognitive behavioral factors. This has been referred to as a “Third Wave” of CBT. The emphasis is on changing the *relationship* with difficult or uncomfortable thoughts and feelings, and learning to *accept* these rather than seeking to modify them. Suffering is regarded as a normal part of life, and the philosophy suggests that attempts to resist or change suffering often lead to its perpetuation or exacerbation.²⁶ The ephemeral nature of thoughts and experiences is stressed. So, patients do not change *what* they think about tinnitus, but rather recognize thoughts, emotions, and sensations simply as part of their moment-by-moment experience that will arise, linger, and then change.

Behavioral change encourages patients to allow all experiences to be present, without attempting to escape or avoid them. There are 2 overlapping strands: acceptance and commitment therapy (ACT) and mindfulness-based therapies, such as

mindfulness-based cognitive therapy (MBCT). Both schools make use of mindfulness meditations (MMs), and it is possible that the practice of MMs, sitting in stillness while allowing tinnitus to be present in awareness involves, at least in part, behavioral exposure. Another possibility is that MMs enhance meta-cognitive awareness and skills that reduce the engagement in repetitive negative thinking. The frequent paradoxical impact of avoidance behavior is highlighted, for example, the attempt to “not think of tinnitus” often results in greater awareness of it. ACT also encourages the patient to invest his or her energy in the pursuit of meaningful values rather than in unsuccessful efforts to remove the aversive experience.

Acceptance-based therapies have been found to be beneficial in the treatment of emotional disorders and long-term physical conditions.^{27–30}

SLEEP MANAGEMENT

Sleep disturbance is a major factor in tinnitus.³¹ Still, little research has been done on the subject. Sleep disturbance has only occasionally been measured in outcome studies and been a target for therapy in even fewer.³² There is, however, good evidence that CBT is an effective approach to managing primary insomnia and insomnia secondary to other health problems.³³ A consensus statement by the British Association for Psychopharmacology recommends that CBT should be the first line of treatment for insomnia.³⁴ In chronic pain states, it has been suggested that treating insomnia as the primary therapeutic target, rather than the pain, leads to better outcomes for both insomnia and pain. There is some evidence that using CBT to manage insomnia in patients with tinnitus is successful in improving sleep and reducing tinnitus distress.³⁵ This has provided a basis for a randomized controlled trial (RCT) into CBT management of tinnitus-related insomnia.³⁶ The process of CBT for insomnia shares the same features as set out previously, although there is a considerable emphasis on monitoring actual sleep patterns and aligning the behavior of being in bed to these and to the circadian rhythm.

EVIDENCE FOR COGNITIVE BEHAVIORAL THERAPY

Meta-analyses have indicated the beneficial effects of CBT on tinnitus-related distress.^{1,13} Across 24 studies ($n = 700$), CBT showed strong to moderate effect sizes on tinnitus annoyance posttreatment and at follow-up¹ and it (Cohen's $d = 1.1$) was more effective than other psychological treatments (Cohen's $d = 0.30$). Smaller effect sizes were obtained for measures of negative affect and sleep problems. Effects on tinnitus loudness were weaker and disappeared at follow-up. The largest meta-analysis to date of 15 RCTs ($n = 1091$) found CBT to have an impact on tinnitus-related distress (effect sizes ranging from 0.44 to 0.7) as well as a positive effect on mood. The benefits of CBT remained significant at follow-ups up to 18 months.¹³ A recent Cochrane review of CBT for tinnitus³⁷ found CBT reduced the impact of tinnitus on quality of life when compared with no intervention/waiting list control, audiological care, TRT, and other active controls (standard mean differences range from -0.56 to -0.3).

RCTs also support “third-wave” CBT. For example, MBCT is an effective treatment for tinnitus, superior to applied relaxation in reducing tinnitus-related distress,^{38,39} and ACT is effective for tinnitus-related distress, compared with TRT.⁴⁰

A systematic review and meta-analysis of RCTs examining tinnitus management found the efficacy of most interventions for tinnitus (including hearing aids, maskers, and TRT) was not demonstrated conclusively.⁴¹ Only studies examining CBT were numerous and similar enough to perform a meta-analysis and the efficacy of CBT

(moderate effect size) appears to be reasonably established. A recent systematic review specifically of mindfulness-based therapies for tinnitus concluded that this approach is of benefit in tinnitus management but recognized that further studies are needed.⁴² Another review of the literature examined 31 trials of CBT for tinnitus, including a number of acceptance-based therapy trials.²³ The investigators concluded that CBT “is the most evidence-based choice for effectively relieving tinnitus complaints so far”²³ (p. 38); there is evidence for long-term benefits of CBT-based treatments over periods of 15 years. In a large trial, CBT has been demonstrated to be effective as part of a stepped care intervention in which audiological diagnostics, treatment, and consultation, as well as CBT-treatment elements are combined.⁴³ Importantly, it also has been demonstrated to be a cost-effective intervention.⁴⁴

A number of tinnitus management guidelines, based on systematic reviews, have either “recommended” or “strongly recommended” the use of CBT in tinnitus management,^{45–47} while noting that the currently available evidence is not sufficient to support the recommendation of many other approaches (eg, acoustic therapeutic measures, transcranial magnetic or direct current stimulation, and specific forms of acoustic stimulation: noise/masker, retraining therapy, music). The latest Cochrane review of CBT for tinnitus concludes³⁷ that “...policy-makers and service providers should feel confident that CBT for tinnitus is beneficial for patients.” Within the United Kingdom, the National Institute for Health and Care Excellence has produced tinnitus management guidelines. Based on the available evidence, the guidelines again point to the use of CBT (including acceptance-based therapies).⁴⁸

Access to Cognitive Behavioral Therapy for Tinnitus

Accessing CBT for tinnitus can be difficult, as relatively few centers offer it. In spite of the evidence, a recent survey of UK tinnitus services revealed that only a minority of tinnitus services offered some form of CBT or of mindfulness.⁴⁹ Very few UK services involved psychologists, and this provision was only within England (not the other UK countries). In most cases, these CBT services were offered by audiologists. These services might be more properly described as a CBT-based approach rather than the provision of full CBT. There is as yet only one study of audiology-led CBT for tinnitus,⁵⁰ and the use of CBT in this context needs to be further investigated. In contrast, the survey revealed that most UK tinnitus services offered some form of sound therapy.⁵⁰ This is interesting because although there is some evidence of the benefits of sound-based therapy,^{51–54} that evidence is less robust⁵⁵ than for CBT.

Interest has grown in alternative ways of accessing CBT, including self-help and Internet-based services. Self-help manuals can offer significant benefits, enhanced by minimal therapist support. Attrition rates are high,^{56,57} however, and effect sizes are smaller than in regular CBT.^{1,13,37} Internet-based CBT has the potential to increase access to evidence-based services that manage tinnitus. Self-help is delivered via computer, with therapist support provided by email. Outcomes are superior to self-help manuals in relieving tinnitus distress and depression, with studies reporting benefits equivalent to regular CBT.^{58–60} Importantly, a recent study has demonstrated that guided Internet-based CBT, delivered by an appropriately trained audiologist, led to benefits in reducing tinnitus distress,⁵⁰ including at follow-up 12 months after treatment.⁶¹ The same study group also noted that the Internet-based CBT was as effective as standard face-to-face care for tinnitus.⁶² High attrition rates may be problematic in Internet therapy.⁶³ Currently, improved access to CBT for tinnitus via the Internet remains a future prospect; the present reality is that it is not routinely available through most tinnitus centers.

A basic rule of economics is that supply and demand move to meet one another, and it is, therefore, possible that there is an interplay between these 2 forces that limit the provision of CBT as a form of tinnitus care. The issue is one of demand as well as supply. More than 25 years ago, a leading UK otologist noted that only 2% of consultants dealing with tinnitus regularly referred patients for psychological assessment or therapy.⁶⁴ It is likely that today the current limited supply of CBT reflects a similar hesitation in requesting the service. Clinical practice guidelines for diagnosis and treatment of tinnitus in Japan acknowledged that despite the possible benefits, it is seen as difficult to perform psychotherapy alongside otorhinolaryngology.⁶⁵ The investigators opined that sound therapy is more likely to be carried out. It is just as likely that this reflects a medical, or care, culture as a national culture. For CBT to be acceptable in a tinnitus context, a biopsychosocial model of health and illness is needed. This is certainly not a new concept, but it must be asked how pervasively it is embraced within otolaryngology and audiology. It is likely that a cultural change is required among clinical gatekeepers for services. It is also likely that a change is needed among health insurance companies who are often unwilling to fund nonmedical therapies for patients with tinnitus and so effectively deny their clients access to meaningful evidence-based support. A cultural change is also needed among patients. It has been noted that people with distressing tinnitus want a pharmacologic solution rather than a management strategy.⁶⁶ If this perspective is to change (while a cure is awaited) then better marketing of CBT is needed.

SUMMARY

CBT for tinnitus involves identifying and modifying maladaptive behaviors, thoughts, and feelings by means of practical hands-on work and homework assignments. CBT has been practised for many years but is still not widely used in tinnitus management. This is unfortunate, as evidence suggests that this approach benefits many patients when tinnitus is a significant source of distress in the patient's life. It is desirable, however, to continue to develop and implement CBT treatments. An argument can be made that tinnitus services should redeploy some resources to follow the evidence and have substantive provision of CBT rather than continuing to invest in less-evidenced strategies. The financial implications of this are likely to be small but it will require a cultural change. Such a change will be needed among patients as well as clinicians and funders. It is appropriate that clinicians take a lead in this by being mindful of the evidence and moving away from the rhetoric of "no cure; you must learn to live with it" and espousing the benefits of CBT, a therapeutic approach that reduces tinnitus suffering. Such a change may influence the choices patients and funders make.

DISCLOSURE

The authors have nothing to disclose.

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