Tinnitus Music Therapy: A Review of Subjective Tinnitus and Analysis of Music Therapy Pieces

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Abstract

Tinnitus, or a perception of sound (buzzing, ringing, hissing, clicking, swooshing) when no actual external noise is present, is a condition that affects over 740 million adults globally and is perceived as a major problem by more than 120 million people, mostly aged 65 years or older (Jarach, M. et al., 2022). Tinnitus can be both an acute (temporary) condition or a chronic (ongoing) health condition, and can be a debilitating factor of daily life. While there is no definitive cure, and efforts to categorize the condition into subcategories has been unsuccessful,[1] some relief may be found in different treatment options, including counseling, cognitive-behavioral therapy (CBT), hearing aids and cochlear implants (for patients with a relevant hearing loss) sound generators, novel auditory stimulation approaches, tinnitus retraining therapy (TRT), pharmacological treatment, neurofeedback, brain stimulation, bimodal stimulation, and, the most accessible, (and central focus of this project) personalized music-therapy masking.[2] The evidence for the efficacy of these methods varies considerably from patient to patient, reflecting the subjective nature of the chronic condition; thus, it's likely to assume the first at-home treatment for most who are affected would be masking via music or sounds due to its accessibility.

Out of all of these methods, this paper will focus on the formulaic, compositional aspects of common tinnitus acclimation music, or music written with the intent of being accessible masking

[1] Tyler, R., Coelho, C., Tao, P., Ji, H., Noble, W., Gehringer, A. and Gogel, S., 2008. Identifying Tinnitus Subgroups With Cluster Analysis. American Journal of Audiology, 17 (2) DOI: https://doi.org/10.1044/1059-0889(2008/07-0044).

[2] Listening to music or sounds composed of specific frequencies with the aim of masking, or covering up, incessant ringing, popping, buzzing, or other sounds associated with tinnitus.

therapy, and its general makeup, as well as providing three original tinnitus tracks written with the understanding of musical tinnitus characteristics (to be established and categorized in this paper) to further an understanding of the nature of masking. By addressing the structure of some of these pieces, the goal for this work is for individuals to better understand how they may participate toward optimizing their own symptom management and enhancing overall well-being in an accessible way.

Introduction

Tinnitus is typically described as the presence of high-pitched ringing or buzzing that is usually only audible to the affected individual (Grossan & Peterson, 2023), though sometimes (rarely) there are objective cases that can be observed and qualified by the examiner. This constant ringing or buzzing can be debilitating and difficult to treat, especially in people without consistent access to music therapists and therapy. This research project aims to succinctly educate the reader on general tinnitus and personalized masking music, as well as providing a musical categorization that describes common characteristics used in easily found therapy tracks. By providing functional insight, this project hopes to provide the reader with the tools to either better find or create their at-home version of tailor-made notched music training, or TMNMT masking (sometimes called sound enrichment).

Please note this is not medical advice, nor should it be taken as such; it is advised to always go to your doctor first – this is for educational purposes only.

In this project, the first section is a Literature Review of existing studies describing and defining subjective tinnitus to provide some context for this condition. The first subsection at the beginning of Part I of the project is Understanding Tinnitus; this segment is intended to add a

deliberate framework for more informed reader comprehension. While it doesn't delve into the specific intricacies of the condition, it does aim to construct a broad picture formed from heavy scientific research. This brief section defines tinnitus, different types of tinnitus, and its different possible causes. It also discusses the three types of music therapy usually used to combat tinnitus symptoms, which are the Heidelberg model of music therapy (HMOMT), standard music therapy (SMT), and tailor-made notched music training (TMNMT); masking is the primary focus of this paper and is the most predominantly discussed.

It is important to note that even though these three methods are commonly used, "...there is no single therapeutic modality sufficiently compelling to warrant its use above all others," (Sandlin & Olsson., 1999) and neither is there a known, certain "cure," for subjective tinnitus, though that's not to say therapy cannot be incredibly effective. There is also no inherently strict cause – though certain activities have an inherently, extremely high likelihood of potential condition development and exasperation, such as working loud construction, or frequently attending loud events – that will, without a doubt, cause tinnitus, as differing human physiology and environments have far too many biases and directional avenues for a simple formulaic answer. This also means that, despite ostensibly having no trigger, the condition may just appear, or seem to appear, out of nowhere. This doesn't mean personalized, or especially self-personalized, music masking therapy can't provide relief, it is just not guaranteed, and it does not work for everyone. There is an overwhelming amount to be studied and learned about the generation of subjective tinnitus and the psychodynamics of those who are suffering from it; in the meantime, potential masking relief may be available. As such, for the purposes of this project, we will be focusing on the compositional aspects of TMNMT in a homemade, accessible fashion.

The next subsection section, Lifestyle and Diet, builds off the previous, discussing the importance of diet and lifestyle in the manifestation and treatment of tinnitus. As previously mentioned, though there may not always be a strict causation, it is undeniable that certain lifestyles lend themselves to a higher chance of developing tinnitus. A deeper understanding of controllable lifestyle factors may aid clearer comprehension in regards to mitigating or exasperating symptoms.

The third subsection, What is Music Therapy Masking?, defines music masking. This lays the foundation for Audiograms and Hearing Exams Contextualized, which explores hearing exams and their charts for better understanding of frequencies our ears are capable of hearing and the aging process' effect on the auditory system.

Part II begins with the subsection Categorization of Masking, where the Categorization Spectrum is introduced and explained. This is vital for understanding the different sound enrichment options that exist and may be best suited to a particular condition. It provides three overarching categories of masking music (Category A, B, and C) as an organizational aid to better contextualize the most common categories. The next three subsections, Category A, Meditative Masking, Category B, Smooth Masking, and Category C, Beep Masking, break down the key aspects of these pieces and why they land where they do on the spectrum. Visuals are provided to show where frequencies are showing up and how they are charted by DAWS, and here the project goes into a bit more detail on frequencies, ambient background noises, nature sounds, sound design, and other common components of these tracks.

This lays the foundation for the next section under Creating Your Own Tinnitus Therapy Tracks, which dissect and articulate the specificities of tinnitus masking music via three original tracks written by following the "formula" found during analysis, as well as making an effort to record

and use everyday “noises” as compositional inspiration for accessible, personalized therapy tracks. This section explores the methodology of creating your own works, as well as an explanation of how the actual construction occurred of an original tinnitus masking piece (using simple DAW features to retain its accessibility). This bleeds into the overall findings and reflections of this project. There is a short Ethical Considerations at the end, followed by the Conclusion.

Since tinnitus is, more often than not, subjective, and personalized music therapy is out of reach for many, this research aims to educate the reader on how to better understand tinnitus and what tinnitus tracks might work best for them in order to potentially find relief via sound or music masking. While standard music therapy is usually recommended first for tinnitus based on cost, efficacy, and convenience, (Niu & You, 2023) this study could potentially provide readers with more information to seek out existing relevant music therapy, and to hopefully create their own, as a potential way of offering accessible agency over tinnitus relief.

This is not medical advice; seeking professional medical help first is always recommended, and this project is for educational purposes only. If at any point, listening to any tinnitus tracks, both referenced and original, cause any discomfort, the listener is advised to stop listening immediately.

PART I
Tinnitus Literature Review

Understanding Tinnitus

As previously mentioned, tinnitus is the perception of sound without an external source, most times appearing in a consistent, (chronic) or sometimes temporary, (acute) form. It can manifest in the form of ringing, buzzing, hissing, swooshing, clicking, or even as the sound of synchronized heartbeats from the blood pumping throughout the body concentrated in the inner ear (known as pulsatile tinnitus). Although it is stereotypically categorized as a high pitched ringing, the "inverse" is decently common; low-frequency tinnitus, affecting individuals profoundly with tones corresponding to the lowest octaves on a piano, manifests as humming, murmuring, rumbling, or deep droning sounds.[3] In a way, this relates to less common musical tinnitus, or Musical Tinnitus, (also known as musical hallucinations or auditory imagery) which is characterized by the perception of simple tones or layered melodies.[4] It is also associated with the aging process, as tinnitus is nearly always found with hearing loss; poor auditory input from the cochlea[5] to the central auditory pathway triggers neural changes that can result in increased spontaneous activity (ringing, buzzing, random sounds) in affected regions (Chung & Lee, pp. 2-3).

With an abundance of differing types and severities of the condition, in 2021, a new diagnostic classification was proposed to distinguish between "pure" tinnitus (meaning without associated

[3] American Tinnitus Association, 2025. Why are my ears ringing? Available at: https://www.ata.org/about-tinnitus/why-are-my-ears-ringing/ [Accessed 11 January 2025].
[4]Audiology Associates, 2020. Hearing Loss Grants Pass OR Audiology Associates [online], Available at: https://www.audiology-associates.com/resources/hearing-loss/ [Accessed 10 March 2025].
[5] The cochlea is a spiral-shaped, fluid-filled mechanism in the inner ear, and it's a crucial part of the hearing process. It houses sensitive, inner ear hair cells that convert acoustic sound vibrations into electrical impulses, which are then translated by the brain. These inner ear hair cells are extremely delicate and prone to damage from loud noises and repeated barrage of sound, and once destroyed they don't regenerate; their damage plays a large role in hearing loss and tinnitus, though their exact role in tinnitus is still debated.

conditions, not withholding the auditory disorder) and the more extreme and disabling "tinnitus disorder,"[6] (experiencing both the combination of the auditory disorder and its associated conditions).[7] By this definition and understanding, the categorization of this condition referred to in this project is considered to be chronic, subjective tinnitus disorder (for the purposes of this paper, it will just be referred to as tinnitus). There are also distinctions between chronic tinnitus; for example, a low roaring tinnitus could be the result of disease, whereas tinnitus due to noise exposure is often described as a tonal tinnitus. Subjective tinnitus, being the most difficult to treat, is also by far the most prevalent.

Subjective tinnitus has many potential causes, ranging from cochlear dysfunction, such as impairment or degeneration to the outer hair cells in the inner ear, or peripheral auditory system, (likely from exposure to sudden or constantly loud noises) untreated or persistent ear infections, the inevitable process of aging, various factors hearing impairment, emotional distress, and somatosensory[8] influences. Tinnitus can also arise from damage along the anatomical structures along the central auditory pathways, with ample evidence indicating that many tinnitus issues arise from intricate interactions between peripheral and central mechanisms (Wadhwa, Jain, & Patil, 2024). Middle-ear ailments are usually grouped as cochlear mechanical tinnitus, though they are often mild occurrences in people with normal hearing; some argue that tinnitus can be viewed, from a conceptual standpoint, as a pathology rooted in neural plasticity with both molecular and systemic components – it encompasses a cochlear component linked to its onset

[6] De Ridder, D., et al., 2021. Tinnitus and Tinnitus Disorder: Theoretical and Operational Definitions (An International Multidisciplinary Proposal). Progress in Brain Research [online], 260, pp.1–25. DOI:https://doi.org/10.1016/bs.pbr.2020.12.002.

[7] Associated conditions include but are not limited to emotional distress, insomnia, anxiety, depression, hyperacusis, cognitive dysfunction, etc.

[8] The somatosensory cortex is a brain region associated with processing sensory information from the body such as touch, pressure, temperature, and pain.

phase, as well as its central aspect being tied to long term, chronic maintenance (Chung & Lee, 2016).

Though this paper will focus on chronic, subjective tinnitus disorder and masking therapy, it is also important to note that its "opposite" exists. Objective tinnitus is defined as heard by both the patient and the examiner, and originates from the para-auditory[9] structures of the head and neck. Objective tinnitus can be cured in many cases, though correct diagnosis with quick and proper management are mandatory for its cure.[10] This type of tinnitus also has subcategories; an example is myoclonus-induced,[11] which divides into further subcategories, such as middle ear myoclonus (MEM) and palatal[12] myoclonus. Though split into subcategories, some argue they should be considered either related or the same.[13] Objective sounds can also be produced by internal functions in the body's circulatory and musculoskeletal systems, leading to a more constant, roaring sound as opposed to the stereotypical high pitched ringing. Vascular anomalies or neurological disorders affecting facial muscles has also been a documented cause.[14] Somatic tinnitus, noises associated with movements or tactile sensations, are often caused by muscle spasms, neck misalignments, or dental issues.

While the majority of people with tinnitus are not severely impaired, specifically subjective tinnitus, around 2.4% experience significant distress,[15] and these individuals usually also suffer

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[9] Hearing transduction physiology, such as the inner and outer structures of the ear, the neck, or head. The ear and its surrounding structures.

[10] Lee, D.Y. and Kim, Y.H., 2018. Relationship Between Diet and Tinnitus: Korea National Health and Nutrition Examination Survey [online], *Clinical and Experimental Otorhinolaryngology*, 11 (3), pp.158–165. DOI:https://doi.org/10.21053/ceo.2017.01221.

[11] Caused by muscle contraction.

[12] Relating to the palate of the mouth.

[13]Salehi, P.P., Kasle, D., Torabi, S.J., Michaelides, E. and Hildrew, D.M., 2019. The Etiology, Pathogeneses, and Treatment of Objective Tinnitus: Unique Case Series and Literature Review. *American Journal of Otolaryngology* [online], 40 (4), pp.594–597. DOI: https://doi.org/10.1016/j.amjoto.2019.03.017.

[14]Miracle-Ear Audiology Experts, 2023. Types of Tinnitus [online], *Miracle Ear.* Available at: https://www.miracle-ear.com/hearing-diseases/tinnitus-ringing-ears/types-of-tinnitus [Accessed 17 April 2025].

[15] Jarach, Carlotta M., et al. National Library of Medicine, National Center for Biotechnology Information, 2023. *Global Prevalence and Incidence of Tinnitus: A Systematic Review and Meta-analysis.* PubMed Central, [online]. Available at: https://pubmed.ncbi.nlm.nih.gov/35939312/ [Accessed 5 January 2025].

from neighboring conditions as a result, such as hyperacusis,[16] insomnia, anxiety, or depression. As this condition has no precise or predictable etiology, (though certain events can certainly lead to a higher likelihood of experience, such as disease, drugs, trauma or illness) it can feel especially debilitating without having a clear, rational starting point. Though there is no "cure," there is enough abundant research (past and ongoing) to discourage physicians from directing their patients to "learn to live with it" or "ignore it," as there are plenty of therapeutic approaches which have proven of significant benefit to the tinnitus patient, including masker and noise generating devices (Sandlin & Olson, 2021). Here is where this project will look to contribute by way of masking therapy and analysis, of which were produced "formulaic" composition guides derived after researching commonly found tinnitus tracks.

Lifestyle and Diet

Even though tinnitus presents as a multifaceted condition with seemingly limitless potential causes and mechanisms, it would be remiss of this project to ignore the potentially incredibly important role of lifestyle and diet in affected persons since that could play a vital role in pain alleviation and prevention.

Lifestyle factors, such as repeated exposure to loud noises or sounds, have long been known to as an etiology to tinnitus. Many studies have shown there are certain occupations that are associated with an increased risk of hearing loss, even though many of these findings are cross-sectional and are either mostly small or focus on only one occupation.[17] Common professions that risk hearing loss or damage are manufacturing, shipyard workers, bartenders, farmers, construction

[16] A hearing disorder characterized by an increased sensitivity to sound, making everyday noises seem uncomfortably loud or even painful.

[17] Molaug, I., et al., 2022. Occupation and 20-year hearing decline: findings from The HUNT Study. *Occupational Medicine* [online], 72 (9), pp.622–628. DOI:https://doi.org/10.1093/occmed/kqac085.

and military occupations, and countless others. Wearing protective earplugs to lower decibel volume can be an effective way to limit exposure and damage.

While damage may be inevitable, lifestyle changes can be an important aspect of hearing care. Though not a cure, it is very possible to alleviate tinnitus symptoms with effective stress management techniques to relieve distress, especially since stress and tinnitus have a negative correlation with each other. Meditation and music therapy masking in combination are proven as potentially helpful methods, alongside deep breathing exercises, yoga, visualization, and self-hypnosis, notwithstanding other healthy activities that alleviate an individual's stress.[18] As with practically all health categories and illness, chronic stress worsens the condition, and can cause both physiological and mental degeneration, and it is always recommended to seek professional help if needed. Maintaining a consistent sleep schedule is also beneficial, although tinnitus is usually most debilitating in quiet environments which can negatively affect sleep health.[19] Meditative music, often used in masking, also can be a way to relax the nervous system, thereby reducing stress and potentially the perception of tinnitus in the auditory cortex.

Diet undeniably plays a large role in overall health, with studies finding a healthier diet (as defined by a Healthy Eating Index,[20] or HEI score 0-100) correlates with reduced odds of reported persistent tinnitus in cross-sectional analysis.[21] It is important to note, however, that there have been contradictory findings in the specificities of food consumption: a 2018 study found associations between persistent tinnitus and higher intake of fruits, vegetables, bread, fish, and eggs, while dairy and caffeinated coffee intake were linked to reduced odds of persistent

[18] RNID, 2024. How to manage tinnitus and stress [online].
[19] Tritonhearing.co.nz., 2024. Stress and Tinnitus: The 5 best ways to relieve stress, Triton Hearing [online].
[20] USDA, 2023. Healthy Eating Index (HEI) Food and Nutrition Service [online], *USDA GOV* Available at: https://www.fns.usda.gov/CNPP/healthy-eating-index-hei [Accessed 25 April 2025].
[21]Treble Health, 2023. Quenching Your Thirst for Answers: Can Dehydration Lead To Tinnitus? [online] Available at: https://treblehealth.com/dehydration-and-tinnitus/ [Accessed 30 May 2025].

tinnitus.[22] Additionally, higher caffeine intake was associated with a lower risk of incident tinnitus in women, (Wadhwa, Jain, & Patil, 2024) though a contradictory study suggests caffeine may exacerbate tinnitus symptoms, as caffeine elevates blood pressure and stimulates nerve cell activity.[23] It is likely individual physiology and environment play a large role in these findings, and the specificities may be nearly impossible to count and track. Similar inflammatory or high stimulatory agents were found to be sodium, salicylates, aspartame, sugar, and unhealthy (trans) fats.

As part of a balanced diet, hydration, including consuming sufficient electrolytes, plays a critical role in managing tinnitus symptoms, as dehydration can worsen symptoms and contribute to conditions that trigger tinnitus, such as high blood pressure, compromised hearing health, and ear infections,[24] as well as affecting the inner ear fluid our ears rely on for proper function. For this reason, it is safe to assume a low score on the HEI (0-100) and moderate to excessive levels of dehydration are likely to exacerbate tinnitus symptoms.

While making conscientious efforts towards maintaining a healthy lifestyle and diet may not be a perfect solution for eradicating tinnitus, there is significant evidence to suggest it may play a role in diminishing symptoms and alleviating stress from the condition.

What is Music Therapy Masking?

As part of lifestyle management, a potential avenue for relief may be found in music therapy masking, also sometimes referred to as sound enrichment.[25] A more topical approach, its aim is

[22] Dawes, P., Cruickshanks, K.J., Marsden, A., Moore, D.R. and Munro, K.J., 2020. Relationship Between Diet, Tinnitus, and Hearing Difficulties [online] Ear and Hearing, 41 (2), pp.289–299. DOI:https://doi.org/10.1097/aud.0000000000000765.

[23]Tritonhearing.co.nz., 2024. Stress and Tinnitus: The 5 best ways to relieve stress, Triton Hearing [online], Available at: https://www.tritonhearing.co.nz/blog/tinnitus/stress-and-tinnitus-5-best-ways-to-relieve-stress/.

[24]Lee, D.Y. and Kim, Y.H., 2018. Relationship Between Diet and Tinnitus: Korea National Health and Nutrition Examination Survey [online], Clinical and Experimental Otorhinolaryngology, 11 (3), pp.158–165. DOI:https://doi.org/10.21053/ceo.2017.01221.

[25] Sound enrichment is often used in the treatment of hyperacusis (oversensitivity to noise) as well as tinnitus.

to alter the person's perception of the condition or potential reaction to it; by manner of habituation, masking can help the brain become more accustomed to tinnitus with the aim of eventually being able to ignore it completely.

The first instances of masking can be traced back to 1903 by a physician called Spaulding wherein a piano was used to match the frequency of tinnitus in his patients; the tone was played until their tinnitus became inaudible by way of systematic auditory distraction.[26] Thirty years later in 1933, Jastreboff and McKinney introduced the theory of "habituation of the disordered auditory system" using low level sounds (sound enrichment) to regulate a person's tinnitus (British Tinnitus Association, p.1), which is still the basis for masking, or sound enrichment, today.

Audiograms and Hearing Exams Contextualized

While discussing hearing loss and its role in tinnitus, as well as the role of specific frequencies (and their placement in the human hearing range) and their role in masking therapy, it may be useful to give some context of what hearing exams consist of. Hearing exams, also called audiograms, are pure-tone examinations that are administered in a sound-controlled room both via air and bone conduction. Air conduction tones are played through inserted or over-the-ear headphones, while bone conduction tones are examined via an oscillating transducer placed on the mastoid process.[27] Tones are usually presented at decreasing 5 to 10 decibel intensity levels until they become inaudible.[28] Patient results are described on a table called an audiogram, which

[26] Almost always an important factor in recovery, this phenomenon refers to covering tinnitus by way of distraction to prevent a person from entrenching the sound into their auditory cortex.

[27] The mastoid process is a bony projection behind the ear; it is part of the temporal bone of the skull. It houses several muscles and contains air-filled spaces known as mastoid cells and is used for bone conduction hearing exams.

[28] This is known as the Hughson-Westlake method, and after tones have been presented in decreasing intensity, the tones increase until they are audible again to detect the hearing range of the examinee. While examining, variation in

measures thresholds at frequencies[29] within a range slightly broader than that of human speech, including 250, 500, 1,000, 2,000, 3,000, 4,000, 6,000, and 8,000 Hz (Salmon, Brant, Hohman, & Leibowitz, 2023).

As when treating tinnitus, if there is a substantial difference (~40 dB for headphones and ~65 dB for insert earphones) in hearing between ears, masking via air conduction may be employed; noise is introduced into one ear to prevent a tone being presented to the tested ear from being perceived in the non-tested ear, which might otherwise result in the patient indicating that they had heard the tone despite it being in the wrong ear. Masking is also applied during bone conduction exams because there is essentially no interaural attenuation[30] with bone conduction, making it important to isolate the non-tested ear from the sound source (Walker, Cleveland, Davis, & Seales, 2013).

Results from the exam are collected and interpreted into an audiogram graph with standardized symbols used as guidelines as set by The American Speech-Language-Hearing Association (ASHA). These are a mixture of symbols such as O, X, <, >, △, ?, [,], and their meaning is further explained in figure a. In figure b, we can see an example of a completed audiogram exam in graph form; the x-axis represents the frequency of sound in hertz, and theyY-axis represents the (inverted) sound intensity in decibels.

As tinnitus is closely linked to hearing loss and damage, a bit of additional context in regards to audiograms and exams may be useful to further illustrate the potential of masking and its role in potential treatment. As music tracks in this category can involve frequencies at the top and bottom of the hearing range, it is worth considering that though the frequencies might not be

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physiology, as well as differences in examiner consistency, audiometry equipment, etc., lend a variation threshold of about 5 decibels.

[29] Normal human hearing ranges from about 20 Hz to 20,000 Hz.

[30] The reduction in intensity (in one ear) of stimulus presented to the other ear canal as the sound is transmitted through the head.

physically heard, they may still (and likely do) have an effect on the physiology of the body. To measure these frequencies, any sine wave player online may help the listener to match pitches, or get close to an outsourced reproduction. This category of tinnitus music may be helpful to those who suspect any high pitched ringing to be of 2,500 frequency or higher as tracks this dry and sporadic may help the brain acclimate to these pitches over time, though it is advised to always speak first with your doctor.

Symbol	Meaning
O	Unmasked air conduction thresholds in the right ear
X	Unmasked air conduction in the left ear
<	Unmasked bone conduction in the right ear
>	Unmasked bone conduction in the left ear
Δ	Air conduction in the right ear
?	Air conduction in the left ear
[	Bone conduction in the right ear
]	Bone conduction in the left ear [8][9]

Figure a. Key of symbols and their meaning as set by The American Speech-Language-Hearing Association in regards to interpreting an audiogram chart. (Source:National Library of Medicine, Audiogram Interpretation, 2023).

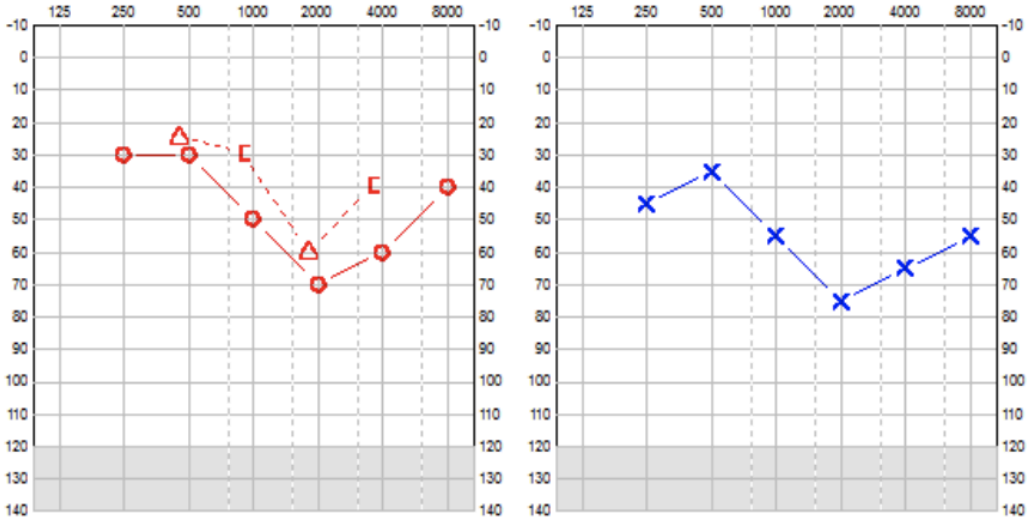


Figure b. An example of an audiogram exam results; the right ear is represented on the left and the left ear is represented on the right (Source: St. George's Hospital NHS Trust: How to Read your Audiogram Results, 2019).

As we age, we lose our ability to hear higher tones, and the range of frequencies that humans can hear is far from a fixed constant – it varies significantly with age, a phenomenon largely due to the natural aging process affecting our auditory system. An adolescent might be able to easily hear 17,000 kHz and above, while that number declines, on average, to 16,000 kHz for someone in their thirties, and by fifty years old, a person might struggle to hear anything above 12,000 kHz. The primary culprit for this decline is presbycusis, or age-related hearing loss, which is primarily due to death of the inner ear hair cells (Environmental Literacy Council, 2025). Even though we might lose the ability to hear higher frequencies, typically lower frequencies remain detectable into old age.

In reviewing the current literature, it is evident that tinnitus is a highly individualized condition influenced by a wide range of auditory, neurological, and lifestyle related factors. While no definitive cure exists, various interventions as discussed — particularly masking techniques and assimilation methods — are an option in reducing symptoms and improving quality of life. Given this context, the following methodology, findings, and reflection section outlines the design and development of an original masking based music therapy framework for organizational and compositional purposes. This framework draws on insights from existing tinnitus research in regards to both the condition and music therapy tracks, and its aim is to explore how personalized, self composed, and accessible audio tracks may aid in the management of chronic, subjective tinnitus.

PART II
Methodology, Findings, and Reflection

Categorization of Masking

There are several possibilities for effective masking pieces, and although none have been shown to absolutely guarantee high efficacy for every single affected patient, the lack of consistent evidence should not be taken as a reduction of total effectiveness across the board, as many have been able to find relief with these methods. Since tinnitus manifests in many different forms, (whistling, high pitched ringing, static noise, etc.) music used for sound enrichment is much more varied than one might first imagine to mask and distract from different pops, whistles, ringing, and frequencies overall. Though the pieces themselves might differ, the underlying principle is the same: to create a sonic landscape in which the volume of tinnitus is diminished or perceived as such in the auditory system, thereby reducing the brain's perception of the noise and, potentially, eliminating the constant inner repetition.

For the purposes of this project, I analyzed thirty different pieces labeled as TRT or masking music and split them into three categories (explained below) which are labeled on a spectrum along with an accompanying graph dissecting the found frequencies; great care was taken to find pieces as opposite from each other as possible using only Spotify and YouTube search, as that is likely where people will reach first for music of any genre. Each subsection gives a general explanation of my findings in each category as well as breaking down at least one specific piece as an example; I have also taken the liberty of naming the subsections in order to better organize my compositional process of the tracks.

As my own contribution, original tinnitus pieces have also been created using the findings of each separate category as a compositional guideline, which are explored in a later context.

Each category, labeled as A, B, and C (alphabetical instead of numerical to avoid confusion with the numerical values of the assigned frequencies, as well as to minimize any implication of superior order or efficacy) has also been split into frequency ranges that I considered most appropriate for each section; although frequencies are usually split into typical ranges[31] when discussing audiograms or in general understanding, I have taken a less typical approach by order of uneven thirds. This came about while I was conducting research on all thirty pieces of tinnitus music I had chosen, and I quickly realized there needed to be a straightforward way to generally categorize these pieces so a listener could understand what it is they are looking for. This spectrum relies heavily on frequency categorization, but it also takes instrumentation, volume changes, and musical texture into consideration when placing them in a certain category. Intervallic structure, or specific chords, weren't very prevalent past major scale one-four-five movement (I IV V) in C or G major, and this was exceedingly common in the first category, though not always (drones on the one, sometimes one to four and back, were also very common). Music theory wise, tinnitus music tends to be incredibly simple and leans, oftentimes, into the world of intricate sound design more than music theory, though there is overlap.

The first category, Category A: Meditative Masking, involves pieces with a majority of frequencies of ~1 kHz to 399 kHz, including sub bass to mid bass ranges; this is the smallest range as well as the most low end, and pieces in this category tend to be more static, droning, and full of swells and padding due to the slow cyclical wave movement these tones must operate at for our ear to receive them as bass.

The second category, Category B: Smooth Masking, contains an analysis of pieces that sit at 400 kHz – 2,499 kHz. Though this starts at what is usually considered lower mid and reaches into the

[31] Most people order frequencies as such when discussing composition: Sub-bass:15 - 50 kHz, Bass: 51 - 200 kHz, Mid-bass = 201 - 400 kHz, Lower mids: 401-900 kHz, Upper mids: 901 - 4,000 kHz, Treble: 4,001 - 20.000 kHz.

middle of upper mids territory, for the purposes of this analysis, it will be considered more average than low.

The final category, Category C: Beeping Masking, houses pieces that sit mostly in the 2,500 kHz to 20,000kHz range, or the high treble tones. Many of these pieces are drier in nature, and as we climb higher in frequency waves, these tones sound less musical and more like pure sine waves; musical interpretation becomes more difficult. Though classic thought might place high and treble frequencies as starting lower at around 900 kHz, I am choosing to start higher since much of tinnitus music tends to sit in those higher frequencies for enrichment purposes. I've also expanded this category to include the most range, and it houses the most information as most masking music contains overwhelming amounts of frequencies in this range via beeps, natural sound design, or artificial repetition at a low volume. There is, of course, overlap between categories as music isn't stagnant, so categorical placement is ultimately decided by which frequencies occur most constantly, their tone, instrumentation, and components of the track as a whole.

Of course, this is not an exhaustive or all-inclusive list, but it does contain the most easily accessible and varied pieces found when conducting this research.

Below is a spectrum to visualize where certain pieces may fall in each category. For pieces that are not as easily quantifiable one way, it may be helpful to imagine them as plotted points in between each category.

CATEGORIZATION SPECTRUM

A (~1 kHz – ~399 kHz)	B (~400 kHz – ~2,499 kHz)	C (~2,500 – ~20,000 kHz)
full swells, highly consonant, tonal, natural sound, water and wind sounds, flutes and bells instrumentation, simple major chord progressions, noticeable but simple harmonic movement, high reverb, padding, drones, low end of the frequency spectrum	some high pitched frequencies, background padding, occasional drones and consonant swelling, not too harsh, not too soft, middle of the frequency spectrum	seemingly disordered, slight or constant dissonances, harsh, high pitched beeps, sporadic, harder to listen to, technical, dry sound environment, high end of the frequency spectrum

Figure c. The categorization spectrum reference for further analysis and track placement.

Category A – Repetition, Droning, Ambient: Meditative Masking (~1 kHz – ~399 kHz)

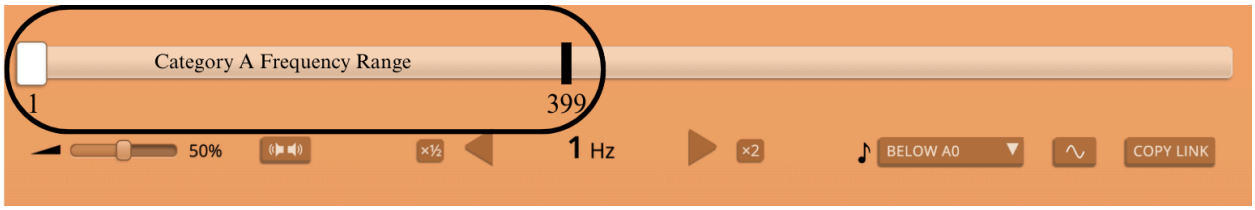


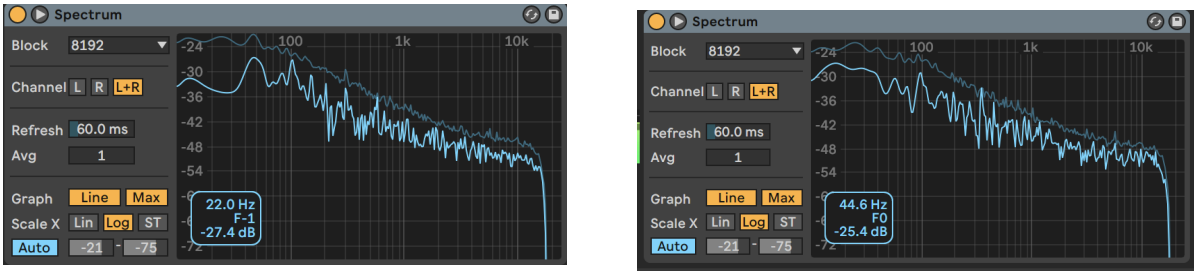
Figure d. A visual representation of the general area for common frequencies found in Category A (Source: Online Tone Generator, modified and edited).

Category A involves tracks that stay, for the most part, in the lowest ranges we can audibly detect. Most humans can only hear frequencies ~20 kHz and up, but I have included 19 kHz lower to encapsulate the entire numerical range; just because a frequency might not be audibly

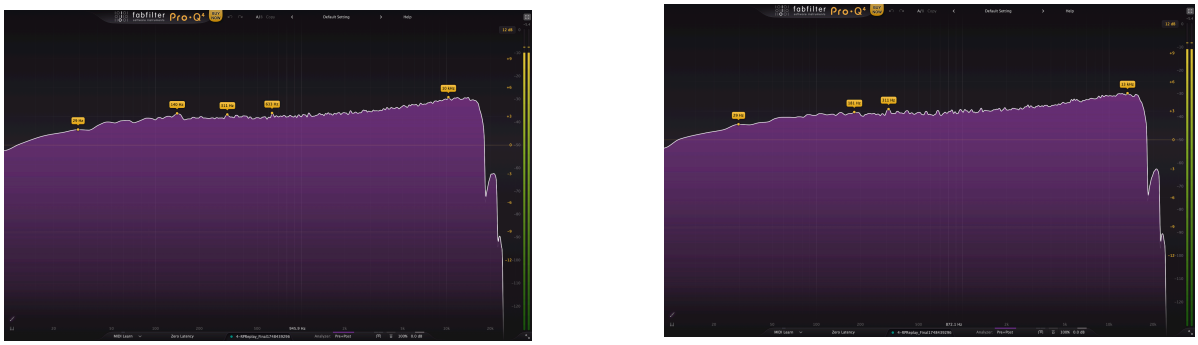
detectable does not necessarily mean it has no effect on the physiology of the body, and for that reason, those typically undetectable frequencies are included in this category.

This range is named after the almost hypnotic qualities it possesses: drones, padding, and meditative repetition with slow, cyclical wave movement. A typical example of a piece in this category, which is also the piece that has been analyzed as the example, is “Pink Noise” by Tinnitus Institute. Pink noise, different from white or brown in its usual frequency level, tends to stay in the lower ranges of human hearing (~15 kHz – ~250 kHz) and has a consistent, flat, even sound. Besides man made pink noise, natural versions include wind rustling through trees, waves on a beach, rain on concrete, etc. It sits in between brown noise, which is typically bass, sub bass and a bit grainier, and white noise, which has a higher, more sporadic frequency (flies buzzing, vacuum cleaner, sometimes referred to as “broadband” noise), pink noise has hypnotic qualities in a flatter state.

You can see the inherent flatness of this track, aptly named “Pink Noise,” in the frequency analysers employed in Ableton. The first EQ reader is a stock plugin labeled Spectrum in Ableton, and the second is another EQ reader (Pro-Q 4) by FabFilter; both give similar information but with different amounts of detail. Spectrum shows us the more common, peak frequencies present, while FabFilter Pro-Q 4 illustrates more of the entire spectrum for more overall context.



Images e and f. Spectrum analysis on "Pink Noise." Low peaks include frequencies at the far low end of human hearing at a very low volume. Spectrum EQ stock plugin, Ableton.



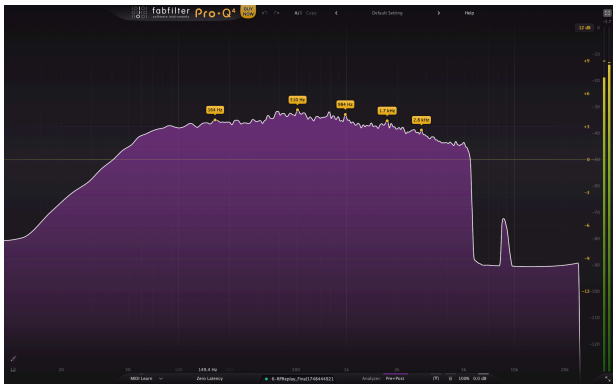
Figures g and h. Pro-Q 4 FabFilter analysis on "Pink Noise." The steadiness of the frequencies present are showcased in the flat, table-like plateau of the graph. Although there is a range of frequencies present, most are concentrated in the low range and there is very little movement.

An aim of both nature sound design and repetitive, flat noise is to potentially relax the nervous system, which can lead to decreased stress levels and, by extension, less severe symptoms. Rarely do these patterns go up in volume, which intentionally helps set a more meditative state of mind (as opposed to Category C, which is pure high end masking).

While pink, white, and brown noise (often purely man made and sourced from fans, fridges, low electrical humming, etc.) fit nicely into this category; many tracks that are pure sound design follow the same frequency patterns. Pure, natural sounds, such as ocean waves or rain, may also

be placed in this section, and can even be pitched down to create an even more meditative effect, such as in “Calm Ocean Waves,” by Tinnitus Institute.

Tracks in Category A serve a meditative, repetitive purpose on the low end of the frequency spectrum, and the consistent swelling, droning, padding, and comforting sounds (of both indoor, man made noise or nature effects) may be a potential relief to those seeking an understated, relaxed, and casual listening experience as a solution.



Images i and j. You can see the plateau and consistent frequencies. Note the original has been pitched down to achieve a more meditative effect (Pro-Q 4).

Category B – Ambient Bells, Repetitive Swells: Smooth Masking (~400 kHz – ~2,499 kHz)

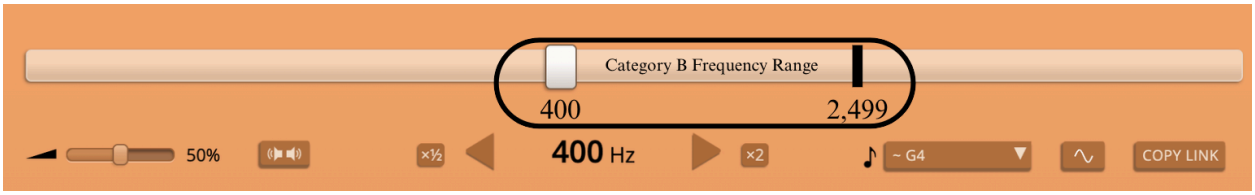
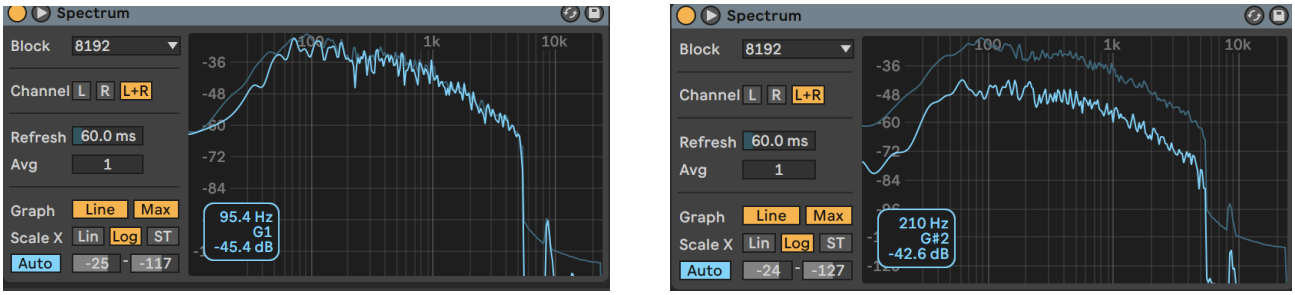


Figure k. A visual representation of the organization of the average frequency ranges in Category B, 400 khz – 2,499 kHz (Source: Online Tone Generator, modified and edited).

In this category, we begin the departure from solely smooth, hypnotic, droning low tones and step into a more blended area. Here begins the introduction of higher frequencies amongst the smooth characteristics of Category A, usually via natural sound design (crickets, short tubed windchimes, cicadas, water droplets falling sharply on metal, etc), or high pitched midi instruments. Towards the bottom of the spectrum for this category, 400 kHz, we have speaking tones and discernable notes, and upwards towards the ceiling of 2,499 hHz, we observe drier, high pitched sine waves, though they are at a much lower level when comparing thresholds in the later Category C.



Images l and m show the pitched down ocean waves and their low frequency peaks (Spectrum).

As characteristic of all categories, not every frequency played is solely within the range of the spectrum, but the majority of sounds sit within this range, hence its placement in this category. The example track that best fits this category is titled “TRT / Soundscape 1.2 - Tinnitus Masking / Tinnitus Relief / Tinnitus Music” by the Tinnitus Research Center and Laurence Goldman, and was easily found on Spotify by simply searching “Tinnitus Music.” It is this piece that will be analyzed for this category.

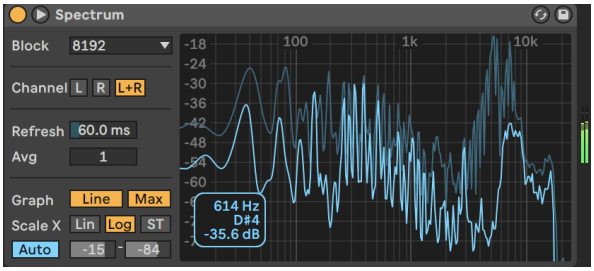


Image n. Stock plugin EQ analysis from Ableton showing frequencies around a D#4, or ~600 kHz.

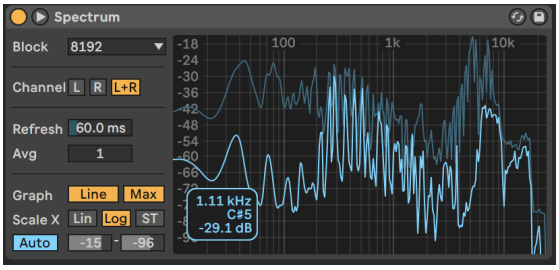


Image o. Stock plugin EQ analysis from Ableton showing frequencies around a C#5, or ~1,000 kHz.

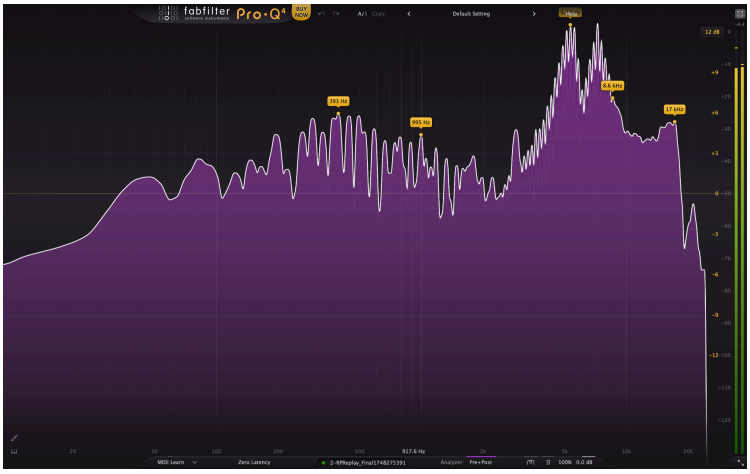


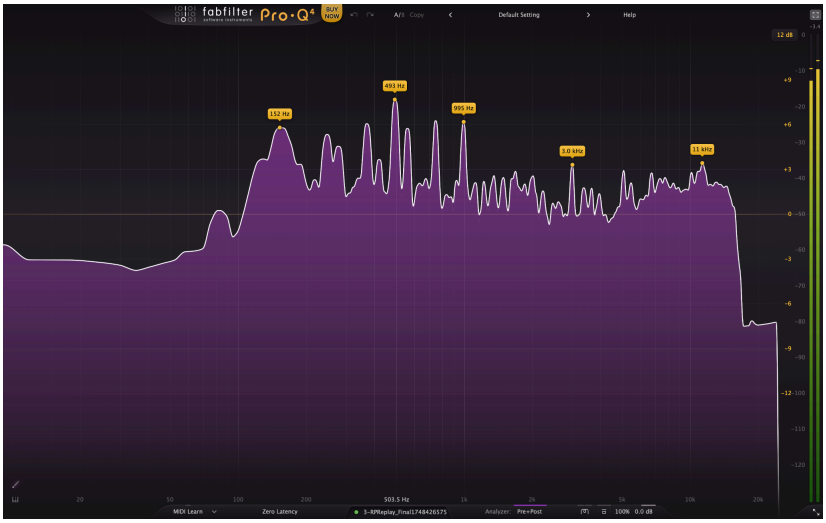
Image p. A visual example of “TRT…Tinnitus Music” and the spectrum of average frequency. On the low end, we can see notes just below 400 kHz, and on the high end extremely high tones are still detected (17,000 at a low decibel) which showcase the range of Category B (Fab-Q 4).

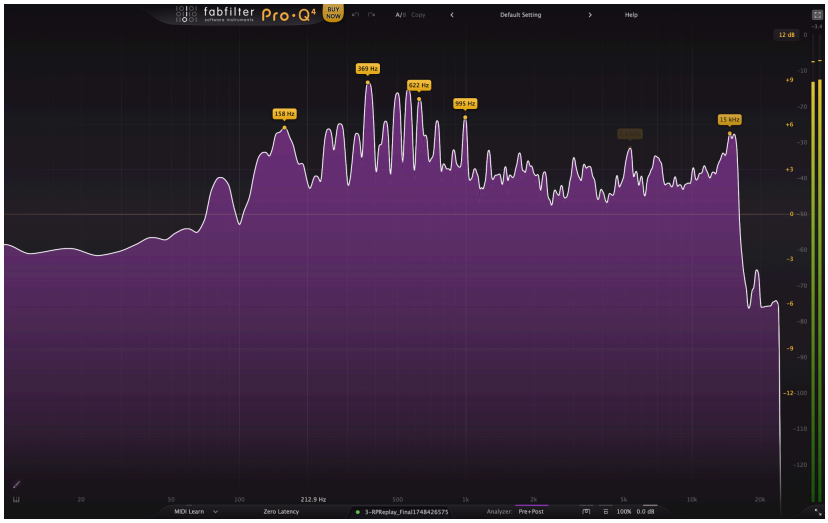
Although many frequencies present are outside the expected range for Category B, it is placed in this section because its sole focus isn't on those high tones (especially since they are at a low decibel) but on a mixture of high and middle frequencies. This category meets in the middle between A and C, and splits the intensity of Beep Masking with the ease of Meditative Masking. Perhaps the most important characteristic of this category is the middle ground between high, dry, piercing tones and low ranges; speaking tones, or identifiable notes, are the centerpiece of this section and they are usually plateaued in a constant state or decorated with higher end on top.

This section is the most broad, meaning it also contains pieces that fit in neither category A or C, such as tracks that showcase mundane sound design, or even just noises, as a feature of sound enrichment, as well as louder nature sounds, such as rain falling on tin metal, windchimes, high pitched crickets or cicadas. Some of these natural high pitches replace the high beeping with less intensity while showcasing strong underlying frequencies to paint a broader musical picture. An example of this can be pulled from the piece "Cure for Tinnitus" by Healing Music Academy. This track takes a flute playing in its lower register (or perhaps a different type of flute, the exact instrumentation is not named) and layers it on top of a low frequency, tonal pad to support the high end animal and insect noises floating on top (a natural high pitched beeping). This creates a unique combination of meditative and dry masking by using familiar sounds which may work to reduce stress, thereby lessening symptoms.

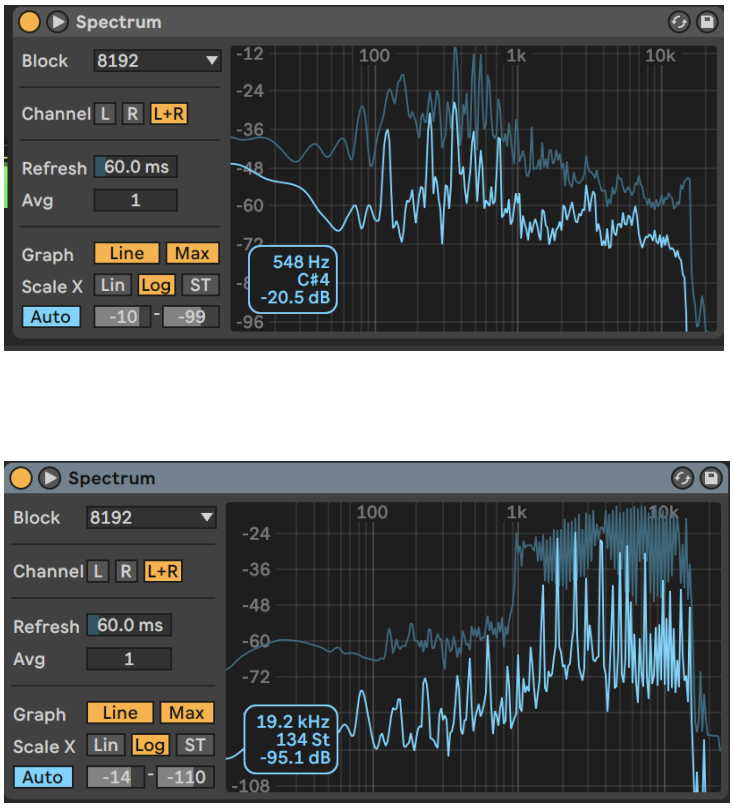
As shown in the spectrum analyzer, the broad range of frequencies is an impressive insight into how much information is actually in music therapy pieces. It's also important to note the shape of the spectrum; while previous sections constantly show table plateaus, here in Category B we

see more liveliness and change, which translates to faster transitions between tones and wave shapes.





Images q and r. Note the varying spikes and large range supported by large padding underneath for a full sound (Pro-Q 4).



Images s and t. Another example of the large spectral range in numerical value (Spectrum).

This middle of the road category contains characteristics that will likely be pleasing to most listeners; harsh tones are subdued and low, repetitive sounds are dispersed. Masking tracks in Category B serve a multifaceted purpose which some listeners may find as a good balance amongst the seemingly random and varied options for masking, and the low decibel combination of lows and highs may also help ease the ears into the more intense Category C experience.

Category C – High Pitched Beeping, Dry Intensity: Beeping Masking (~2,500 – ~20,000 kHz)

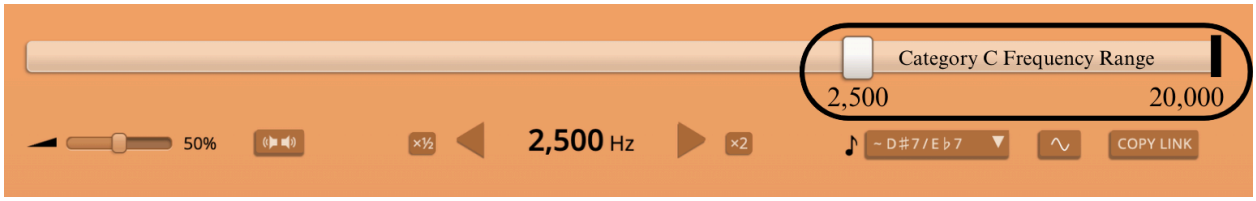


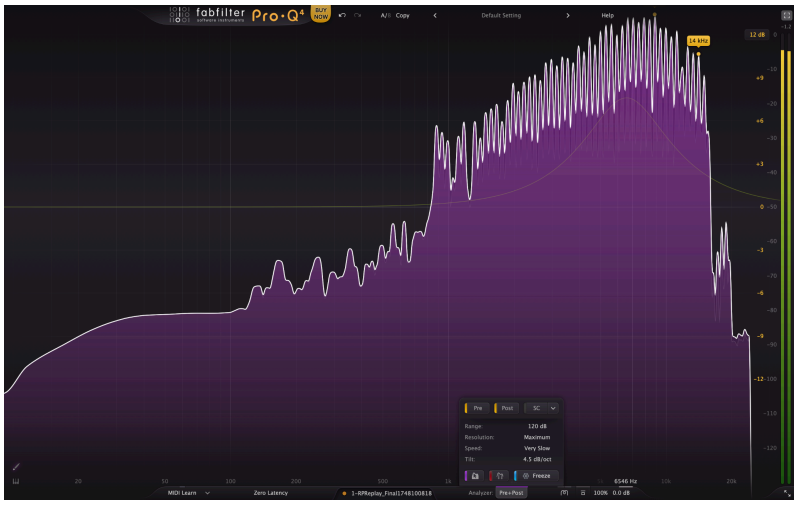
Figure u. A visual representation of the organization of frequency ranges in Category C (Source: Online Tone Generator, modified and edited).

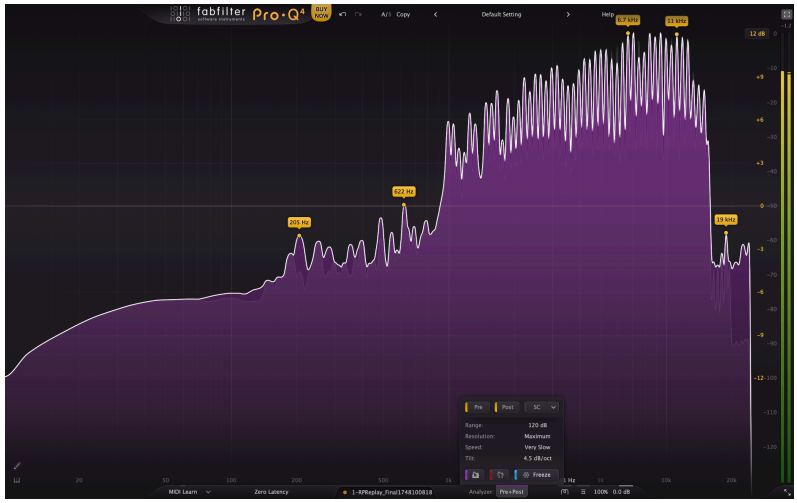
Before listening to pieces in this category and frequency range, it is recommended to take caution when listening as there is no guarantee listeners with or without tinnitus might not feel auditory discomfort or potentially worsening symptoms; reaching out to a healthcare provider first is recommended.

This category includes pieces constructed with high pitched, high frequency, and straight beeping as the centerpiece of the tracks. Occasionally, these pieces are layered with medium range tones (about 325 kHz to 2,000 kHz) or some padded drone pitched underneath; natural sound design, such as birds, crickets, or running water, are not uncommonly found in this category even with the sharp contrast to the high pitched beeps (though this section is the most dry in terms of instrumentation). In this category I've placed pieces that have several occurrences of boosted frequencies of 12,000 and up kilohertz which aim to distract or assimilate the brain to these sharp pitches.

The most intense example of this type of tinnitus music is a four hour video from Youtube labeled "High Pitched Tinnitus Neuromodulation." This track is on the far right of the spectrum

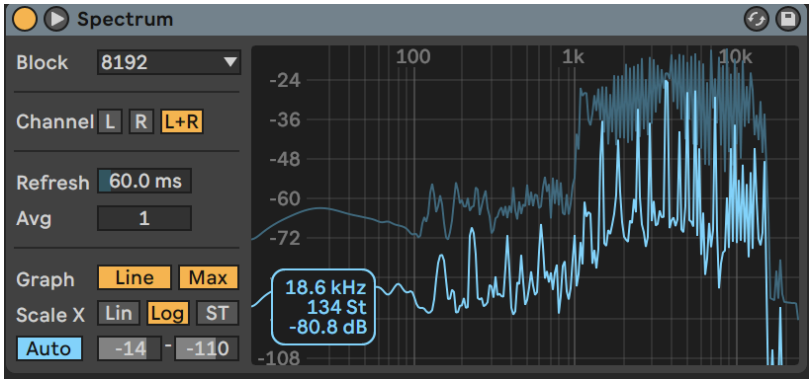
meaning it is completely sparse of anything besides high end, sporadic frequencies meant to distract the brain.[32]

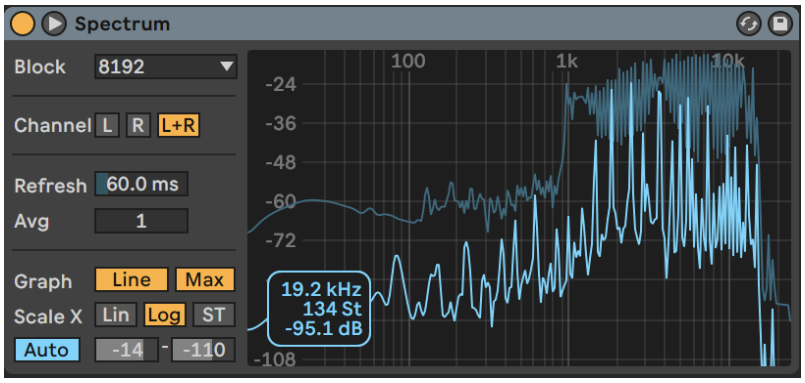




Images v and w. These two images show some of the peaks of the piece, going up to almost 20,000 kHz (the peak of human hearing). These tones can be uncomfortable for some people to listen to, and are not always detectable by everyone. Other frequency levels are also visually seen, though not specifically written out with this plugin (Source: Ableton Stock EQ Spectrum).

[32] It's worth noting that if you do not have tinnitus, or even if you do, this piece might be very uncomfortable to listen to as it is meant to mask high end frequencies by loudly copying them. Due to this, the structure may or may not cause a worsening of tinnitus (as everyone's physiology is different) so listening with caution is advised, as well as starting at a low volume.





Images x and y. Here we can see the concentration of high frequencies in the upper right hand corner, as well as a more overall viewpoint of the range of frequencies. The frequencies are overwhelmingly present in 14,000 + kHz, but lower parts of the spectrum are present as well.

The frequency range in this piece spanned from 205 kHz (about a G # 3 or A ♭ 3, a comfortable tonal range heard in speaking tones) up to about 19,000 kHz (played at a low decibel level, this high register is so dry and tight it always presents as a sine wave or a pure tone even due to its high cyclical nature). Although this track did not stay solely and completely in the 2,500 to 20,000 range, it was still placed in this category as it predominantly and overwhelmingly stayed in the high, upper ranges with consistently quick movement. Pieces placed in this category can differ in their construction – while this piece was sporadic and seemingly random with throwing

tones, some tracks focus on a singular tone (for example,“Tinnitus 7500 Hz Tone (What Does Tinnitus Sound Like?) | Sound Relief Tinnitus & Hearing Center,” by Sound Relief and Tinnitus Hearing Center) which is sustained for as long as the listener may require. The priority of categorization is mostly dependent on the common frequencies and less on the structure of when or how they’re played.

This sporadic piece, a C on the spectrum scale, may be uncomfortable to listen to, and, depending on the listener's hearing ability, some higher frequencies may not be audibly heard at all. Many of these higher frequencies are used in hearing exams, and as we age, we lose the ability to hear them; perhaps it could be argued as a theory that subjective tinnitus can run in a similar (auditory) vein version of phantom pain[33] – while once there was a clear ability to hear that frequency, as the physiology changes (age, damage, removal, etc.) the brain replaces the emptiness of that sound with its own internal, phantom reproduction.

Category C is by far the most intense out of all three categories, and depending on the several factors of the listener, such as age, severity of tinnitus, personal perception and physiology, etc., it may or may not be effective treatment. Beeping Masking may be soothing in its effect, but not in its nature; making use of the upper high ends of human hearing can potentially help the brain acclimate to piercing, dry sounds reminiscent of tinnitus.

Creating Your Own Tinnitus Therapy Tracks

With the establishment of each category, as well as dissecting their components, readers might now find it potentially easier to construct their own personalized music therapy based upon their

[33] Phantom pain is a usually painful perception that relates to a limb or part sense of the body (either because it was removed or was never there in the first place). Phantom limb sensations are reported most frequently, but may also occur following the removal or damage of nerves, organs, tissue, etc. Pain and/or sensation is highly individualized.

subjective tinnitus and their own music preferences, as emphasizing the accessibility of custom-making one's own music therapy is a desired outcome of this project.

As mentioned many times before, always contact your doctor first, and this is not medical advice.

Category A: Mediative Masking

To begin, I constructed a Category A track, Meditative TRT, by simply following this "formula" as identified earlier in this paper:

Consistent low frequencies + smooth repetitions + naturally sourced sound = Meditative TRT

To start, I recorded the hum of my kitchen refrigerator, as it naturally sounded as if it were in the low end. In the spirit of accessibility of composition in music therapy, everything was either recorded with my phone on voice memos, royalty free sounds were downloaded, or stock DAW instruments were used. Those looking to construct their own pieces without a professional DAW could easily use Garageband for free, (it has more than enough capability to make simple, personalized music therapy tinnitus music as well as good stock plugin availability) and any manipulation done was with stock plugins or simple transposition; all plugins used are either in DAW plugins or available in the form of a free trial.[34] For the original pieces, I have switched to using Baby Audio's Smooth Operator Pro (EQ Plugin) to demonstrate the frequency spectrum used.

[34] Pro-Q 4 can be used in its entirety for a month, and Baby Audio's Smooth Operator Pro can be used in trial mode without expiry (though after 50 seconds, it pauses its effect which will show upon export).

This piece, titled “Meditative Masking: Fridge/Stream/Cricket Sounds” is built proportionally to exactly three minutes with sixteen seconds of build between each of the three sections as a meditative pattern. The first recording is the hum of a fridge pitched down forty semitones, which transforms it into a deep, soft, echoing brown noise peaking at a steady frequency of about 25 kHz, a deep, naturally soothing frequency that is oftentimes not noticed and easily classified as background noise. As you can see from the recorded waveform, it's incredibly stagnant with repetitive information.

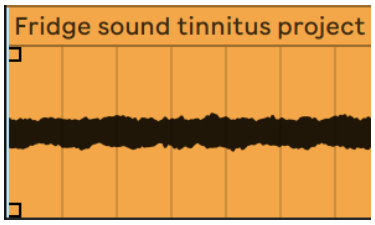


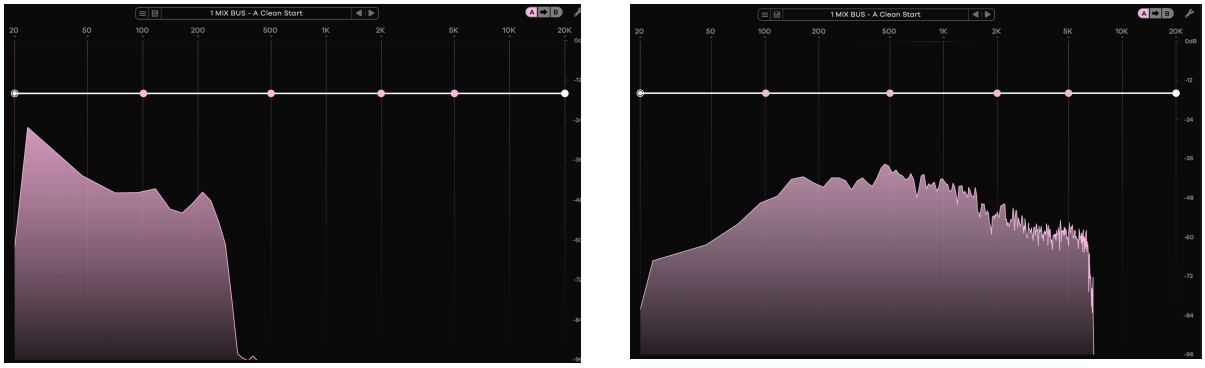
Image z, the waveform of the bass end.

The second layer added abundant additional frequencies peaking at around 150kHz; the high pitches of the fridge do measure high, (8,000+ kHz) but they’re clouded by low volume and a heavy low end, so they’re quite masked. This is unaltered, and transposition is at zero.

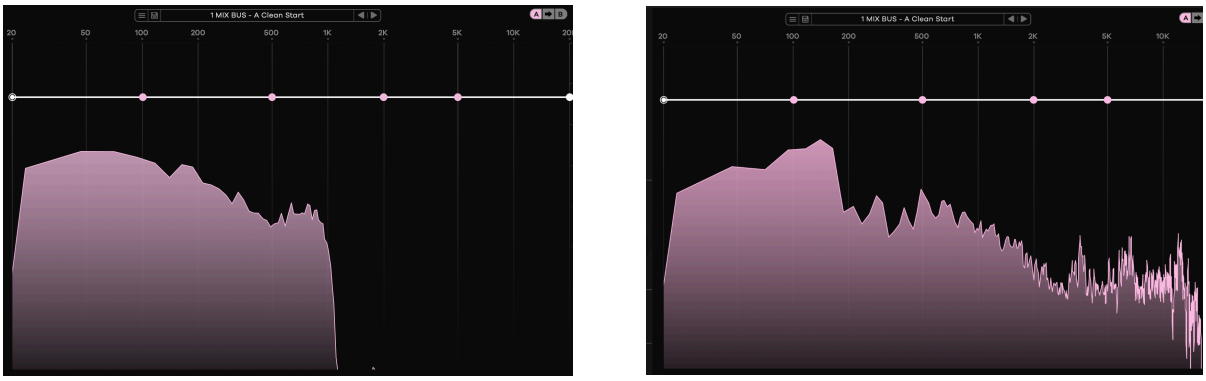
The third addition, a royalty free download of a stream, is pitched down 48 semitones to create a deep, repetitive sound; frequencies peak at around 50 kHz, though the spectrum has more width than the pitched down fridge sound.

The last addition is the same stream sound at its normal pitch; it peaks at just about 500 kHz and drops off, on average, just after 5,000 kHz.

It’s worth noting there is also a significant volume change during this piece; it begins at a low decibel volume and gradually increases naturally with the addition of more sound. It’s also cyclical in nature, and halfway through unwinds itself opposite the way it begins.



Images a1, b1, c1, and d1. The low end spectrum stayed around 25 kHz – 210 kHz, the top right shows the mid range, bottom left the pitched down water stream, bottom right normal stream sounds.

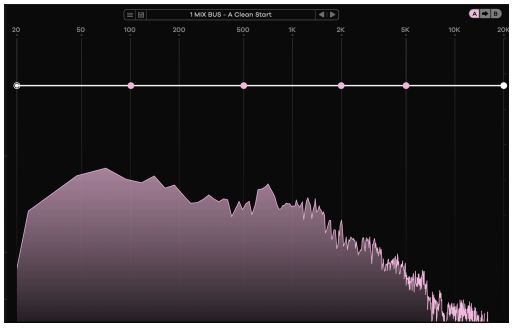


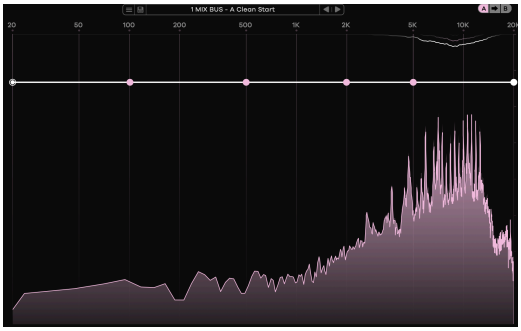
This three minute Meditative Tinnitus Track is easily broken down into a "formula" and can be constructed by sampling, recording, or downloading simple sounds with the right frequencies and texture to create a personalized, meditative track to one's preferences. For someone who is seeking more repetitive and calm sounds to mask their tinnitus, as well as attempting to relax their anxiety and nervous system, this option may help. Construction of these pink, white or brown noise sounds is much more simple than one might think, and can be a powerful therapy aid.

Category B: Smooth Masking

For the Category in the middle, Category B, I constructed a piece that, like the aforementioned analysis, contains elements of the first and last sections. To start, I recorded a washing machine with my phone and lowered the pitch 48 semitones (the sound of the spin cycle was already naturally peaking at around 55 kHz, so low end was already overwhelmingly present, but I wanted an even more darker sound) to have a base of about 25 kHz. I added another pitched down version (24 semitones down) in the middle, and then the unmodified sound on top. The original clip is about eight seconds of audio, which was edited to remove extra pops and clicks and then duplicated together to create a cleaner and more cohesive sound for more meditative listening. These three layers provided the lower, steady, and predictable frequencies to mask the harshness of the upper highs.

Images e1, f1, g1, and h1. E1 (top left) shows the low frequencies of the down 48 semitone washing machine sounds. f1 (top right) shows the same sound pitched 24 semitones down, g1 (bottom left) is the original washing sound, and h1 (bottom left) shows the higher frequencies of the midi bells dancing on top of the lows.





I constructed randomized bells at a low volume to sit above the three washing machine tracks; these were made using midi input and selecting the notes. The goal for this two minute therapy track is to combine both low and high frequencies for those who experience several complex sounds or are unsure exactly what they are hearing.

The "formula" followed for this category is as follows:

Low end repetitive frequency + mid range repetitive frequency + high end, high treble randomized pitches = Smooth TRT

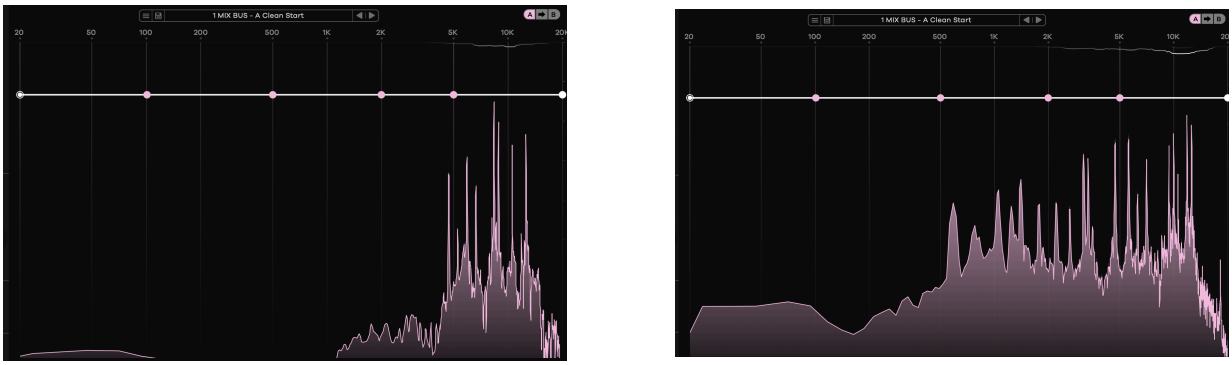
There is also a significant volume change during this piece as in the first category; this is due to additional layered sound. There is a cyclical nature to this piece, but it is not as intentionally built around patterned time stamps as the first piece. This two minute Smooth Tinnitus Track was created with this "formula" in mind, and has remarkably accessible construction to one's preferences and environment. For someone who suffers from low and high end tinnitus, this Category may be a good option to mask frequencies all over the spectrum, and it shows a combination of easy listening and attention grabbing sounds.

Category C: Beep Masking

For the final category, Category C, I constructed a simple, completely dry piece with the third spectrum of frequencies in mind. This piece stays primarily in the 10,000 kHz and up range as its primary concern is to assimilate the brain to these uncomfortable high ends.

Please note that as this piece is uncomfortable to listen to, it may not be suitable for all listeners and listeners should take caution before listening; it is advised to start at the lowest volume.

The construction of this piece was also focused on accessibility, so I used a stock musical instrument in Ableton, Street Bells, which I pitched up to the highest degree. The brightness was turned all the way up, it was detuned, decay was switched to 515 milliseconds, and the Mod Frequency was set to 125. The entire one minute track is completely dry, with randomness increasing during the duration; towards the end the same track was duplicated and played on top of itself to create more intensity.



Images i1 and j1 show the high, randomized frequencies constructed for masking and assimilation.

As you can hear and see on the EQ plugin, the intense succession of bright, quick tones create a randomization that can be used to mask several frequencies someone may experience.Volume levels stay consistent throughout, as sudden increasing with higher frequencies can be uncomfortable and worsen symptoms.

For our final "formula," it could be said to be as follows:

Bright, high, dry tones + randomization + quick decay time = Beep TRT

Though this piece may be uncomfortable, it may serve as a way to silence the psychosomatic and physiological symptoms of tinnitus, and with this formula, people may be able to make their own tracks to their comfort and preferences.

Conclusion

Subjective tinnitus can be a debilitating condition with both psychosomatic and physiological symptoms; the primary aim of this research is to provide valuable context and information regarding subjective tinnitus to empower people with the knowledge they need to construct their own tailor made notched music therapy, or TMNMT (sound enrichment). While objective tinnitus can objectively be medically diagnosed and treated, the much more prevalent subjective type poses a much greater therapeutic challenge. This research focuses mainly on TMNMT, (though it does discuss briefly the Heidelberg Model and Standard Music Therapy, as well as their unique merits and limitations) which works by suppressing specific tinnitus frequencies through customized music tracks (mostly sound design), offers an accessible and potentially

home written alternative for those affected, especially for individuals lacking access to long-term professional care (though it is not a replacement for professional intervention).

By discussing the condition, potential causes, lifestyle and dietary factors, this research seeks to inform the reader with relevant prevention methods and information. While results can be highly individualized and unpredictable, and a cure is never guaranteed, individuals may benefit from increased awareness and proactive self-management strategies.

This work also discussed how audiograms and hearing exams can intersect with masking and assimilation strategies; this essential context provides more information in regards to understanding frequency sensitivity and hearing thresholds and how they change during the aging process.

This project also developed an original, user-friendly classification system for tinnitus masking music (Spectrum Categories A, B, and C) with the aim to provide a practical framework for writing personalized tinnitus tracks using readily available digital tools (DAWS, plugins, own recordings, etc.). These guidelines aim to empower individuals to create their own coping mechanisms based on their auditory preferences and environments. While not intended as a substitute for professional medical treatment, this research encourages further self-exploration into self-management of tinnitus; by integrating an extensive literature review with accessible technological tools, it is the aim of this work to foster both relief and autonomy for those living with this persistent and debilitating auditory condition. This concludes Part I of this research, which housed the Abstract, Introduction, and Literature Review.

The second half of this project, Part II, focuses on researching online music therapy tracks and breaking them down into “formulas” that can be recreated for one’s own personal use as a potential resource. The Methodology, Findings, and Reflection commence at the start of Part II;

they are grouped holistically as the Methodology (analyzing tinnitus music by listening and breaking them down into their formulaic components) organically falls into the Findings and Reflection, which breaks down those specificities. This research focused on tracks found only on Spotify or YouTube, the two of the most commonly used streaming or music platforms.

It is worth noting that because the topic of this project is subjective tinnitus, it may be possible that exposure to this music, as well as any noise or sound, may worsen the condition. This is the main ethical consideration of this research. It is not this project's intent to harm the listeners' ears in any way, so if at any point there is any discomfort, please disengage with the tracks. Category C, Beep Masking, may be particularly prone to causing discomfort.

Part II explored the classification, structure, and therapeutic potential of tinnitus masking music by analyzing 30 publicly available tracks and organizing them into three distinct categories — Category A: Meditative Masking, Category B: Smooth Masking, and Category C: Beep Masking — based primarily on their frequency spectrum, sonic texture, instrumentation, and overall composition. Each category was shown to target different frequency ranges and characteristics. Category A emphasized low end frequencies, repetitive, and ambient sounds designed for calming, relaxing, and meditative use. Category B balanced mid and high frequencies with identifiable notes and natural sound elements, making it the most accessible and broadly effective (occasionally with higher ends on top). Category C focused on intense, high-frequency beeping tones that, while potentially uncomfortable, aim to desensitize the brain to those piercing tinnitus frequencies.

Beyond analysis, the project also emphasized accessibility by demonstrating how original therapy tracks could be constructed using basic tools like smartphones, stock DAW plugins, and free software. The goal of this is to empower individuals to tailor their own masking tracks to

their preferences, fostering a much more personal and realistic approach to symptom management. The development of compositional “formulas” for each category further demystifies the creation of effective masking music.

Ultimately, while masking is not a universal cure and its efficacy is unique for each individual, its flexible applications show great promise in offering potential relief, and even emotional comfort, to tinnitus sufferers. Readers are encouraged to experiment within these frameworks — but always consult medical professionals first — as the subjective nature of tinnitus demands both caution and customization.

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