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Mechanisms and Research Progress of Personalized Music Therapy in the Treatment of Tinnitus

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Abstract

Personalized music therapy has shown promising application prospects in the management of tinnitus. Although domestic and international scholars have discussed related literature on music-based interventions, the mechanisms, specific methods and research progress of personalized music therapy have not been described in a systematic and detailed way. In view of this gap, this article reviews several main approaches that use personalized or individualized sound and music in tinnitus treatment, including neuromonics tinnitus therapy, tailor-made notched music training, phase-shift treatment, the Heidelberg model of music therapy, and Traditional Chinese Medicine (TCM) five-tone therapy. It also briefly introduces our department's practical experience with using natural sound for non-masked sound therapy in idiopathic tinnitus. We hope this review will provide a useful reference for further research and clinical application of music therapy for tinnitus.

Keywords: tinnitus; personalization; music therapy

1. Introduction

Subjective tinnitus refers to a subjective auditory perception arising in the ear or head in the absence of any external acoustic or electrical stimulation. With the rapid development

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of modern society, mental stress has increased, environmental noise pollution has become more serious, and both population ageing and the "younger onset" trend of tinnitus have become more evident. As a result, the prevalence of tinnitus has been rising year by year.

Epidemiological investigations from other countries report that the prevalence of tinnitus in the adult population ranges from 4.4% to 15.1%, among whom 1%–3% experience a severe impact on quality of life, often accompanied by irritability, insomnia, anxiety, depression and, in some cases, even suicidal ideation (Hoffman & Reed, 2004). A 2017 epidemiological survey of tinnitus among 1,748 individuals undergoing routine physical examination in Dalian, China, found an overall prevalence of 32.4% (566/1748; Hong et al., 2017).

Because the etiology and pathogenesis of tinnitus remain uncertain, there is still a lack of universally effective and evidence-based treatment options. However, a review of recent domestic and international literature suggests that, compared with other approaches, sound-based therapy has been widely used in clinical tinnitus management. The 2014 *Clinical Practice Guideline: Tinnitus* from the United States also recommends sound therapy as a treatment option.

Among the various sound-based methods, masking therapy and tinnitus retraining therapy (TRT, a representative partial-masking habituation protocol) are currently recognized as effective. Yet both approaches have limitations. Feldman reported that masking is ineffective in patients whose psychoacoustic masking curves show "separated" or "non-maskable" types when any kind of noise is used; although habituation-based therapy can be applied to all tinnitus patients, it usually requires a long treatment period, and many patients have difficulty maintaining adherence.

With advances in medicine and digital technology and the introduction of the concepts of precision medicine and personalized care, researchers worldwide have developed individualized music and sound therapy protocols tailored to different types of tinnitus. This review summarizes the mechanisms and recent research progress of several representative personalized music therapies for tinnitus.

2. Neuromonics Tinnitus Therapy

Neuromonics tinnitus therapy (NTT) mainly consists of structured tinnitus counseling combined with individualized music stimulation. The method was first proposed by Davis in Australia in 1996. In NTT, customized music replaces traditional broadband noise masking. By using intermittent music stimulation to dynamically mask the tinnitus signal, the therapy seeks to reduce a patient's sensitivity to tinnitus and their emotional distress.

The personalized music used in NTT is designed according to each patient's audiogram.

The frequency spectrum is modified to compensate for hearing loss and to ensure broad frequency coverage (up to approximately 12.5 kHz), so that the corresponding auditory neurons can all receive relatively balanced stimulation. At the same time, relaxing music is selected, with tempo matched to the resting heart rate (about 60–80 beats/min), in order to help patients reach an optimal state of relaxation and thereby attenuate maladaptive interactions between the auditory system, limbic system and autonomic nervous system.

Since 1996, Davis and colleagues have conducted three clinical trials involving around 110 patients (Davis et al., 2007, 2008). In the first trial, 30 patients were alternately assigned to a music group and a noise group and received either personalized music or white noise for 7 months. The results showed no significant difference in overall efficacy between the two groups, but the music group reported better relaxation. Moreover, after the study ended, the investigators found that patients whose tinnitus was not fully masked achieved longer-term improvement in tinnitus-related distress.

To verify this observation, a second clinical trial was conducted in 2002. Fifty patients were randomly allocated to four groups: (1) personalized music with complete masking, (2) personalized music with intermittent masking, (3) white noise with partial masking, and (4) counseling only. All four groups received the same tinnitus counseling. After 12 months of treatment, the improvement in Tinnitus Reaction Questionnaire (TRQ) scores in the two personalized music groups (66%) was significantly greater than in the non-music groups (22% and 15%). The music groups also showed greater improvements in anxiety level, tinnitus severity, relaxation, minimum masking level and loudness than the white noise partial-masking and counseling-only groups. Among the music groups, the intermittent masking protocol showed particularly marked improvement compared with non-music groups.

Based on earlier findings that many patients in the complete-masking group gradually reduced the intensity of music stimulation (transitioning to intermittent masking) and reported even better improvements, the authors designed a third clinical trial. Thirty-five patients were randomized into an intermittent-masking group (personalized music for 6 months) and a mixed group (complete-masking treatment with personalized music plus broadband noise for 2 months, followed by 4 months of intermittent masking with personalized music). After 6 months, 91% of patients had at least a 40% reduction in tinnitus-related interference, with the greatest improvement occurring during the first 2 months. At the end of treatment, both groups showed significant improvements in irritability, tinnitus-related cognition, minimum masking level and loudness discomfort level, with a slightly better outcome in the mixed group, although the difference between groups was not statistically significant.

A multi-center clinical study involving nine institutions further confirmed the feasibility and effectiveness of neuromonics tinnitus therapy (Wazen et al., 2011). However, NTT is

not suitable for all types of tinnitus. In a cohort study of 552 tinnitus patients, Hanley et al. (2008) found that neuromonics therapy produced the best outcomes in patients with monotypic tonal tinnitus and idiopathic tinnitus with hearing loss $\leq$50 dB; more than 92% of such patients experienced at least a 40% reduction in tinnitus-related interference, with an average improvement of 72%.

3. Tailor-Made Notched Music Training

Tailor-made notched music training (TMNMT) is based on the "central gain" and lateral inhibition theories of tinnitus. According to these models, tinnitus arises because cochlear damage and deafferentation of auditory nerve fibers lead to maladaptive neural plasticity and aberrant cortical reorganization in the auditory cortex. When hearing is normal, auditory neurons not only transmit excitatory signals to higher-order neurons but also exert lateral inhibition on neighboring neurons. This lateral inhibition contributes to a balanced representation of frequencies (Diesch et al., 2010; Noreña, 2011).

When hearing loss occurs, neurons in the auditory cortex do not simply disappear; instead, they lose input from the cochlea and thus provide less lateral inhibition to adjacent frequency channels. Neurons in the deprived frequency region, especially at the borders of the hearing-loss area, begin to respond to inputs from non-deprived frequencies. At the same time, weakened lateral inhibition and changes in neuronal sensitivity can increase central gain and lead to excessive representation of edge frequencies. Enhanced spontaneous firing and synchronous activity of neural populations above the perceptual threshold may then be perceived as tinnitus (Noreña, 2011).

If this mechanism is indeed involved in tinnitus generation, then increasing lateral inhibition to the overactive neurons might help suppress tinnitus. TMNMT aims to achieve this by applying a "notch filter" centered on the tinnitus frequency. Music is digitally processed so that a specific frequency band around the individual tinnitus pitch (often a half or one octave wide) is removed. When patients listen repeatedly to this notched music, neurons coding for adjacent frequencies are stimulated, whereas neurons coding for the tinnitus frequency receive little or no input, thereby enhancing lateral inhibition onto tinnitus-related neurons.

Experimental studies have shown that notched noise processed through a band-stop filter can suppress neural activity in the auditory cortex corresponding to the notched frequency band (Pantev et al., 1999). Moreover, frequency tuning is one of the fundamental properties of auditory neurons. With long-term listening to notched music, neurons representing frequencies adjacent to the notch may shift their tuning toward the notched region and exert

stronger lateral inhibition on tinnitus-related neurons, while the tinnitus-frequency neurons receive less excitatory input. In this way, notched music training may reduce the hyperexcitability and/or abnormal synchronous activity of cortical neurons coding the tinnitus frequency, and gradually reverse maladaptive neural plasticity.

Animal experiments have also shown that amplifying the spectral energy around the edges of a notch can significantly suppress responses at the notch center frequency (Catz & Noreña, 2013). Clinically, Stracke et al. (2010) and Okamoto et al. (2010) conducted year-long TMNMT interventions in tinnitus patients and found significant reductions in tinnitus loudness in the treatment groups. Auditory steady-state responses and N1m results indicated that tinnitus-related neural activity in the temporal auditory cortex was significantly reduced after treatment.

It appears that TMNMT may operate via two complementary mechanisms. On the one hand, prolonged listening to notched music effectively deafferents the tinnitus-frequency channel, transiently blocking input to the corresponding cortical neurons and thereby decreasing their excitability. On the other hand, neurons at the edges of the notch receive stronger stimulation from the enriched music, which enhances lateral inhibition onto tinnitus-frequency neurons.

The effectiveness of TMNMT is related to the tinnitus frequency range. Teismann et al. (2011) conducted a 5-day intensive TMNMT program in 20 patients with chronic tinnitus and hearing loss $\leq$50 dB HL. The results showed that patients with tinnitus frequencies below 8 kHz experienced significant reductions in tinnitus loudness, tinnitus-related distress and tinnitus-related cortical activity, whereas patients with tinnitus frequencies above 8 kHz showed no obvious change. This may be because musical signals contain relatively less high-frequency energy and the human cochlea is less sensitive to very high frequencies (Fastl & Zwicker, 2007).

The efficiency of lateral inhibition also depends on the width of the spectral notch. Earlier studies reported that removing one octave or half an octave around the tinnitus frequency was effective for tinnitus patients (Stein et al., 2015). In healthy participants, Okamoto et al. (2005) compared notched broadband noise with notch widths of one octave, half an octave, and a quarter octave, and found that the N1m amplitude decreased significantly after stimulation with half- or quarter-octave notches compared with the one-octave condition. Clinical research (Wunderlich et al., 2015) similarly showed that three different notch widths (one octave, half an octave, and quarter octave) all reduced tinnitus distress and tinnitus-related neural activity after three months of TMNMT, with the half-octave notch producing the greatest improvement on a global clinical rating scale. A notch width of one-eighth octave appears to be a critical limit; narrower notches no longer enhance lateral inhibition.

In general, TMNMT requires at least three months of training before tinnitus loudness shows a clear and stable reduction (Stein et al., 2016).

4. Phase-Shift Treatment for Tinnitus

Phase-shift treatment was proposed by Choy at the 2004 New York Academy of Medicine conference. The basic idea is to deliver an external sound wave with the same frequency and intensity as a patient's tonal tinnitus but with a phase shift of 180 degrees, so that the two waveforms cancel each other, thereby eliminating cortical perception of tinnitus. The theoretical essence is to prolong the duration of residual inhibition. In principle, this approach is similar to the active noise cancellation principle used in noise-canceling headphones.

The waveform of a tonal tinnitus can be approximated as a sinusoidal wave that describes the frequency and intensity of the tinnitus. However, the exact temporal and spatial trajectory of tinnitus perception is not fully understood, making it difficult to generate a perfectly opposite-phase sound. Therefore, in practice, a tinnitus-matching sound whose phase is continuously shifted at a certain rate (e.g., 60 degrees per 30 seconds) is used instead. After 30 minutes of stimulation, the tinnitus percept is theoretically expected to be suppressed for about 10 minutes.

Lipman and Lipman (2007) conducted a four-week study in 61 patients with predominant tonal tinnitus. For the first two weeks, patients received sound stimulation using their individually matched tinnitus frequency and intensity; for the subsequent two weeks, they received phase-shift treatment. The stimulation was delivered three times per week, 30 minutes per session. The results showed that 37% of patients had a one-grade reduction in Tinnitus Handicap Inventory (THI) scores, and 5% had a two-grade reduction. Fifty-seven percent of patients reported a tinnitus loudness decrease of more than 6 dB, and 42% experienced complete residual inhibition lasting from 1 hour to 7 days (mean 2 days).

In another study, Choy et al. (2010) compared three sound types (a pure tone at 1,000 Hz, 77 dB; a tinnitus-matched pure tone at 77 dB; and phase-shifted stimulation) in 35 tinnitus patients who had failed other treatments. Each sound was delivered for 30 minutes. The proportions of patients who experienced a loudness reduction of at least 6 dB were 24%, 27%, and 82%, respectively. To further verify these findings, the research team conducted a multi-center clinical trial at six centers in the United States, Europe, and Asia. Using a reduction of at least 6 dB in tinnitus loudness as the criterion for effectiveness, 301 of 493 patients (61%) responded to phase-shift therapy, with center-specific response rates ranging from 49% to 72%. Residual inhibition lasted 3–43 days, which is substantially longer than the typical duration achieved with masking or habituation-based methods.

These results suggest that phase-shift treatment can produce robust and long-lasting reductions in tinnitus loudness. However, at present, this approach is mainly applicable to patients with relatively stable, monotone tinnitus.

5. Heidelberg Model of Music Therapy

The Heidelberg model of music therapy (HMMT) was first proposed in 2004. This neuromusic therapy combines psychological regulation with targeted remediation of maladaptive neural plasticity in both lemniscal and non-lemniscal auditory pathways. The protocol consists of four modules.

Counseling

Through guided counseling, patients are helped to develop an appropriate understanding of tinnitus, including its mechanisms and benign nature. The principles of music therapy are explained, and the clinician systematically reviews the patient's medical history and medication use, answers questions, and uses a sinus tone generator to help patients identify a tone that subjectively resembles their tinnitus.

Resonance training

Patients perform vocal exercises to stimulate resonance in the cranial and cervical cavities (typically about 3 minutes per hour). The goal is to increase blood circulation in tinnitus-related brain regions and to indirectly stimulate auditory pathways via somatosensory input. The brain processes somatosensory and auditory stimuli through multiple cross-modal pathways. Many patients can change their tinnitus perception by clenching their teeth, pressing specific head or neck points, turning the head, or abducting the shoulders (Baguley, 2002). Latifpour et al. (2009) suggested that the interaction between somatosensory and auditory input may occur at the level of the dorsal cochlear nucleus. Therefore, resonance and muscle activation in the head and neck may indirectly modulate cochlear nucleus activity.

Auditory cortex training

Because the brain can actively filter out irrelevant information and selectively attend to relevant auditory stimuli, purposefully introducing "wrong notes" or pitch deviations into music can influence auditory processing. Frequency discrimination training may interfere with tinnitus-related cortical reorganization and alter the internal tinnitus spectrum. In

HMMT, structured listening tasks and discrimination exercises are used to re-train the auditory cortex.

Tinnitus refocusing and relaxation

Through music therapy, the balance between sympathetic and parasympathetic nervous activity is expected to be restored. During relaxation training, patients are guided to recall personally meaningful and pleasant memories, which helps divert attention away from tinnitus and promotes psychophysiological relaxation. At the same time, intermittent presentation of tinnitus-like sounds is embedded into the music at a comfortable loudness level that still allows the therapist's verbal instructions to be heard. Patients are encouraged to deliberately recall and confront negative factors that tend to amplify their tinnitus perception, gradually reducing their sensitivity and emotional reactivity to tinnitus. The core idea is not to eliminate tinnitus at all costs, but to help patients face tinnitus directly and learn to ignore it.

In a study of 19 patients with acute tinnitus who received a 5-day HMMT program, structural MRI showed a significant increase in gray matter volume in the right Heschl's gyrus after treatment compared with 22 untreated tinnitus patients and 22 healthy controls (Krick et al., 2015). Tinnitus-related distress improved significantly more in the treatment group than in the control group. In a separate morphometric study of 257 tinnitus patients, Schecklmann et al. (2013) reported that higher levels of tinnitus distress were associated with smaller gray matter volumes in auditory cortical areas. A follow-up study in 78 patients yielded similar findings (Krick et al., 2017).

HMMT has also been shown to activate the posterior cingulate cortex, a core hub of the default-mode network (DMN). Resting-state DMN activation is often reduced in tinnitus patients, and DMN dysfunction has been linked to typical stress-related symptoms such as sleep disturbance, anxiety, depression, irritability and difficulty concentrating (Krick et al., 2017). Therefore, HMMT may alleviate tinnitus-related distress partly by restoring DMN function and specifically activating the posterior cingulate cortex.

In a cohort of 107 patients with chronic tinnitus who underwent a 5-day HMMT program, 76% showed a reduction in tinnitus rating scales, and all patients reported reduced tinnitus-related distress. The therapeutic effect was long-lasting, with follow-up periods up to 5.4 years (mean 2.65 years; Li et al., 2016). These results indicate that HMMT can effectively improve both acute and chronic tinnitus and its comorbid symptoms, with sustained benefits. Although tinnitus involves multiple brain regions, gray matter changes in tinnitus-related areas appear to be closely associated with the level of tinnitus distress. Krick's research

further showed that tinnitus patients have reduced gray matter in Heschl's gyrus and medial frontal regions, and that Heidelberg music therapy can specifically increase the volume of the right Heschl's gyrus, indirectly supporting its role in improving tinnitus-related emotional disturbances and reversing maladaptive neural plasticity.

6. Traditional Chinese Five-Tone Therapy

Five-tone therapy is a form of personalized sound treatment based on the Traditional Chinese Medicine (TCM) theory of "the five viscera and their corresponding tones." It applies syndrome differentiation—especially organ (zang-fu) pattern differentiation—to select musical modes corresponding to individual patients. In this system, different musical tones are believed to resonate with specific internal organs and thereby regulate emotions and organ function. Classical texts describe such correspondences: "gong" (do) belongs to the spleen, "shang" (re) to the lung, "jue" (mi) to the liver, "zhi" (so) to the heart, and "yu" (la) to the kidney. In the *Huangdi Neijing*, the five tones are further linked to the five elements: jue–wood, zhi–fire, gong–earth, shang–metal, yu–water.

Modern research (Pan et al., 2016) suggests that each zang organ has an inherent frequency, and that the vibration of this frequency produces energy corresponding to physiological function. When an organ becomes diseased, its energy is altered. By applying specific musical tones associated with an organ, resonance may occur and correct the abnormal energy, thereby achieving "reducing excess and supplementing deficiency." Classical TCM statements such as "music moves the blood vessels, circulates vitality, and harmonizes the mind" and "deviant sounds evoke deviant qi and disorder; proper sounds evoke harmonious qi and order" reflect this view. Some TCM physicians have even directly called music a form of medicine.

Guided by both modern sound therapy concepts and TCM five-tone and five-element theory, five-tone therapy has been applied as a unique form of music intervention in clinical tinnitus treatment, providing a new path for comprehensive care. For example, ancient texts noted that a "hollow stomach and deficiency of ancestral qi" could lead to tinnitus. For patients with tinnitus due to spleen-stomach deficiency accompanied by anxiety, music in the gong mode that "enters the spleen meridian"—such as *Moonlight on the Spring River* or *Idle Chant*—may be selected. On the one hand, such music is used to regulate the ascending and descending and transportive functions of the spleen and stomach; on the other hand, because fear and anxiety are associated with water (kidney), music that tonifies earth (spleen) to restrain water can help alleviate fear and anxious mood using calm, gentle gong-mode melodies.

The *Neijing* also states that "wood constraint, when severe, leads to tinnitus and vertigo." In cases of tinnitus due to liver qi stagnation transforming into fire, the therapeutic principle is to drain excess fire by treating the child organ. Zhi-mode music such as *Step by Step Higher* or *Blooming Flowers under the Full Moon* can be used. A study of 80 patients with idiopathic tinnitus of the liver qi stagnation pattern showed that zhi-mode five-tone music therapy for four weeks significantly reduced tinnitus loudness and THI scores and was superior to conventional masking treatment (Zhang et al., 2018).

As early as the 1990s, a "sound information therapy" device based on the principle of acoustic resonance was used to treat tinnitus. Recent studies have again confirmed its safety and efficacy (Li et al., 2005). Its theoretical foundation lies precisely in the TCM concept of "five tones entering the five zang organs," and its mechanism may be related to changes in plasma 5-hydroxytryptamine (serotonin) levels (Wang & Li, 1996).

7. Discussion and Outlook

Sound-based therapy for tinnitus is generally divided into two main categories: partial masking and complete masking. Partial masking is typically implemented as part of habituation-based therapies such as tinnitus retraining therapy. It is analogous to the "candlelight effect"—by introducing background sound, patients' attention is actively or passively diverted away from tinnitus, and maladaptive connections between the auditory system and limbic/autonomic systems can be weakened. Over time, this can reduce tinnitus perception and its associated symptoms (Jastreboff, 2000).

Complete masking uses externally generated sounds that are carefully matched in pitch and loudness to the tinnitus, with the goal of completely covering it. By compensating for reduced auditory input resulting from cochlear damage, masking can decrease abnormal spontaneous activity of hair cells, restore excitability in efferent pathways, directly suppress aberrant neural firing in the central auditory system, and influence maladaptive plasticity to relieve tinnitus (Goldstein et al., 2005). Although both partial and complete masking can be effective, they each have shortcomings.

Complete masking can often provide rapid symptom relief, but its efficacy largely depends on residual inhibition, which tends to be short-lived. For example, the average duration of residual inhibition has been reported to be only around 5.1 minutes (4.5–6.2 minutes; Goldstein et al., 2005). Consequently, the long-term benefit of pure masking is limited. Some patients may also become dependent on masking sounds and find themselves even less able to tolerate tinnitus in the absence of masking. Because complete masking typically uses narrowband noise at a level higher than the tinnitus loudness, long-term use may be difficult

to tolerate and might carry a risk of further hearing damage. In addition, masking is mostly suitable for patients with cochlear tinnitus who show positive residual inhibition.

Partial masking and habituation-based therapies (such as TRT) tend to have better long-term effects than pure masking, but they require prolonged training. A full TRT protocol usually involves wearing noise generators for at least 6 hours per day over a period of about 18 months (Jastreboff, 2000). If no clear benefit is felt in the short term, many patients are unable to maintain adherence. Furthermore, there is no universally accepted standard for habituation protocols. For instance, some clinicians require patients to attend closely to both tinnitus and background sound during treatment, whereas others allow patients to work or study while listening. From a theoretical perspective, tinnitus must first be perceived before it can be habituated; if patients simultaneously engage in other activities, their perception of tinnitus may be weakened in ways that do not promote central re-training. These controversies have led some researchers to question the efficacy and practicality of traditional habituation approaches.

Against this background, various forms of personalized music therapy have been developed based on the mechanisms of masking, residual inhibition, lateral inhibition, neural plasticity and limbic–auditory interactions. As reviewed in this article, these include neuromonics tinnitus therapy, tailor-made notched music training, phase-shift treatment, the Heidelberg model of music therapy, and TCM five-tone therapy. Overall, music as a carrier of sound therapy is well received by patients and highly valued by tinnitus researchers.

One current hypothesis proposes that tinnitus perception may be related to a "noise cancellation" mechanism involving limbic–auditory feedback loops (Rauschecker et al., 2010). According to this view, environmental noise is normally suppressed by feedback from paralimbic structures before reaching auditory cortex. However, if the amygdala and/or nucleus accumbens become hyperactive, such as under chronic stress or emotional dysregulation, this noise cancellation system can break down, and internally generated noise is no longer filtered out, resulting in tinnitus perception. Pleasurable music has been shown to reduce amygdala activity (Menon & Levitin, 2005). As a sound therapy carrier, music also offers at least three practical advantages: (1) a broad frequency spectrum that can cover the tinnitus frequency range in most patients; (2) the possibility for patients to choose music they enjoy, which promotes attention engagement, dopamine release and experience-dependent cortical plasticity (Bao et al., 2001); and (3) the ability to modulate frontal alpha activity, which may be relevant because tinnitus intensity has been linked to reduced frontal alpha power (Dohrmann et al., 2007; Schmidt & Trainor, 2001).

It should be emphasized that although sound (music) therapy is an important component of comprehensive tinnitus management and can be used throughout the treatment process,

tinnitus care should not rely solely on sound therapy. Overemphasizing sound therapy may lead to unrealistic expectations, disappointment and increased emotional distress if patients do not achieve rapid improvements. In our department, non-masking sound therapy for idiopathic tinnitus is divided into four stages:

1. **Counseling, communication and clarification.** At the first visit, the clinician carefully listens to and documents the patient's tinnitus history and performs detailed audiological and tinnitus psychoacoustic assessments. The results are explained in understandable language to help patients form a realistic, non-catastrophic understanding of tinnitus. Counseling is typically conducted 2–3 times, 30–60 minutes per session.

2. **Initial stage.** After the first counseling session, and under the guidance of an audiologist, patients select natural sounds they find pleasant from a tinnitus device. They are informed of the importance of maintaining a sound-enriched environment in daily life (at work and at home) to reduce tinnitus perception. The use of natural sounds is explained in detail: (a) *Sound level:* for patients with hyperacusis, the volume is set to the maximum level they can tolerate, 1–2 times per day, 30 minutes each time. After hyperacusis improves, sound therapy is adjusted to target tinnitus, with the natural sound set at or slightly below the tinnitus loudness. For patients whose tinnitus severely affects sleep, masking mode can be used at bedtime (volume above tinnitus loudness) for 40–60 minutes before sleep; (b) *Duration:* patients are advised to listen to sound therapy every morning, afternoon and evening, 30–60 minutes per session; (c) *Listening environment:* sound therapy should not be performed in very noisy environments. It can be combined with work or study, but patients are encouraged to maintain general bodily relaxation. During this stage, short-term pharmacological interventions may be used to relieve negative emotions, such as flupentixol–melitracen for anxiety or clonazepam for sleep.

3. **Adaptation stage.** After 2 weeks to 1 month in the initial stage, once sleep and emotional symptoms have improved, patients are instructed to gradually taper and discontinue medication, increase participation in social and recreational activities, and continue sound therapy.

4. **Full habituation stage.** After 3–6 months, many patients can completely adapt to tinnitus. At this stage, sound therapy can be discontinued, and patients enter a "tinnitus-experienced" group who maintain regular follow-up and periodic audiological review.

In conclusion, personalized music therapy draws on advances in neuroscience, audiology, psychology and, in some cases, TCM theory to offer more refined and individualized options for tinnitus management. Future research should further clarify the neural mechanisms of different music-based interventions, optimize patient selection and treatment parameters, and explore how these approaches can be integrated into multidisciplinary tinnitus clinics to achieve more stable and long-lasting benefits.

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History and Prospects of Music Therapy

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Abstract

Music therapy has rapidly developed within a relatively short period due to its highly practical nature, and it has progressively shifted toward a biopsychosocial model. This review summarizes the historical development of music therapy in China and abroad—particularly in Europe and the United States—describes different schools of music therapy, analyzes existing problems in current practice, and discusses possible approaches to improvement and future directions for the field.

Keywords: Music therapy; History; Current status; Prospects; Review

1. Historical Development and Current Status of Music Therapy

1.1 Music Therapy Abroad

Music has long been regarded as having the power to influence both psychological and physical well-being. In primitive societies, Western tribes used drumming and sacred chants in magical or religious rituals to expel evil spirits and heal illness. Ancient Greek thinkers—Pythagoras, Plato, and Aristotle—are often considered foundational to music therapy. Pythagoras proposed the concept of "musical medicine," arguing that music harmonizes the soul and can either intensify or relieve emotion. Plato believed music influences behavior and consciousness, while Aristotle emphasized its cathartic value.

Following the decline of the Roman Empire, music continued to be used in religious and ritual contexts. During the Renaissance, physicians and scientists began systematically observing music's effects on humans and animals. By the 18th and 19th centuries, music was increasingly recognized as a means of relaxation and emotional regulation.

Modern Western music therapy began in the late 19th century. In 1789, writings appeared discussing the physiological effects of music. In the early 20th century, hospitals in the United States employed musicians to aid patient rehabilitation. During and after World War II, the need to rehabilitate veterans accelerated the institutionalization of music therapy. Academic programs were established, including the first university music therapy course at Michigan in 1944; the National Association for Music Therapy (NAMT) was formed in 1950, later unified into the American Music Therapy Association (AMTA) in 1998.

In the United Kingdom, Nordoff and Robbins played a leading role in advancing creative and improvisational approaches to music therapy. By the late 20th century, music therapy organizations such as the World Federation of Music Therapy were established, and the profession expanded globally. Today, thousands of registered music therapists work across healthcare, psychology, rehabilitation, and education.

1.2 Music Therapy in China

The use of music for healing in China can be traced back several millennia. In classical texts such as the *Yellow Emperor's Inner Canon*, music was associated with the five elements and believed to influence the physiology and emotions of the body. Historical writings describe the therapeutic role of music for regulating mood, cultivating the spirit, and restoring harmony between the body and mind.

Throughout the Tang, Song, Yuan, Ming, and Qing dynasties, music was used for emotional regulation and wellness practices. Daoist traditions emphasized music as a tool for preserving health, calming the mind, and preventing illness.

Modern music therapy in mainland China began relatively late. In the 1980s, Chinese scholars introduced Western music therapy concepts through lectures and collaborative programs. Hospitals in Beijing, Shenyang, and Changsha pioneered clinical applications combining music therapy with traditional Chinese medicine and psychotherapy. The China Music Therapy Association was founded in the 1990s, and professional training programs subsequently expanded.

Currently, hundreds of institutions across China employ music therapy in clinical and educational contexts. However, the overall development remains at an early stage. Challenges include theoretical limitations, uneven professional training, and the need for culturally grounded approaches.

2. Schools of Music Therapy

Music therapy remains a developing discipline, and multiple theoretical schools have emerged internationally. Major approaches include: Nordoff–Robbins Creative Music Therapy, Psychodynamic Music Therapy, Clinical Orff Therapy, the Clinical Applications of Kodály and Dalcroze Methods,

Guided Imagery and Music (GIM), Developmental Music Therapy, Music Therapy with Transactional Analysis, Gestalt Music Therapy, and Behavioral Music Therapy. Among these, Nordoff–Robbins, psychodynamic, Orff-based, and behavioral approaches exert the greatest influence.

In China, theoretical development is still emerging. Three primary viewpoints exist: (a) fully adopting Western music therapy methods; (b) developing indigenous approaches rooted in traditional Chinese culture and medicine; and (c) integrating Chinese and Western perspectives. Currently, an integrated approach is regarded as the most constructive direction for China's music therapy development.

3. Existing Problems and Future Prospects

3.1 Weak Theoretical Foundations

Most Chinese publications focus on clinical techniques, experiments, and case studies, whereas foundational theoretical research remains limited. Music therapy is often interpreted through pre-existing psychological or educational frameworks, resulting in insufficient independent theoretical models.

3.2 Emphasis on Treatment Over Prevention

Music therapy in China is primarily applied to clinical illness, with relatively little focus on preventive health, sub-clinical populations, students, or individuals with mild psychological difficulties.

3.3 Insufficient Attention to Cultural Context

Borrowing from foreign models is necessary during early development, but cultural adaptation is essential. Each country's music therapy system reflects its own cultural and medical heritage; therefore, China must integrate music therapy with traditional cultural resources to form locally appropriate methods.

3.4 Difficulty in Evaluating Therapeutic Outcomes

Music therapy requires long-term treatment and involves complex psychological processes, making quantitative outcome measurement challenging. Developing reliable assessment tools is essential for advancing theoretical and clinical research.

3.5 Lack of Research on Mechanisms of Action

The mechanisms through which music affects physiological and psychological processes remain unclear. Further investigation—at the levels of physical acoustics, organ systems, molecular activity, and mind–body interactions—is needed to support evidence-based practice.

4. Conclusion

In conclusion, music therapy has developed rapidly due to its strong clinical applicability. It is transitioning from a biomedical model to a biopsychosocial framework that integrates music, psychology, culture, and aesthetics. Music therapy is expected to play an increasingly important role in future healthcare and social well-being.

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A Review of Music Therapy Research in China

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Abstract

A review and discussion of research on music therapy in China reveals four primary areas of focus: operational methods, therapeutic effects, mechanisms of action, and cultural–philosophical dimensions. These studies exhibit diversity and localization in terms of research perspectives, methods, theoretical construction, and operational techniques, gradually improving and expanding the disciplinary system of music therapy in China. Although current research has yielded some achievements, many studies still face challenges regarding theoretical foundations, research methods, and research perspectives. Future work should explore more rigorous experimental paradigms and more diverse theoretical frameworks in order to further promote the development of music therapy as a localized discipline in China.

Keywords: music therapy; psychological healing; traditional music

1. Introduction

In 1950, the United States took the lead in establishing the National Association for Music Therapy and in publishing dedicated papers and journals in this field. This marked the formal emergence of music therapy as a new modern discipline. In China, the development of music therapy can be traced back to 1979, when Liu Bangrui—a doctor of music therapy from the United States—was invited to lecture at the Central Conservatory of Music. His lectures introduced music therapy to China for the first time and opened the curtain on the construction of the discipline in China.

Because of different cultural backgrounds, each country defines and delimits the scope of music therapy in its own way. Zheng Yuzhang and colleagues were among the first to systematically articulate the concept of music therapy in China. They argued that music therapy is a discipline that studies, on the basis of the practical functions of music, the systematic use of music to influence

the human body. Any method that applies music in a planned and systematic way to promote human physical and mental health should fall within the scope of music therapy.

With social development and the gradual refinement of disciplinary systems, Chinese scholars have increasingly recognized the substantial impact of culture, society and philosophical thought on the effectiveness of music therapy. They have begun to break through conventional disciplinary boundaries and explore new theoretical frameworks in adjacent disciplines to compensate for current limitations. As a result, new interdisciplinary fields such as medical ethnomusicology, ethnic music therapy and expressive arts therapy have emerged. In this sense, music therapy in China has become an interdisciplinary field that takes musicology, psychology and modern medicine as its core, while also integrating content from anthropology, traditional Chinese medicine (TCM), philosophy and aesthetics. It is a science that uses music as a medium, and through specific musical activities, aims to treat disease and promote physical and mental well-being.

2. Overview of Research on Music Therapy in China

With the introduction of music therapy into China, early efforts focused on disseminating the basic concepts and operational methods of music therapy and carrying out preliminary practical attempts. Subsequently, research hotspots shifted toward questions of therapeutic efficacy and mechanisms of action. In this process, localized treatment concepts and methods have been gradually integrated into music therapy, and scholars have sought therapeutic approaches rooted in Chinese traditional culture that might be particularly effective for Chinese people. The goal has been to construct a music therapy system with distinctively Chinese characteristics.

2.1 Research on Music Therapy Methods

Early research mainly explored commonly used methods and classifications of music therapy. For example, Gao Tian divided music therapy into three levels according to depth of treatment: supportive music therapy, insight-oriented music therapy and reconstructive music therapy, and described the specific therapeutic goals and technical categories of each level. Huang Guozhi classified music therapy methods into active, receptive and combined forms, noting that combined music therapy includes approaches developed in China such as music-guided Qigong and electrical music therapy, as well as methods originating abroad such as music drama therapy and music play therapy. Guo Ziguang and colleagues, drawing entirely on the characteristics of Chinese traditional music and TCM theory, proposed music methods such as “calming the spirit with music,” “relieving depression with music,” “expressing grief with music,” “arousing anger with music” and “evoking joy with music.”

In the last decade, with the development of science and technology and the diversification of

disciplines, the application methods of music therapy in China have become increasingly varied. Composite therapeutic approaches have appeared, such as music exercise therapy, music-and-tea therapy, music aromatherapy and mindfulness-based music therapy. These methods frequently combine music with movement, tea culture, aromatherapy, mindfulness, Qigong and other elements.

Although these methods draw extensively on both Chinese and foreign theories and techniques and are improving, the selection of musical material is still heavily influenced by the therapist's subjectivity and by individual differences among patients. It is therefore difficult to establish standardized musical protocols and to achieve consistent therapeutic effects across different populations. For composite approaches, because there are often no blank control groups or comparisons with single-modality treatments, it is difficult to distinguish clearly between the therapeutic effects of music and those of acupuncture, electrical stimulation, group counseling, meditation, Qigong or exercise. As a result, the unique role and advantages of music therapy are not always evident.

2.2 Meta-Analytic Studies on the Effects of Music Therapy

Music therapy has been developing in China for nearly half a century, and numerous empirical studies have demonstrated its benefits for physical and mental health. To further investigate the effectiveness of music therapy, scholars have increasingly adopted meta-analysis, systematically screening randomized controlled trials (RCTs) in relevant fields and synthesizing data to provide more reliable conclusions from an evidence-based medicine perspective.

For example, Jiang Linhan and colleagues conducted a meta-analysis to re-examine the effects of music therapy on patients with hypertension and found that music interventions significantly improved cardiovascular function, sleep quality and emotional state, thereby promoting the development of non-pharmacological treatments. Shi Zhimin and colleagues synthesized studies on the effects of music therapy on children with autism spectrum disorder and confirmed that music therapy can improve emotion, language, perception and social functioning. You Qian verified the therapeutic effect of five-element music therapy on post-stroke depression and constructed an evidence-based practice protocol for this intervention, laying a foundation for standardized research on five-element music therapy.

Music therapy has also been extended to everyday life domains. Hu Xi and Liu Jian showed through meta-analysis that fast-tempo music can enhance speed, endurance and strength performance during exercise in different populations, thus broadening the application of music to the field of sports. Zhao Yiran and colleagues demonstrated that music training can effectively slow cognitive decline in older adults and improve their quality of daily life. Zhou Wenji found that music therapy has an analgesic effect during labor, can effectively shorten the duration of the first stage of labor and reduce maternal risk, and thus benefits both physical and mental health of pregnant women.

These studies collectively indicate that music exerts significant, clinically verified positive effects on

cognitive function, emotional state, pain, cardiovascular health, sleep quality and exercise performance. However, researchers have also noted that in some domains, the quality of existing studies is relatively low and the number of high-quality RCTs is limited, leading to substantial heterogeneity and less rigorous conclusions in some meta-analyses. In addition, beyond traditional pairwise meta-analyses, there are few network meta-analyses that compare the relative efficacy of different musical interventions, different therapeutic methods and different diagnostic groups. To refine and extend previous findings, meta-analytic research still requires larger sample sizes, more numerous trials and higher-quality RCTs.

For individual clinical trials of music therapy, the ideal approach is to adopt randomized, double-blind controlled designs whenever possible, thereby minimizing placebo effects and observer bias. Only when music therapy reaches the highest levels of evidence-based research can its therapeutic effects be clearly verified, and its uniqueness and advantages be fully demonstrated, paving the way for its wider dissemination in the general population.

2.3 Research on Mechanisms of Music Therapy

Following a large number of reports confirming the effectiveness of music therapy, another major research focus has been the mechanisms by which music produces therapeutic effects. Current work has mainly interpreted the role of music therapy from physiological, physical, psychological and TCM perspectives.

For instance, Wang Yuyong and colleagues summarized the mechanisms of music therapy at both the physiological and psychological levels, arguing that music can influence the central nervous system, autonomic nervous system, endocrine system and immune system of the human body, as well as psychological processes such as perception, motor perception and emotion. Lü Yangting and colleagues explained the health-promoting function of music from the perspective of acoustic resonance and rhythmic entrainment, illustrating how musical sound waves can facilitate a harmonious bodily state; they supported their views with musical examples, TCM theory and modern empirical results. Huang Haitao and colleagues, drawing on brain science, interpreted the impact of music on the brain and related responses using theories of the limbic system and the reticular activating system of the brainstem.

Li Tengzi, beyond physiological mechanisms, emphasized the importance of psychological and social mechanisms. He argued that music can promote emotional expression and relieve psychological stress, while the interpersonal and environmental context of music therapy can improve social functioning and create favorable conditions for individuals to integrate into social networks. Other scholars, such as Li Xiaoling and colleagues, Lin Facai and Meng Xin and Wang Weidong, have explained the mechanisms of music therapy using TCM theories of yin–yang balance, meridians and the five elements, with the aim of elaborating and promoting China's own music therapy theories.

These studies show that scholars have been trying to explore the mechanisms of music therapy from many angles, hoping to reveal the principles by which music produces therapeutic effects and thereby promote the practical development of China's music therapy system. However, current perspectives remain relatively narrow, focusing mainly on medical and physiological aspects such as neural reflexes and biochemical–immune processes. There is still a lack of deep, multi-angle research using animal models, molecular biology, advanced brain-imaging methods, aesthetic preference, cultural cognition, spirituality and personality. Explanations based on TCM theory also remain largely speculative and are difficult to verify using modern scientific methods.

2.4 Cultural and Philosophical Studies of Music Therapy

In the past decade, scholars in China and abroad have increasingly recognized the importance of cultural and social factors for medical practice. They have found that viewing disease solely through the lenses of physiology and anatomy is highly limited. Overemphasis on disease itself can deviate from medicine's fundamental goal of maintaining patients' overall well-being. Re-centering culture and care in medicine can better help people cope with physical and mental distress. This awareness has helped give rise to disciplines such as medical anthropology.

A similar shift has occurred in music therapy. Some researchers have begun to explore the relationships among music, medicine and culture, greatly promoting the development of localized music therapy in China. From a musical-cultural perspective, many studies have been based on Chinese music history, examining relevant classical texts and folk practices. For example, Zhou Yuexia analyzed ideas about the therapeutic role of music in classic works such as the *Huangdi Neijing* and *Record of Music*, laying a theoretical foundation for the formation and development of China's indigenous music therapy system. Zhang Jiacun and colleagues constructed a developmental model of ancient music therapy based on pre-Qin thought, arguing that traditional Chinese music therapy in philosophy, medicine, musicology and health cultivation ultimately converged on the goal of musical healing.

Zhong Wen and colleagues, using guqin music as an example, not only traced health-preservation ideas embedded in ancient qin culture but also integrated the TCM theory of "regulating the spirit in accordance with the four seasons," further refining the theory of guqin-based music health cultivation. Wang Site and colleagues interpreted the cultural connotations of shamanic music healing and emphasized that its ultimate goals—like those of TCM health preservation and modern medicine—are human well-being and social harmony.

In the realm of TCM culture, Zhang Yong divided ancient music therapy thought into three orientations according to different treatment aims: health-preservation oriented, medical-treatment oriented and psychological-treatment oriented music therapy, thus clarifying the content and form of indigenous approaches. Wang Site and Zhang Zongming provided modern interpretations of

historical case records of music-based healing and analyzed the cultural connotations and contemporary medical value of ancient music therapy at micro, meso and macro levels. They also compared Chinese and Western music therapy thought and highlighted several distinctive features of TCM-based music therapy, including its emphasis on prevention, its flexible therapeutic methods and its ecological view of harmony between humans and nature.

Undoubtedly, cultural research on music therapy is of great significance. It breaks through a purely materialist mindset and elevates discussion to the level of humanistic spirit, stressing the influence of regional musical cultures on cognition, personality, mind and values. However, if such work only surveys past ideas without employing modern scientific thinking and methods for verification, it remains difficult to extend these insights to the applied level or to promote their broader use in clinical and community settings.

3. Characteristics of Music Therapy Research in China

3.1 Diversity and Integration

The above review shows that research on music therapy in China is characterized by diversity and integration, specifically in terms of integration across historical periods (ancient and modern), across cultural regions (Chinese and foreign) and across disciplines.

With regard to integration of the ancient and the modern, scholars have sought to refine and enrich the modern music therapy system by excavating traditional Chinese ideas about music-based healing, thereby developing a uniquely Chinese disciplinary framework. Taking guqin music as an example, already in the pre-Qin period, the chapter "On Music" in *Xunzi* stated that qin music can sharpen the senses, harmonize vital energy, cultivate ritual behavior and ultimately promote social stability. In the Wei–Jin period, Ji Kang emphasized that qin playing can guide and nourish the vital spirit, cultivate temperament and prolong life. In the Northern Song dynasty, Ouyang Xiu explicitly wrote that learning the qin cured his depressive illness. Many qin treatises from the Ming and Qing dynasties record the practical functions of qin music in enhancing concentration and intelligence, reducing stress, promoting sleep and alleviating anxiety, mania and depression.

These historical sources demonstrate that guqin music has long been recognized as helpful for health preservation and disease treatment. Ancient thinkers also observed that pieces differing in musical color, stylistic features and modal structure can have different effects on mood and personality, and they consciously used these functions to regulate people's physical and mental states. Contemporary researchers, by applying modern disciplinary methods to verify and reinterpret the historical functions of guqin and other traditional musics, and by systematically summarizing ancient music therapy ideas, have given substance to the integration of ancient and modern perspectives.

Regarding integration of Chinese and foreign elements, a common strategy has been to combine

Western music therapy models with Chinese musical materials in order to increase patients' acceptance and improve treatment effects, or to integrate traditional music therapy theories with modern research methods to create new, distinctively Chinese therapeutic approaches. Examples include electrical music therapy, music-and-light therapy and five-element music therapy, all of which draw on indigenous concepts. Some scholars have also used traditional Chinese ideas to explain the mechanisms of modern music therapy, seeking new ways to address physical and mental distress from Eastern philosophical perspectives, especially through notions such as harmony between humans and nature, dialectical application of musical modes and prevention-oriented treatment.

In addition to temporal and regional integration, the blending of disciplines is also a major trend. Music therapy has always been an interdisciplinary field involving musicology, medicine, psychology and, increasingly, philosophy and anthropology. In the past decade, the emergence of medical anthropology, medical ethnomusicology, ethnic music therapy, expressive arts therapy and related fields has expanded the theoretical frameworks available to music therapists. Although many of these fields originated abroad, they resonate strongly with Chinese cultural traditions in stressing holistic views, balance and harmony, and individualized treatment.

Composite music therapy methods not only reflect the diversification of research perspectives and methods but also deepen the connections between music therapy and other applied fields. This expansion has gradually broadened the research objects of music therapy from the rehabilitation of patients to the health and well-being of the general population. Ultimately, any way in which music affects physical and mental health, along with its relevant operational theories, has become a potential subject of study in the discipline.

3.2 Localization

Since music therapy was introduced into China, research has consistently moved in the direction of localization. As seen above, indigenous cultural theories have been woven throughout the field's development. The disciplinary system of music therapy has gradually improved, and a variety of indigenous methods—such as five-element music therapy, music-guided Qigong, guqin therapy and state-oriented music therapy—have been proposed. Some studies focus on constructing localized theories of music therapy, particularly by drawing on TCM and ancient music culture, in order to move beyond a Western, biomedicine-centered paradigm. These efforts emphasize the interrelationships among music, culture and medicine and seek to promote the practice and development of music therapy grounded in Chinese traditions.

In terms of theoretical foundations, traditional concepts such as harmony between humans and nature, yin–yang balance, dialectical application of musical modes, the five elements, qi dynamics and meridian theory can all be used to interpret the mechanisms of music therapy. They also profoundly influence treatment philosophies such as "treating disease before it arises," prioritizing

psychological regulation and emphasizing health preservation. These ideas can guide music therapy for people in different regions, with different conditions and at different health levels (including subhealthy populations), and help explore more efficient and convenient treatment modalities that improve quality of life and subjective well-being.

In terms of musical materials, to enhance acceptability for Chinese patients and to tap the potential of indigenous music, researchers have paid particular attention to traditional forms such as ritual music and guqin music. Local musical traditions are often expressions of a group's "collective unconscious." People in the same region grow up in similar environments and develop similar value systems, moral views and aesthetic preferences. When they encounter familiar musical styles, they are more likely to resonate with them. The moral and value systems embedded in local musical cultures also align with people's mentalities, thereby facilitating social integration and harmony between self and environment.

Chinese national music, with its distinct aesthetics and cultural connotations, arises from Chinese people's ways of feeling and understanding the world and, in turn, shapes their physical and mental health and inner states. It is therefore irreplaceable by Western music and forms a crucial basis for developing a localized music therapy system. Guqin music, as a quintessential literati music, preserves traditional aesthetic styles, notation and transmission modes, and embodies core Chinese cultural values and philosophical ideas. Its social and medical functions have been documented throughout history and have thus drawn particular attention from researchers.

Recognizing the importance of localization has led to a rapid increase in research on indigenous music therapy. A search of the China National Knowledge Infrastructure (CNKI) database using keywords such as "music therapy," "music treatment," "music healing" and "music intervention" yielded 9,219 relevant publications between April 1, 1980 and October 15, 2024. A secondary search found 1,732 papers containing terms such as "indigenous," "China," "traditional," "ethnic," "TCM," "five elements" and "guqin," accounting for 18.79% of the total. These studies have grown rapidly over the last 15 years and are concentrated mainly in TCM, music and dance studies, and clinical medicine. Although the increasing number of such studies shows that Chinese scholars are paying more attention to localization, the proportion suggests that there is still considerable room for further development.

Interestingly, music therapy was initially rooted in applied psychology in China, yet psychology-related studies now account for less than 2% of all music therapy research in CNKI. By contrast, TCM and musicology have attracted more researchers, even though music therapy still involves many psychological topics. This again reflects the trends of diversity, integration and localization in Chinese music therapy.

3.3 Return of the Humanistic Spirit

Looking back on the development of music therapy in China, we can see that its focal points have shifted over time. Early research emphasized the influence of music on emotion in the context of psychology, then expanded to the treatment of psychological disorders and later to physical and mental rehabilitation in clinical medicine. More recently, attention has returned to the realms of mind and spirit, stressing people-centered treatment concepts and lifestyles that promote harmony and health.

Thus, Chinese music therapy not only values the role of music itself in treating physical and mental disorders but also emphasizes humanistic care during the treatment process and the everyday use of music for well-being. This pattern of "moving beyond disease to return to humanity" is in fact consistent with music's original purposes. Historically, music was used to communicate with the heavens, to pray for good weather, to express feelings and to shape moral character and social order. Its ultimate goal has always been to comfort people's hearts and help them live better lives.

In contemporary society, problems such as population ageing and high stress among young people are increasingly prominent. If people's hearts cannot be soothed at the spiritual level, conflicts may intensify and the effect of purely physiological or physical treatments may be greatly reduced. Under high pressure, individuals often focus attention outward and neglect their inner state, leading to exhaustion of both body and mind. Some people resort to extreme or compensatory behaviors to relieve stress, such as overeating, binge shopping or listening to highly stimulating music. However, fleeting pleasure obtained through these means cannot truly fill inner emptiness or fundamentally solve deeper problems.

By contrast, therapies such as guqin-based interventions can be understood not only as techniques but also as ways of life and as forms of cultural cognition. Beyond simple relaxation, they aim to nurture the soul, foster positive values and a tranquil mindset, and guide people toward more constructive ways of responding to life.

Within this perspective, the return of the humanistic spirit can help patients adopt a more positive attitude toward their illnesses, imbue the treatment process and outcomes with human warmth, and improve quality of life and perceived happiness. It can also promote the health of subhealthy populations and contribute to social harmony. The emphasis on humanistic spirit in Chinese music therapy is influenced by new disciplines such as medical anthropology, medical ethnomusicology and ethnic music therapy, but it is even more deeply rooted in indigenous concepts from TCM and philosophy, such as harmony between humans and nature, yin–yang balance, prevention, health preservation and Confucian ideas about the moral and educational functions of music.

As a result, the scope of music therapy has expanded to encompass all forms of relationships between music and physical or mental health. Although some of these applications may not fit strict definitions of clinical music therapy, their effects are undeniable. Contemporary scholars need

to combine evidence-based medicine with other scientific approaches and use both qualitative and quantitative methods to verify and refine these interventions, thereby promoting the development and application of the field.

4. Limitations and Prospects

Although Chinese music therapy has made significant progress, current research still has some shortcomings in terms of theoretical foundations, research methods and research perspectives.

From a theoretical standpoint, traditional Chinese music therapies have been developing but have made few substantial breakthroughs. Some scholars are especially enthusiastic about five-element music therapy and tend to confine traditional music therapy within the framework of the "five-tone and five-element" theory described in the *Huangdi Neijing*. Yet even the definition of "five tones" remains debated. For the currently most accepted "modal" interpretation, existing empirical studies often lack comparative research among different modes and therefore cannot fully demonstrate the unique effects of five-element music or the relationships among the five types of modes. Logically, the "five-tone and five-element" theory is an application of the five-element schema to music theory; it does not fully conform to the objective relationships among musical pitches, nor does it necessarily imply patterns of mutual inhibition among tones. At present, there is a lack of rigorous evidence linking the five tones with the five zang-organs or the five emotions. The distinctiveness of five-element music therapy thus requires further large-scale, scientifically designed studies.

In terms of research methods, most studies still rely mainly on dialectical (theoretical) analysis or simple experimental designs. There is a shortage of work that synthesizes historical documents, theoretical reasoning and empirical research across multiple fields and perspectives. In clinical studies, high-level evidence-based research is relatively rare even in medicine, let alone in musicology and psychology. Randomized, double-blind controlled trials can effectively avoid placebo effects and observer bias and thus more clearly highlight the unique role and advantages of music therapy. In composite therapies, there is often a lack of blank control groups and of direct comparisons between single-modality and multi-modality treatments, making it difficult to distinguish the effects of music from those of acupuncture, meditation, group psychotherapy, exercise and other interventions.

In studies of traditional music therapy, some experimental designs still lack standardized and rigorous procedures. There can be substantial subjectivity in the choice of musical materials, measurement tools, control of confounding variables and selection of participants. All of these require further refinement. These issues indicate that, as a new interdisciplinary field, music therapy still needs to improve its disciplinary system and methodological toolkit. Related disciplines should learn from one another, integrating strengths to construct more scientific research paradigms.

In terms of research perspectives, current work still focuses primarily on receptive (passive) music therapy, with relatively few studies on active forms of music therapy. The research field is domi-

nated by medical and physiological topics, whereas psychological and musicological perspectives are underrepresented. Beyond studies of therapeutic effectiveness, research on mechanisms of action remains relatively superficial, largely confined to nervous system and biochemical–immune aspects. There is a shortage of deeper investigations into molecular mechanisms, animal models and advanced neuroimaging, as well as comprehensive studies of brain processes, aesthetic preference, cultural cognition, spirituality and personality.

The application of music therapy to non-patient populations also deserves more attention. Scholars should integrate theories from psychology, musicology and TCM, applying concepts such as health preservation, flexible and diverse therapeutic forms and related cultural frameworks to develop music-based interventions for general well-being. This would not only extend the reach of music therapy but also contribute to the localization and international dissemination of China's indigenous approaches.

Furthermore, in musicology, medicine and psychology alike, the distinctiveness of music itself is not always fully recognized in music therapy research. In some psychological studies, music is merely added to existing interventions, without clearly clarifying how music differs from, or improves upon, other techniques such as meditation, group counseling or conventional psychotherapy. In musicology, any use of music is sometimes labeled "music therapy," blurring the boundaries between music therapy, music education, performance and theory, and neglecting to specify the principles, targets and techniques of therapeutic practice. In medicine, music is sometimes treated as a special "drug," with the assumption that once applied, illness will be cured, or "music activities" are directly equated with music therapy, without a deep understanding of the nature of musical processes and interventions.

At the practical level, modern music-based interventions often focus only on the immediate stress-relief effects of acoustic stimulation, while overlooking the ways in which musical cultures shape cognition, spirituality, personality and life meaning. The symbolic, ethical and existential dimensions of music—its ability to provide guidance and encouragement for life—remain underexplored.

In sum, after more than half a century of development in China, research on music therapy exhibits clear trends of diversity, integration and localization in research perspectives, theoretical frameworks and technical approaches. With ongoing advances in science and technology, and with continuous changes in the forms of music, therapy and daily life, the boundaries among natural sciences and humanities are becoming increasingly blurred, and disciplines are progressively interweaving with one another. In an era that emphasizes cultural confidence, people are paying more attention to indigenous cultural traditions. Scholars are actively integrating these traditions with modern disciplinary systems in order to fully tap their contemporary value and promote localized research.

Looking to the future, only by continuously excavating traditional Chinese theories of music therapy, rigorously verifying their effects using scientific methods, and forming feasible intervention schemes that address current shortcomings can China build its own system of music therapy methods and

theories—one that both benefits the health of its people and contributes to global knowledge in this field.

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