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Meditation and Music Therapy in the Era of Digitalization: Challenges and Future Considerations

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Abstract

The integration of therapeutic meditation and music therapy has long been recognized for its profound impact on mental health, emotional well-being, and cognitive functioning. In the era of digitalization, these traditional practices are undergoing a transformative evolution, driven by advancements in artificial intelligence, virtual reality, and mobile health technologies. This perspective explores the intersection of meditation and music therapy with digital tools, highlighting both the opportunities and challenges presented by this technological shift. While digital platforms like meditation apps and VR-based music therapy offer unprecedented accessibility, personalization, and scalability, they also raise critical concerns regarding data privacy, the loss of humanistic care, and the potential commercialization of therapeutic practices. This paper examines the current landscape of digital meditation and music therapy, emphasizing the need for a balanced approach that integrates technological innovation with the core principles of empathy, cultural sensitivity, and scientific rigor. By proposing a comprehensive framework that considers the perspectives of patients, therapists, and technology, this study aims to guide the future development of digital therapeutic interventions, ensuring they remain effective, ethical, and inclusive in promoting mental health and well-being.

Keywords: *Therapeutic Meditation, Music Therapy, Digitalization, Mental Health, Artificial Intelligence, Humanistic Care*.

Introduction

Meditation and music are widely used in health, education, and social community settings to promote overall health, emotional and social well-being (Hwang et al., 2023; Hana, 2016). Studies have found that meditation and music interventions can enhance present-centeredness and emotional well-being (Carmody & Baer, 2008). Research shows that meditation and/or music can cultivate a positive mindset and mindfulness (Bartos et al., 2021; Baird, 2016). Regular meditation practice can cultivate present-moment awareness, which can improve emotional balance and cognitive abilities, such as mental clarity. It allows individuals to find contentment and joy by establishing a stronger connection with the present moment. Meditation can also promote a sense of hope and resilience by encouraging the release of negative thoughts and cultivating a deeper positive and optimistic perspective (Fredrickson et al., 2019; Lama, 2014). A meditation practice called mindfulness has been applied to a variety of clinical problems, and interventions based on mindfulness meditation are now routinely used to treat mental disorders in some countries (Laukkonen & Slagter, 2021).

On the other hand, music has been shown to have a significant impact on happiness and pleasure.

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It can evoke feelings of inspiration and hope, and be a source of comfort and encouragement. By uplifting mood and reducing stress, music can promote an overall sense of well-being. In addition, if listened to attentively, music can promote a connection with the experience of the "here and now" and enhance a sense of mindfulness (Hauck & Hecht, 2023; Reybrouck & Brattico, 2022). Sound and music are used in mindfulness and mindfulness-based meditation, becoming an important part of some practices (Baylan et al., 2018; Bell et al., 2016). Similarly, music therapy programs also use mindfulness as a therapeutic method (Baylan et al., 2018; Bradt et al., 2021). These studies show that music has an impact on a person's emotional and physiological state through specific rhythms, melodies, and tones, while meditation achieves emotional regulation and inner balance by directing attention. The rhythm of music combined with the breathing frequency of meditation can further stimulate the individual's inner energy and achieve the effect of unity of body and mind.

The digital revolution is reshaping the practice and theoretical foundations of meditation and music therapy in unprecedented ways. One study developed a meditation app that combined elements of music therapy and dance/movement therapy, reflecting the growing popularity of digital tools designed to enhance psychological well-being in young populations (Cha & Woo-Kyung, 2021). A recent study explored the feasibility of using a mobile app to manage traumatic stress through neurofeedback-based meditation combined with binaural beats. This intervention represents a promising digital alternative to traditional trauma exposure therapy, leveraging technology to make therapeutic techniques more accessible and more effective (Choi et al., 2024).

In addition, there are models and frameworks that define guidelines for the design of digital mindfulness supports (e.g., Salehzadeh Niksirat et al., 2017; Zhu et al., 2017). Platforms such as Headspace and Calm, by integrating machine learning algorithms and biosensing technologies, are able to analyze users' psychological states (such as stress levels or mood swings) in real time and generate dynamically adjusted meditation audio or visualization relaxation exercises. Furthermore, the introduction of virtual reality (VR) and augmented reality (AR) technologies has created immersive environments for meditation and music therapy. For example, VR headsets have the advantage of blocking out external distractions. In addition, XR also offers the possibility of cultivating physical or mental states (e.g., displaying biofeedback) (Döllinger et al., 2021).

With the intervention of digital technology, the relationship between patients, therapists and technology (non-living things) has become increasingly complex. On the one hand, the rise of artificial intelligence-assisted diagnosis and treatment provides patients with more efficient and personalized services, but it also brings huge challenges to privacy protection and data security. When patients receive these technical supports, they often need to provide highly sensitive psychological data, and whether the collection, storage and use of these data are compliant and transparent has become a key factor in patients' trust in digital tools. In the macro context of the digital age, this article will explore how mindfulness and music therapy can balance the tension between efficiency and emotional depth, personalization and cultural diversity in technological innovation and practical implementation. And put forward path suggestions to promote the standardization and sustainable development of these technologies in therapy.

Updates

Meditation and music therapy are effective means of improving mental health, and have a long history and rich theoretical support. Traditional meditation relies on concentration training,

while music therapy uses sound and rhythm to regulate emotions and relieve stress. Recent advancements in the field of therapeutic meditation and music therapy have been profoundly influenced by technological innovations and the ongoing global challenges posed by the COVID-19 pandemic (Giordano et al., 2020; Talmage et al., 2020).

In the field of meditation, the combination of meditation and technology is showing a rapid development trend. Meditation apps such as Headspace and Calm provide personalized voice guidance and emotion recognition functions through AI algorithms to help users achieve a more efficient meditation experience; at the same time, VR technology allows users to achieve deep relaxation and concentration effects in virtual space by building immersive natural environments such as forests and beaches. In addition, the rise of wearable devices also makes it possible to monitor the effects of meditation in real time. Studies have found a link between meditation practice and changes in brain areas and networks related to impulsive problems (Hölzel et al., 2011; Dambacher et al., 2015; Chaibi et al., 202). An example of a neuromediation appliance is the Muse™ brain sensing wearable device. Via Bluetooth, the Muse EEG headband is connected to the Muse meditation app. It registers and recognizes Beta Waves (active, alert, and focused mental states) and Alpha Waves (relaxed and calm mental states) of the wearer and promotes Alpha states by providing auditory feedback (Muse, 2023). The presence of high Beta wave brain frequencies could hinder the ability to self-regulate emotions, as asynchronicity in frontal frequencies is related to aggression in offenders (Sergious et al., 2022). Besides, BCMI systems have also been developed to aid emotion self-regulation in listeners, by providing music and neurofeedback to help listeners identify and train their emotion states, as measured through EEG (Ehrlich et al., 2019). A study explored the integration of neurofeedback-aided meditation with positive psychology interventions (PPI). This innovative approach combines traditional meditation practices with cutting-edge neuroscience to enhance the stability and efficacy of interventions (Hwang et al., 2017).

Music therapy has also made breakthroughs with the help of technology. Virtual music therapy is being explored as an effective model for delivering personalized care, demonstrating flexibility in treating various health conditions (Estrella-Juarez et al., 2023). This technology-driven model is likely to persist and evolve, shaping the future of music therapy service delivery (Knott & Block, 2020). A team has developed a remote music therapy system (called "Music-Telepy") that uses the Internet to provide and receive music therapy (Kosugi et al., 2013; Kosugi et al., 2025). Music-Telepy connects music therapists to facilities for patients with dementia via optical fiber and uses computers, webcast mixers, microphones, speakers, and monitors to provide music therapy (Kosugi et al., 2025). In addition, using technology that incorporates resonance frequency breathing during therapy sessions has been shown to deepen and support interpersonal and emotional processes naturally occurring during therapy, e.g., helping with the regulation of excessive arousal (Brabant et al., 2017). Besides, remote and virtual music-based interventions (MBIs) were adapted to maintain continuity of care. These MBIs included activities like virtual jam sessions, musical dialogues, and song composition. Platforms like Zoom, Skype, and FaceTime facilitated these interventions. Further, the shift to tele-neurological music therapy (tele-NMT) has proven to be a promising alternative for delivering neurological music therapy (Vinciguerra & Federico, 2022).

In summary, the technological transformation of meditation and music therapy is not only a modernization of traditional therapies, but also a new exploration towards future psychological well-being.

Opportunities

The growing recognition of meditation and music therapy as effective tools for mental health improvement presents unprecedented opportunities in the digital age. Advances in immersive technologies, and mobile health platforms are revolutionizing these traditional practices, unlocking new avenues for accessibility, personalization, and innovation. AI-powered tools excel at processing complex health data, providing valuable insights into individual needs. For instance, AI models can analyze emotional states, stress levels, and behavioral patterns, enabling the creation of highly personalized meditation and music therapy regimens. Tailored soundscapes and guided meditation sessions can be dynamically adjusted to suit the user's mood and physiological metrics, enhancing the therapeutic experience. Platforms like Headspace and Calm have already demonstrated the potential for AI-driven personalization, setting the stage for broader adoption.

Additionally, the integration of VR and augmented reality (AR) offers immersive environments that can deepen user engagement. Simulated natural settings such as forests or oceans provide a calming backdrop for mindfulness practices, reducing external distractions and amplifying relaxation. Similarly, VR-enabled music therapy can foster emotional connection and enhance focus, making it a valuable tool for treating anxiety, depression, and trauma. The workplace represents another promising domain. Companies increasingly include digital mindfulness and music therapy programs in employee wellness initiatives. These interventions boost resilience, reduce stress, and improve productivity, creating a win-win scenario for employers and employees. This trend underscores the potential for broad-based adoption across diverse professional environments. Digital health platforms and wearable devices also hold promise for expanding access to therapeutic services. Remote monitoring and virtual consultations make therapy available to underserved populations, including those in remote or rural areas. The ability to track progress and adapt interventions in real time ensures consistent and effective outcomes, democratizing access to mental health resources. Despite these opportunities, it is essential to uphold ethical standards and prioritize user diversity in digital applications. Future development must consider inclusivity, ensuring that cultural, gender, and age-specific nuances are respected. With judicious integration of technology, meditation and music therapy can transition from niche practices to mainstream health solutions, while preserving their core holistic values.

Challenges

Blur of Individual Features

Achieving personalized treatment on a digital platform while maintaining the scientificity and standardization of treatment is a goal that is both promising and challenging. The core of personalized treatment is to provide customized solutions based on individual differences of users (such as age, physiological condition, and cultural background) (Searchfield et al., 2017), while scientificity and standardization are the basis for ensuring the effectiveness of treatment. How to find a balance between the two has become a key issue that needs to be urgently addressed in the current field of digital treatment.

Personalized treatment requires multi-dimensional data (Agres et al., 2021). Digital platforms can fully understand the status and needs of users through multiple channels such as wearable devices, user behavior data, and psychological assessment questionnaires. For example, by monitoring the user's heart rate, sleep quality, and mood changes, the platform can dynamically

adjust the recommended meditation courses or music types (Kirk & Axelsen, 2020; Innes et al., 2016). The application of artificial intelligence and machine learning technologies has further enhanced the platform's personalization capabilities, enabling the algorithm to continuously optimize the recommended content based on the user's real-time feedback and treatment progress. However, data-driven personalization also faces many challenges. The accuracy and comprehensiveness of user data may be limited, especially in the absence of professional equipment or inaccurate self-reporting by users (Rio & Tenney, 2002).

Moreover, the user's mental state is affected by multiple factors, including family environment, social and cultural background, etc. The mental health concepts, stress sources, and emotional expressions in different cultures can significantly affect the individual's mental state (Kirmayer, 2001). Studies have shown that family dynamics have a profound impact on mental health, for example, there is a significant association between adverse family environments in childhood and adult depressive symptoms (Felitti et al., 1998). This shows that the assessment of mental state cannot rely solely on physiological data or immediate emotions, but also needs to take into account long-term social and family factors. However, these complex cultural differences and social backgrounds are often difficult to capture through standardized algorithms. At the same time, maintaining the scientific nature and standardization of treatment is the key to ensuring the credibility and effectiveness of digital platforms. The core of scientificity lies in the theoretical basis and empirical support of the treatment method. The design of the digital platform should be based on the research results in the fields of psychology, neuroscience, and music therapy to ensure that the meditation and music content provided has clear treatment goals and scientific basis. For example, meditation courses for anxiety should be based on the principles of cognitive behavioral therapy (CBT) (Cayoun, 2011), while music used to improve sleep should combine acoustics and neuroscience research (Croom, 2012). In addition, digital platforms need to verify their effectiveness through clinical trials and long-term effect evaluation. Only scientifically validated tools can truly bring substantial help to users.

Lack of Humanistic Care

Humanistic care emphasizes respecting the dignity and emotional needs of individuals during treatment, and its core lies in building trust and emotional connection (Frank, 2013). In mental health treatment, humanistic care can not only provide a supportive environment, but also promote the psychological recovery of patients through understanding and acceptance. However, on digital platforms, although technology has greatly facilitated the access to mental health services, it has also led to a lack of humanistic care, which is worth further exploration.

Technology-driven treatment tools (such as meditation applications or online music therapy platforms) can provide convenient services, but their essence is the interaction between people and machines, not between people. This interaction mode may cause users to feel isolated and alienated during treatment. For example, excessive use of electronic devices has been shown to be associated with increased social isolation (Primack et al., 2017), which is itself one of the important causes of mental health problems. When users meditate or perform music therapy through digital platforms, they may feel lonely due to the lack of real interpersonal interaction, especially when they are already in a state of psychological vulnerability. This loneliness may further aggravate their psychological distress rather than alleviate it.

In face-to-face psychotherapy, therapists convey care and empathy to patients through eye contact, body language, and changes in voice tone. This non-verbal communication is crucial to patients' emotional experience (Richards & Viganò, 2013). These non-verbal cues can not only

convey emotional support, but also help therapists better understand patients' emotional states. In contrast, virtual therapy and self-help applications are difficult to reproduce this important link, resulting in patients feeling a lack of emotional connection during treatment. For example, a meditation application may recommend music or meditation courses suitable for users through algorithms, but it cannot perceive the user's emotional fluctuations during use, nor can it convey comfort through eye contact or tone of voice. This lack of emotional support may make users feel neglected, thereby affecting the effectiveness of treatment. Therefore, this study focuses on a framework that integrete the presence of therapist in the mediation/music therapy. To enhance users' emotional experience. Platforms can establish community functions that allow users to interact with other users or professional therapists, thereby reducing social isolation. For example, users can share their own treatment experiences on the platform or participate in group meditation activities to feel a sense of belonging and support.

Challenge to Therapists

The popularity of digital tools is reshaping the role of therapists in the treatment process. Taking AI-driven meditation applications and remote music therapy as examples, these technologies have greatly enhanced the popularity of therapies, but at the same time weakened the core role of therapists. Digital tools have attracted a large number of patients with their low cost and high convenience (Torous et al., 2021), which has led more and more people to choose technological treatments with lower prices and more flexible time. In the traditional treatment model, therapists are at the core of the treatment process, but now many patients have begun to rely on self-service applications (Haleem et al., 2022) instead of face-to-face interactions with therapists for guidance and support. This trend has blurred the identity of therapists as professionals to a certain extent. This trend may cause the occupational market of therapists to be hit, especially under the dual pressure of declining income and patient loss. In addition, patients' dependence on technology may also change their expectations of the treatment process, making it difficult for therapists to meet the needs of highly technological patients.

To complicate matters, the rapid development of technology has placed higher demands on the skills of therapists. Many therapists may be accustomed to the traditional face-to-face treatment model (Wentzel et al., 2016), and may feel unfamiliar or uncomfortable with new technologies (such as artificial intelligence, virtual reality, data analysis tools, etc.). For example, when using digital platforms for treatment, therapists need to master how to interact with users through video conferencing tools, how to interpret the data analysis reports provided by the platform, and how to use artificial intelligence tools to optimize treatment plans. This kind of technological adaptation not only requires investment of time and energy, but may also cause therapists to be anxious about their own professional abilities.

Conflict Between Commercialization and Medical Attributes

With the increasing degree of marketization, many meditation and music therapy products may pay more attention to commercial value when they are promoted quickly. In pursuit of broad market appeal, commercial products often simplify the core methods of therapy (Grocke & Wigram, 2006). The effects of meditation and music therapy are usually based on complex psychological and neuroscience theories. For example, mindfulness meditation requires systematic training and step-by-step guidance (Yates et al., 2017), while music therapy requires a personalized program designed in combination with the patient's psychological state and treatment goals (Nunes et al., 2024). However, in order to attract more users, many commercial applications simplify the therapy into fragmented and modular content. For example, some

meditation applications provide audio guidance of varying lengths, and users can choose options such as "3 minutes of relaxation" or "5 minutes of decompression" at will. This fragmented experience makes it difficult to achieve the effect of systematic therapy, and may even mislead users into that meditation and music therapy are tools for quick decompression, while ignoring their deeper healing potential.

The rapid promotion of commercialization has also led to the lack of scientific verification of some therapies (Wang et al., 2023). New methods in the medical field usually require long-term clinical trials and scientific research to verify their effectiveness and safety. However, commercial products often prioritize the speed of product launch in order to occupy the market before competitors. This has led to many therapies being launched on the market without rigorous scientific verification, increasing potential risks for users. Some AI-based meditation applications claim to provide personalized treatment recommendations through data analysis, but the effectiveness and reliability of their algorithms may lack public scientific support (Pavlopoulos et al., 2024). This may not only reduce the effectiveness of the therapy, but also have a negative impact on the patient's mental health. With the increasing degree of marketization, meditation and music therapy products do tend to ignore medical attributes and scientific basis in their rapid promotion. This trend requires vigilance and reflection. In order to balance commercial value with medical value, product developers and relevant regulatory agencies should strengthen cooperation to promote the scientific verification and standardized development of therapies. Only by finding a balance between scientificity and commercialization can we ensure that meditation and music therapy will not lose their core therapeutic functions and medical value while increasing market penetration.

Future Directions

This study constructs a framework that integrates the perspectives of patients, therapists, and technology to optimize the delivery of digital meditation and music therapy (Figure 1).

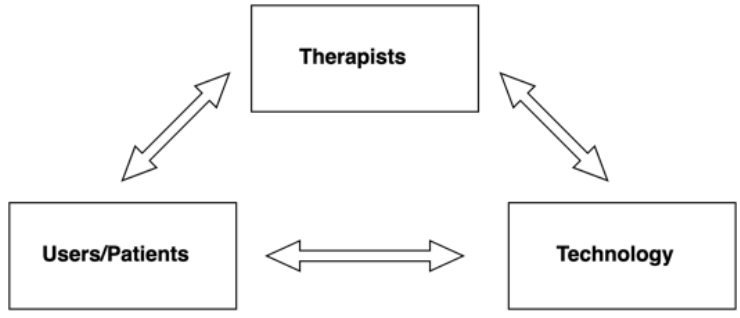

Figure 1. Proposed Framework.

At the core of this framework is the recognition that patients are the primary beneficiaries of digital meditation and music therapy. Their needs and experiences are central to the design and implementation of digital therapeutic interventions. Patients seek personalized, accessible, and effective therapeutic solutions that cater to their unique psychological and emotional states. However, the digital medium, while offering convenience and scalability, may inadvertently exacerbate feelings of social isolation, reduce opportunities for non-verbal communication, and foster an over-reliance on technology. These challenges highlight the importance of embedding emotional support and human connection into digital platforms (Palmer et al., 2024; Balcombe

& De, 2022, February). Patients interact with these platforms to access therapy, provide feedback on their experiences, and seek supplementary support from therapists when needed. Their active participation is critical for refining therapeutic algorithms and improving outcomes, ensuring that digital tools remain responsive to their evolving needs.

Therapists, as the custodians of therapeutic expertise and humanistic care, play a pivotal role in bridging the gap between technology and patient well-being. Therapists must adapt to new tools while maintaining the core principles of empathy, trust, and professional integrity (Kottler, 2022). To address these challenges, the framework emphasizes the importance of providing therapists with training programs to enhance their digital literacy and integrate technology into their practice. Additionally, therapists serve as critical evaluators of the effectiveness and ethical implications of digital tools, ensuring that these tools align with therapeutic principles and do not compromise the quality of care.

Digital platforms leverage data analytics, AI, and machine learning to generate personalized treatment plans, optimize therapeutic processes, and enhance user engagement (Batra & Dave, 2024). However, the integration of technology into therapeutic practice is accompanied by significant challenges, including data privacy risks, algorithmic bias, and a lack of robust scientific validation for many digital interventions (Mennella et al., 2024). To mitigate these risks, the framework advocates for the development of transparent and accountable algorithms, as well as the establishment of regulatory oversight to ensure that digital tools prioritize user well-being over commercial interests. Technology mediates the relationship between patients and therapists, providing real-time data, facilitating communication, and enabling the scaling of therapeutic interventions. Its design and implementation must prioritize ethical considerations and user well-being, ensuring that technological advancements complement rather than replace the human elements of therapy.

In summary, this framework offers a comprehensive approach to addressing the challenges and opportunities presented by the digitalization of meditation and music therapy.

Conclusion

The integration of meditation and music therapy into the digital age presents both transformative opportunities and significant challenges. As digital technologies such as AI, VR, and wearable devices continue to evolve, they offer unprecedented accessibility, personalization, and innovation in therapeutic practices. These advancements have the potential to democratize mental health care, making it more accessible to underserved populations and providing real-time, data-driven interventions tailored to individual needs. However, the rapid digitalization of these therapies also raises critical concerns, including the potential loss of humanistic care, ethical dilemmas surrounding data privacy, and the risk of over-commercialization.

One of the key challenges lies in balancing the efficiency and scalability of digital tools with the emotional depth and cultural sensitivity that are essential for effective therapy. While technology can enhance the delivery of meditation and music therapy, it must not overshadow the human connection and empathy that are central to therapeutic success. Therapists play a crucial role in bridging this gap, ensuring that digital tools complement rather than replace the human elements of care. Additionally, the need for rigorous scientific validation of digital interventions cannot be overstated, as the commercialization of therapy apps often prioritizes market appeal over clinical efficacy.

Looking ahead, the future of digital meditation and music therapy will depend on a collaborative

approach that involves patients, therapists, and technologists. By prioritizing ethical considerations, cultural inclusivity, and scientific rigor, the field can harness the full potential of digital innovations while preserving the core values of mindfulness and music therapy. Ultimately, the goal is to create a harmonious integration of technology and human care, ensuring that these therapies remain effective, accessible, and deeply meaningful in the digital era.

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