# The Effect of Music Therapy on Pediatric Cancer Patients Physical and Psychological Health

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## Abstract

In this literature review, we summarize the effect of music therapy on cancer patients' physical and psychological well-being. We review the current literature, including randomized controlled trials, meta-analyses, and review papers. First, we describe the two types of music therapy and their distinctive qualities and benefits. Next, we focus on music therapy's individual effects on psychological health, concentrating on patients' stress levels, anxiety and depression symptoms, and emotional expression. We also examine music therapy's effect on physical symptoms linked to cancer treatments. Finally, we summarize the limitations of extant research on music therapy, as well as future directions. Understanding the benefits of music therapy as a nonpharmacologic treatment provides a foundation for improving pediatric patients' quality of life during the course of their treatment and cancer journey.

## Introduction

In this literature review, we summarize the effect of music therapy on cancer patients' physical and psychological wellbeing. We review the current literature, including randomized controlled trials (RCT), meta-analyses, and review papers. First, we summarize the two types of music therapy and their distinctive qualities and benefits. Next, we focus on music therapy's individual effects on psychological health, concentrating on patients' stress levels, anxiety and depression symptoms, and emotional expression. We also examine music therapy's effect on physical symptoms linked to cancer treatments. Finally, we summarize the limitations of extant research on music therapy, as well as future directions. Understanding the benefits of music therapy as a nonpharmacologic treatment on the different aspects of pediatric patients' lives serves as a foundation to improve pediatric patients' quality of life during the course of their treatment and cancer journey.

A study found that, during the course of cancer treatment, pain was the most common symptom of treatment in pediatric cancer patients, with 84.4% of the inpatient group and 35.1% of the outpatient group experiencing moderate to severe pain (Collins et al., 2000). At the same time, another study found fatigue (62%) as the most prevalent side effect both during and after treatment (Cole et al., 2024). Music therapy can improve both the physiological (Fedhila et al., 2023) and psychiatric (Eseadi & Ngwu, 2023) symptoms, especially in pediatric patients, with the therapeutic nature of music and the role of the music therapist (Rodríguez-Rodríguez et al., 2023).

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## Types of Music Therapy

Music has been formally and informally used as a therapeutic tool for improving psychological and physical health (Huang & Li, 2022), especially for individuals who suffer from debilitating physical illnesses, including cancer (Rennie et al., 2022). Across the United States, many pediatric hospitals have been adopting Music therapy as a standard part of psychosocial care services for cancer patients (Knott et al., 2022).

Specifically, music has been used as a therapeutic intervention to help treat individuals who suffer from cancer to cope with their mood symptoms (Huang & Li, 2022). Music therapy is formally defined as the use of particular qualities of music in a therapeutic relationship with a music therapist (De Witte et al., 2022; Wheeler, 2015). There are two distinctive types of music therapy, which include active and receptive music therapy. Active music therapy includes improvisational, compositional, and re-creative methods. Improvisational music therapy, the most common type of active music therapy, is when the patient and music therapist spontaneously play instruments or sing, sometimes along with a given track (De Witte et al., 2022; Wheeler, 2015). Compositional music therapy involves the patient creating or writing a musical or lyrical piece (Wheeler, 2015). Re-creative music therapy is when patients play a piece of composed music. Patients can perform in choirs or musical productions, which can also provide a sense of community (Wheeler, 2015). Receptive music therapy is when the patient and music therapist listen to live or recorded music. After listening to music together, the music therapist and patient then discuss the patient's emotions, experiences, and the connection of the music to their life (Wheeler, 2015).

In all types of music therapy, music therapists may take advantage of musical components such as rhythm, pitch, tempo, dynamics, melody, and harmony to encourage better emotional expression, social interactions, communication of thoughts, and other relevant goals (De Witte et al., 2022). The tempo of the music directly correlates with the body's heart rate (HR), respiratory rate (RR) and blood pressure (BP). Slower tempos may induce further relaxation due to slower HR, RR, and BP. Changes in tempo can be used to synchronize irregular HR and RR (De Witte et al., 2022; Warth et al., 2015). Mindfulness music and biographically meaningful songs, can be used during music therapy sessions to evoke further communication and relaxation (Knoerl et al., 2022; Warth et al., 2021). Music therapy sessions typically last from 15 to 90 minutes. The frequency of sessions varies depending on the study, typically weekly or biweekly meetings over one or three months (Xie et al., 2022). After looking at the various approaches of music therapy and some of the therapeutic mechanisms, we now turn to its effect on both psychological and physical symptoms.

**Effects of Music Therapy on Stress**

Music therapy has been shown to reduce stress in children and adults with cancer in various studies (Knoerl et al., 2022; M. Cole et al., 2024b). For example, a RCT observed a significant decrease in salivary cortisol levels in adolescent and adult cancer patients who received a live music intervention compared to the control group after a single session (Xie et al., 2022). Cortisol is used as an objective biomarker to assess stress reactivity (Hasanah & Haikal, 2022). Another study found that pediatric cancer patients who listened to unfamiliar music for twenty minutes following receiving treatment reported lower stress levels and greater relaxation (M. Cole et al., 2024). Additionally, adult patients who listened to their preferred music for twenty minutes for eight weeks experienced a significant reduction in cortisol levels as well as perceived stress (Tollabzadeh et al., 2023). In a study with adolescent and young adult patients, four 45-minute sessions of mindfulness music therapy for twelve weeks led to a significant reduction in perceived stress (Knoerl et al., 2022). Collectively, these findings indicate that music therapy can reduce stress in children and adult cancer patients, despite various formats and durations.

**Effects of Music Therapy on Anxiety and Depression Symptoms**

Between 15% and 54% of cancer patients experience psychiatric symptoms, including anxiety and depression (Eseadi & Ngwu, 2023). Music therapy is a nonpharmaceutical method that can be used to help manage anxiety and depressive symptoms (Eseadi & Ngwu, 2023). For example, adolescent cancer patients who received 5-minute biweekly sessions over twelve weeks exhibited increases in serotonin levels and reductions in anxiety symptoms (Zhao, 2025). Various studies have also shown that music therapy is particularly influential for reducing anxiety symptoms before and during medical procedures and treatments (e.g., chemotherapy) (Eseadi & Ngwu, 2023; Fedhila et al., 2023; Rodríguez-Rodríguez et al., 2022). Additionally, a meta-analysis summarizing 15 RCTs observed that music therapy had a moderate effect on reducing anxiety symptoms in adult cancer patients (Zang et al., 2023).

While the majority of studies found that music therapy reduced anxiety symptoms, a RCT found that there were no improvements in anxiety following four sessions of mindfulness music therapy in adolescent and young adult cancer patients. However, these null findings may be due to the small sample size and other challenges the patients are facing as adolescents and young adults (Knoerl et al., 2022). Although the majority of reviews and studies found an improvement in anxiety following music therapy intervention, more research is needed to understand the impact of music therapy on anxiety comprehensively.

While there have been numerous studies examining anxiety symptoms, fewer studies have examined how music therapy affects depression symptoms in cancer patients. One study found an immediate improvement in depression symptoms in pediatric cancer patients after a single session of live music. However, there was no difference in depression symptoms between the intervention and control groups after the third (final) session (Xie et al., 2022). A retrospective study examining the therapeutic effects of music therapy on patients with end-stage cancer used a self-rating depression scale. While there was no significant difference in observed depression scores, there was significant improvement in depression management scores in the group receiving music therapy (Dong & Qu, 2024). This finding indicates that music therapy may improve depression symptoms in patients; however, more research needs to be done to elucidate the long-term effects of music therapy on depression symptoms.

**Effects of Music Therapy on Emotional Expression**

Music therapy has been shown to improve pediatric cancer patients' expression of emotions (Rodríguez-Rodríguez et al., 2023). For example, pediatric cancer patients demonstrated more positive facial expressions (e.g., joy) during and following music therapy sessions (Rodríguez-Rodríguez et al., 2023). In another study, children made drawings before and after music therapy. Drawings made by the children before the music intervention primarily expressed emotional distress, anxiety, and fear (Franco et al., 2021). However, after music therapy, the children's drawings depicted positive emotions and motifs of happiness (Franco et al., 2021). Furthermore, a study examining pediatric cancer patients found that active music therapy (involving songwriting and music making) led to better self-expression in patients, particularly during treatments and at the end of life (Knott et al., 2022). Thus, music therapy can not only improve patients' emotions, but also improve the expression and communication of their emotions.

The involvement of the music therapist's active listening, attunement, and verbal acknowledgement of emotional expressions may help validate the patient's emotional states and provide further support in the therapeutic effects of music therapy. This environment creates a safe space for patients to share and express their inner thoughts, experiences, and

imagine/confront their fears (Giordano et al., 2024). Music therapists play an important role in the emotional and psychological benefits of music therapy for pediatric cancer patients.

**Effects of Music Therapy on Physical Symptoms**

Cancer treatments (e.g., surgical, radiotherapy, chemotherapy) can be very physically demanding. Music therapy can be used to decrease painful symptoms associated with these treatments, allowing for a better quality of life for pediatric and adult patients (M. Cole et al., 2024). Researchers have found that 8 sessions of receptive music therapy before and after chemotherapy significantly reduced patients' pain and fatigue as well as anticipated nausea and vomiting (Giordano et al., 2024). Another RCT examined the effect of live receptive music therapy in adolescent and young adult patients who had a hematologic tumor and were undergoing hematopoietic stem cell transplantation (HSCT). However, researchers found no significant decrease in fatigue after live receptive music therapy over the course of three sessions, which may be due to the observation that fatigue levels were low initially (Xie et al., 2022). A meta-analysis corroborates this trial, showing that there is insufficient evidence that music therapy alleviates fatigue in patients with HSCT (Baydoun & Barton, 2018). While another RCTI found that there was no decrease in pain levels in patients following interactive music therapy, the intervention group received significantly less equivalent doses of morphine, indicating lower reported levels of pain (Bates et al., 2017). Conversely, several studies show significant improvements in physical pain after various types of music therapy (Cole et al., 2024; Rennie et al., 2022; Rodríguez-Rodríguez et al., 2022). While it might depend on the type of cancer treatment each patient is receiving, both receptive and active music therapy can improve physical symptoms of pain, fatigue, nausea, or vomiting caused by cancer treatments. However, given that the evidence is mixed, more research is needed to elucidate the effects of music therapy on physical symptoms in cancer patients.

**Therapeutic Elements of Music Therapy**

The therapeutic nature of music therapy relies on both the individualized sessions and the relationship with the music therapist (Giordano et al., 2024). Music therapists incorporate different elements of listening, playing, or writing music designed to meet the needs of each patient during their sessions. Music therapy can act as a distraction for patients, allowing them to focus on the music rather than on the painful treatment or their situation. Utilizing different rhythmic and melodic elements of music, patients can feel greater relaxation, more positive emotions, and reduced stress. Additionally, improved mood and self-image as a result of music therapy can facilitate more social interaction and better interpersonal communication (Fedhila et al., 2023). Particularly for adolescent patients who are undergoing changes through puberty as well as from cancer, music therapy can provide them an outlet to express and process their emotions and situations nonverbally (Cole et al., 2024). Furthermore, these interactions with music therapists and sometimes parents, when they join in during sessions, can reduce patients' feelings of isolation (Rodríguez-Rodríguez et al., 2022). Listening to music in general may help patients understand and process their emotions, but the presence of the music therapist can additionally provide patients with a confidential person to communicate with. Particularly, by playing music together in active music therapy and discussing the music during receptive music therapy, patients and music therapists create a special connection. Music therapists' interactions with patients, in addition to music therapy, promote better social interaction, broader family cohesion, and communication with medical personnel (Fedhila et al.,

2023; Rodríguez-Rodríguez et al., 2022). Additionally, music therapy sessions held in groups can strengthen patients' social connections (Rennie et al., 2022). Music therapy's therapeutic nature comes from qualities of receptive and active music therapies, calling to use particular elements of music to improve patients' quality of life as well as the relationship built between patients and music therapists.

**Limitations and Future Directions**

This review synthesises evidences from both empirical and secondary analyses; yet many limitations should be acknowledged. First, the studies included were heterogeneous in terms of cancer type and participant age. Many studies did not specify the exact cancer diagnosis or patient age, and some included young adults alongside pediatric patients. Second, methodological differences were evident across the literature: sample sizes varied considerably, and while some studies employed control groups receiving standard care, others did not. Third, the research was conducted in diverse geographic regions, including China, Brazil, and North Africa, raising the possibility of cultural and contextual influences that may affect the findings. Together, these factors reduce the generalizability of the data, as the included studies reflect a wide range of designs, populations, and quantitative and qualitative approaches.

Despite these limitations, this review underscores the significant benefits of music therapy for adult and pediatric cancer patients. Future research should build on these findings by conducting larger-scale RCT, which would help minimize heterogeneity and reduce bias, thereby strengthening the evidence base. In clinical practice, integrating music therapy alongside conventional medical care offers a supportive pathway for addressing not only the physical but also the emotional challenges faced by pediatric cancer patients. With further study, music therapy has the potential to become a recognized component of holistic pediatric oncology care.

**Conclusions**

Music therapy is a nonpharmacologic modality that improves patients' psychological and emotional well-being. Current research demonstrates music therapy’s effectiveness in reducing stress and anxiety both prior to treatment and in daily life, regardless of the duration or specific type of intervention. Evidence proves that music therapy provides children with a valuable means of emotional expression, supported through both the therapeutic process and the guidance of trained music therapists. Evidence also suggests that music therapy can alleviate treatment-related physical symptoms, including anticipatory nausea and vomiting, pain, and fatigue. Despite the significant beneficial findings of music therapy, several limitations must be addressed. Future studies should include larger sample sizes and randomized controlled trials in order to reduce heterogeneity and bias. In addition further research is also needed to clarify music therapy's direct impact on physical symptoms and depression. While much of the current evidence base still draws from adult populations, the available pediatric studies highlight its value for enhancing quality of life during treatment. Understanding the place of music therapy in pediatric oncology is consequential to improving quality of life for children with cancer through an effective, nonpharmacologic approach.

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