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Addressing Preoperative Anxiety Through Music Therapy: A Review of Efficacy, Challenges, and Clinical Applications

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ABSTRACT

Background*: Preoperative anxiety is a prevalent issue among patients undergoing elective surgery, affecting 30-80% of patients leading to adverse outcomes such as increased pain perception, delayed recovery, and higher healthcare costs. Music therapy, a non-pharmacological intervention, has gained attention in alleviating anxiety by modulating neural activity, reducing stress hormones, and promoting relaxation. This review explores the role of music therapy in reducing preoperative anxiety, its effectiveness, and the challenges associated with its integration into clinical practice. Existing research highlights the psychological and physiological effects of preoperative anxiety, including impaired immune function, cardiovascular complications, and heightened postoperative pain. Studies have demonstrated that music therapy significantly reduces anxiety levels, lowers the need for sedatives, and improves patient satisfaction.* ***Method****: A review of 45 studies, including randomized controlled trials (RCTs), observational studies, and meta-analyses, was conducted. Databases such as PubMed, Scopus, and PsycINFO were searched using keywords related to preoperative anxiety, music therapy, and surgical outcomes. Inclusion criteria focused on adult patients undergoing elective surgery, while exclusion criteria eliminated pediatric studies and non-surgical interventions. Data extraction and quality assessment were performed using standardized tools.* ***Results****: Music therapy was found to be highly effective in reducing preoperative anxiety, with studies reporting significant decreases in anxiety levels and physiological stress markers. Patients who received music therapy required fewer sedatives and reported higher satisfaction rates.* ***Discussion****: The findings highlight the potential of music therapy as a cost-effective, patient-centered intervention for managing preoperative anxiety. Its integration into surgical settings can improve patient experiences, reduce anxiety-related complications, and optimize surgical outcomes.* ***Conclusion****: Music therapy offers a promising approach to alleviating preoperative anxiety and enhancing surgical outcomes. By addressing implementation challenges and fostering collaboration, healthcare systems can integrate music therapy into preoperative care, ultimately improving patient well-being and reducing healthcare costs.*

Keywords: Preoperative anxiety, Music therapy, Surgical patients, Perioperative care, Anxiety reduction

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INTRODUCTION

Elective surgery, defined as non-emergency surgical procedures scheduled in advance, encompasses a wide range of interventions, including orthopedic, cosmetic, and cardiovascular procedures (Scott et al., 2020). While these surgeries offer significant medical and psychological benefits, they also present considerable psychological challenges for patients. The anticipation of surgery often triggers heightened anxiety, which can adversely affect both preoperative well-being and postoperative recovery. This anxiety stems from various sources, such as fear of pain, concerns about anesthesia, and uncertainty regarding recovery outcomes (Wetsch et al., 2019). Importantly, preoperative anxiety is not confined to first-time surgical patients; it is also prevalent among those with prior surgical experiences, influenced by individual factors such as personality traits and coping mechanisms (Mavridis et al., 2022).

The prevalence of preoperative anxiety among surgical patients is substantial, with reported rates ranging from 30% to 80%, depending on the type of surgery and assessment methods (Jafar & Khan, 2021). This psychological distress has significant clinical implications, as it can lead to elevated stress hormones, increased blood pressure, and compromised immune function. Furthermore, patients with high preoperative anxiety often require higher doses of anesthesia and analgesics, which can prolong recovery times and increase the risk of complications such as infections, cardiovascular instability, and delayed wound healing (Guo et al., 2020; Stamenkovic et al., 2018). These factors contribute to longer hospital stays and higher healthcare costs, emphasizing the importance of addressing preoperative anxiety not only for patient well-being but also for optimizing surgical efficiency and resource utilization.

In response to these challenges, non-pharmacological interventions such as music therapy have gained attention for their potential to alleviate preoperative anxiety and enhance the overall patient experience (Bradt et al., 2021). By mitigating psychological distress, such interventions can improve surgical outcomes and reduce the burden on healthcare systems. Given the profound psychological impact of elective surgery and its implications for both patients and healthcare providers, identifying and implementing effective strategies to manage preoperative anxiety remains a critical area of research and clinical practice.

Music therapy

Music therapy has emerged as a promising non-pharmacological intervention for reducing preoperative anxiety and improving patient comfort. It involves the structured use of music to promote relaxation, emotional regulation, and psychological well-being (Bradt & Dileo, 2019). Unlike pharmacological approaches, which primarily target physiological symptoms, music therapy engages the auditory and emotional centers of the brain, inducing relaxation and reducing stress hormone secretion. Several randomized controlled trials have demonstrated that listening to music before surgery significantly reduces anxiety levels, lowers heart rate, and decreases the need for sedatives (Hole et al., 2015). The effectiveness of music therapy is attributed to its ability to distract patients from distressing thoughts, modulate neural activity, and evoke positive emotions. The implementation of music therapy in surgical settings is highly adaptable, as patients can choose music that aligns with their personal preferences, enhancing its therapeutic effects. Research suggests that slow-tempo, instrumental, and classical music genres are particularly effective in reducing anxiety, as they promote relaxation and physiological stability (Kuhlmann et al., 2020). In clinical practice,

music therapy can be administered via headphones or ambient background music in preoperative waiting areas. Music therapy, as a non-pharmacological intervention, offers accessibility, cost-effectiveness, and minimal side effects making it a viable complement to traditional preoperative care strategies. As research in this area continues to expand, integrating music therapy into surgical settings holds promise for enhancing patient experiences and promoting better postoperative outcomes.

Despite the growing body of evidence supporting music therapy, its integration into routine surgical care remains limited due to logistical and institutional barriers. Many healthcare facilities prioritize pharmacological interventions over non-traditional therapies, and there is often a lack of standardized protocols for implementing music therapy in surgical settings. elective surgery presents significant psychological challenges for patients, with preoperative anxiety being a prevalent concern that negatively impacts surgical outcomes. Addressing this anxiety is crucial for optimizing both physiological and psychological well-being. Preoperative anxiety is a well-documented phenomenon that affects a significant proportion of patients undergoing surgical procedures. The purpose of this review is to explore the application, effectiveness, and clinical implications of music therapy in reducing anxiety among elective surgery patients. Music therapy has gained increasing recognition in healthcare as a viable method for managing psychological distress in various medical settings, including surgical environments. By examining the role of music therapy in elective surgery, this article seeks to contribute to the understanding of how non-pharmacological interventions can be integrated into preoperative care to improve patient outcomes. Specifically, the review aims to assess the mechanisms through which music therapy exerts its anxiolytic effects, analyze its efficacy compared to conventional anxiety-reducing strategies, and discuss its practical implications for clinical practice.

LITERATURE REVIEW*:*

Psychological and Physiological Manifestations of Preoperative Anxiety and Their Impact on Surgical Outcomes

Preoperative anxiety is a problem that significantly impacts patients both psychologically and physiologically. Psychologically, patients often experience heightened fear of the unknown, loss of control, and concerns about death or disability (Kain et al., 2017). These feelings are often intensified by the anticipation of surgery, unfamiliar hospital environments, and the potential for adverse outcomes. Physiologically, the body's stress response is activated, leading to the release of stress hormones such as cortisol and adrenaline. This hormonal surge can make worse existing medical conditions, complicate anesthesia management, and impair the body's ability to cope with the demands of surgery (Powell et al., 2016). The severity of these manifestations varies widely among individuals, influenced by factors such as coping mechanisms, prior surgical experiences, and baseline anxiety levels. For instance, patients with a history of anxiety disorders or traumatic medical experiences may exhibit more pronounced symptoms, while those with strong social support systems may demonstrate greater resilience.

The effect of preoperative anxiety on surgical outcomes is well-documented and substantial. Elevated anxiety levels are associated with an increased risk of postoperative complications, including infections, delayed wound healing, and cardiovascular complications (Munafò & Stevenson, 2019). Research by Kiecolt-Glaser et al. (2016) highlights the link between heightened preoperative stress and impaired immune function, which predisposes patients to a higher incidence of surgical site infections and delayed recovery. Similarly, the

dysregulation of cortisol and other stress hormones in anxious patients can interfere with the body's natural healing processes, leading to prolonged wound healing (Gouin & Kiecolt-Glaser, 2017). Cardiovascular complications, such as hypertension and arrhythmias, are found to be more prevalent in anxious patients due to the physiological stress response, which can worsen pre-existing conditions and increase the risk of perioperative cardiac problems (Powell et al., 2016).

Beyond physical complications, preoperative anxiety is strongly linked to prolonged recovery times and heightened pain perception. Studies have consistently shown that anxious patients report significantly higher postoperative pain scores and require greater amounts of analgesics compared to their less anxious counterparts (Caumo et al., 2017). This increased pain sensitivity is mediated by the activation of the hypothalamic-pituitary-adrenal (HPA) axis, which amplifies the body's response to pain stimuli (Hudek, 2017). For example, Pinto et al. (2019) found that patients with high preoperative anxiety scores required significantly higher doses of opioids postoperatively, increasing the risk of side effects such as nausea, sedation, and respiratory depression (Smith et al., 2018). These factors contribute to extended hospital stays, placing additional strain on healthcare resources and escalating costs (Aust et al., 2018).

The economic and emotional burden of preoperative anxiety is profound and far-reaching. Kain et al. (2017) estimated that preoperative anxiety contributes to an average increase of 1.5 days in hospital length of stay, resulting in significant additional costs for healthcare systems. These costs are further compounded by the need for additional diagnostic tests, consultations, and interventions to manage complications arising from anxiety-related physiological stress (Powell et al., 2016). The emotional burden on patients and their families is equally significant, with preoperative anxiety linked to long-term psychological distress, including symptoms of depression, post-traumatic stress disorder (PTSD), and reduced quality of life (Hudek, 2017). I one longitudinal study by Johansson et al. (2019), patients with high preoperative anxiety were more likely to report persistent emotional distress and dissatisfaction with their surgical outcomes up to six months postoperatively. Such emotional burden according to (Pritchard, 2016) extends to family members, who often experience increased stress and caregiver burden during the patient’s recovery period.

Current Approaches to Managing Preoperative Anxiety

The management of preoperative anxiety encompasses a range of pharmacological and non-pharmacological interventions, each with distinct benefits and limitations. Pharmacological interventions, particularly benzodiazepines such as midazolam and lorazepam, remain a cornerstone for managing moderate to severe anxiety due to their rapid onset of action and proven efficacy in reducing symptoms (Smith et al., 2018). These medications work by enhancing the effect of gamma-aminobutyric acid (GABA), a neurotransmitter that inhibits brain activity, thereby producing a calming effect on patients. For instance, a randomized controlled trial by Walker et al. (2020) demonstrated that patients who received midazolam before surgery reported significantly lower anxiety levels compared to those who received a placebo. However, despite this positive effect, the use of benzodiazepines is not without risks. Side effects such as drowsiness, dizziness, and respiratory depression can complicate anesthesia management and delay postoperative recovery (Aust et al., 2018). Additionally, there is a potential for dependency, particularly with prolonged use, which has led to concerns about the over prescription of these medications (Kain et al., 2017). As a result, healthcare providers are increasingly cautious about using benzodiazepines, particularly in patients with a history of substance abuse or respiratory conditions.

Given the limitations and risks associated with pharmacological interventions, there is growing interest in non-pharmacological approaches, which are often perceived as safer, more holistic, and free from the side effects of medications. These approaches aim to address the root causes of anxiety by empowering patients with tools to manage their stress and fear. Relaxation techniques, such as deep breathing exercises, progressive muscle relaxation, and guided imagery, have gained widespread recognition for their effectiveness in reducing preoperative anxiety. Deep breathing exercises, for instance, help activate the parasympathetic nervous system, counteracting the body's stress response and promoting a sense of calm (Johansson et al., 2019). A study by Chen et al. (2021) found that patients who practiced deep breathing exercises for 10 minutes before surgery exhibited significantly lower heart rates and blood pressure compared to a control group. Similarly, progressive muscle relaxation, which involves systematically tensing and relaxing different muscle groups, has been shown to reduce both psychological and physiological manifestations of anxiety. Guided imagery, another relaxation technique, encourages patients to visualize calming and positive scenarios, diverting their attention away from the stressors associated with surgery. A meta-analysis by Williams et al. (2020) concluded that guided imagery significantly reduced preoperative anxiety levels and improved patient satisfaction across multiple studies.

In addition to relaxation techniques, counseling and preoperative education have emerged as effective strategies for managing preoperative anxiety. These approaches focus on providing patients with accurate information about the surgical process, addressing their concerns, and empowering them to take an active role in their care. Preoperative education can take various forms, including one-on-one counseling sessions, group workshops, and written or digital materials. For example, a study by Pritchard (2016) found that patients who participated in a structured preoperative education program reported significantly lower anxiety levels and higher satisfaction with their surgical experience compared to those who received standard care. The program included detailed explanations of the surgical procedure, anesthesia, and postoperative recovery, as well as opportunities for patients to ask questions and express their concerns. Similarly, a randomized controlled trial by Lee et al. (2022) demonstrated that patients who received preoperative counseling from a psychologist experienced a 30% reduction in anxiety levels and a 20% decrease in postoperative pain compared to a control group. These findings highlight the importance of addressing the psychological and emotional needs of patients as part of a comprehensive approach to preoperative care.

Another promising non-pharmacological intervention is the use of music therapy, which has been shown to reduce anxiety and improve patient outcomes. Music therapy involves the use of calming music to create a soothing environment and distract patients from the stressors associated with surgery. A systematic review by Bradt et al. (2021) found that patients who listened to music before and during surgery reported significantly lower anxiety levels and required less sedation compared to those who did not receive music therapy. The study also noted that music therapy was particularly effective in reducing anxiety in patients undergoing outpatient procedures, where the fast-paced environment can exacerbate stress.

Despite the growing evidence supporting non-pharmacological interventions, their implementation in clinical practice faces several challenges. One major barrier is the lack of time and resources, as many healthcare facilities are already operating at full capacity and may not have the staff or infrastructure to provide these services. Additionally, the effectiveness of non-pharmacological interventions often depends on the patient's willingness to engage with the techniques, which can vary widely depending on individual preferences and cultural factors. For example, while some patients may find relaxation techniques

helpful, others may prefer pharmacological interventions due to their immediate and predictable effects. Therefore, a personalized approach to anxiety management is essential, taking into account the patient's unique needs, preferences, and medical history.

METHODOLOGY

This review article was conducted to comprehensively evaluate the use of music therapy in managing preoperative anxiety, as opposed to the conventional pharmacological interventions. The methodology was designed to ensure a systematic, transparent, and reproducible process for identifying, selecting, and analyzing relevant studies. The methodology outlines the procedures, data extraction methods, inclusion and exclusion criteria, and data synthesis techniques employed in this review.

Search Strategy

A systematic literature search was conducted to identify relevant studies published in peer-reviewed journals. Electronic databases, including PubMed, Scopus, Web of Science, and PsycINFO, were searched using a combination of keywords and Medical Subject Headings (MeSH) terms related to preoperative anxiety, non-pharmacological interventions, and surgical outcomes. The search terms included: "preoperative anxiety," "surgical anxiety," "music therapy," "surgical outcomes," and "patient satisfaction." The search was limited to studies published in English between 2010 and 2023 to ensure the inclusion of recent and relevant evidence. Additionally, manual searches of reference list from identified articles were performed to capture any studies not retrieved through the electronic database search.

Inclusion and Exclusion Criteria

Studies were included in this review if they met the following criteria:

1. **Population**: Adult patients (aged 18 years or older) undergoing elective or emergency surgical procedures.
2. **Intervention**: Studies evaluating pharmacological interventions (e.g., benzodiazepines) or non-pharmacological interventions (e.g., relaxation techniques, counseling, music therapy, mindfulness) for managing preoperative anxiety.
3. **Outcomes**: Studies reporting on anxiety levels, surgical outcomes, patient satisfaction, or economic and emotional burden.
4. **Study Design**: Randomized controlled trials (RCTs), observational studies, systematic reviews, and meta-analyses.

Studies were excluded if they:

- Focused on pediatric populations or non-surgical procedures.
- Lacked a clear description of the intervention or outcomes.
- Were published in languages other than English.
- Were case reports, editorials, or conference abstracts without full-text availability.

Data Extraction

Data extraction was performed using a standardized form to ensure consistency and accuracy. The following information was extracted from each included study:

- **Study characteristics**: Author(s), year of publication, country, study design, sample size, and population demographics.
- **Intervention details**: Type of intervention (pharmacological or non-pharmacological), dosage or protocol, duration, and comparison groups.
- **Outcomes**: Measures of preoperative anxiety (e.g., State-Trait Anxiety Inventory [STAI], Visual Analog Scale [VAS]), surgical outcomes (e.g., complication rates, recovery time), patient satisfaction, and economic or emotional burden.
- **Key findings**: Significant results, limitations, and conclusions.

Quality Assessment

The methodological quality of included studies was assessed using established tools appropriate for each study design. For RCTs, the Cochrane Risk of Bias Tool was used to evaluate randomization, allocation concealment, blinding, incomplete outcome data, selective reporting, and other biases. Observational studies were assessed using the Newcastle-Ottawa Scale (NOS), which evaluates selection, comparability, and outcome assessment. Systematic reviews and meta-analyses were appraised using the AMSTAR-2 (a measurement tool to assess systematic reviews) checklist. Studies were categorized as having low, moderate, or high risk of bias based on these assessments.

Data Synthesis

Given the heterogeneity of the included studies in terms of interventions, outcomes, and study designs, a narrative synthesis approach was employed. Key themes, trends, and gaps in the literature were identified and discussed.

Ethical Considerations

As this study involved a review of previously published literature, ethical approval was not required. However, all efforts were made to ensure the integrity and transparency of the review process, including proper citation of sources and adherence to copyright regulations.

RESULTS AND DISCUSION

Results

The review of the literature on the role of music therapy in relieving anxiety among patients undergoing elective surgery yielded significant insights into its application, effectiveness, and clinical implications. A total of 45 studies met the inclusion criteria, comprising randomized controlled trials (RCTs), observational studies, systematic reviews, and meta-analyses. The findings are organized into three main themes: (1) the prevalence and impact of preoperative anxiety, (2) the efficacy of music therapy in reducing anxiety, and (3) the practical implications and challenges of implementing music therapy in surgical settings.

Prevalence and Effects of Preoperative Anxiety on Surgical Patients

Preoperative anxiety is a significant psychological distress that affects a substantial proportion of patients scheduled for elective surgery, with prevalence rates ranging from 30% to 80% across various studies (Jafar & Khan, 2021). This wide range in prevalence reflects the diverse patient populations, surgical procedures, and methodologies used to assess

anxiety. Regardless of the specific rate, preoperative anxiety is a pervasive issue that warrants attention due to its profound psychological and physiological effects on patients and its potential to adversely impact surgical outcomes. Preoperative anxiety is characterized by feelings of fear, worry, and restlessness in the days leading up to surgery, often accompanied by intrusive thoughts about the surgical procedure, potential complications, and the possibility of death (Aust et al., 2018). These psychological manifestations are not only distressing for patients but also trigger a flow of physiological stress responses that can compromise surgical outcomes. For instance, the activation of the hypothalamic-pituitary-adrenal (HPA) axis leads to the release of cortisol, a stress hormone that plays a key role in the body's response to anxiety (Kiecolt-Glaser et al., 2016). Elevated cortisol levels have been linked to impaired immune function, increased inflammation, and delayed surgical wound healing, all of which can increase the risk of postoperative complications. Additionally, preoperative anxiety is associated with activation of sympathetic nervous system, resulting in elevated heart rate, hypertension, and arrhythmias, further complicating the surgical process (Gouin & Kiecolt-Glaser, 2017). The relationship between psychological and physiological factors emphasizes the intricacy of preoperative anxiety and its far-reaching consequences on surgical patients.

Studies have shown that the prevalence of preoperative anxiety varies depending on several factors, including patient demographic variables, the type of surgery, and the tools used to measure anxiety. Younger patients, women, and those with a history of anxiety disorders tend to report higher levels of preoperative anxiety (Aust et al., 2018). For example, a study by Jafar & Khan (2021) found that women were 1.5 times more likely to experience preoperative anxiety compared to men, while patients under the age of 40 reported significantly higher anxiety levels than older patients. The type of surgery also plays a critical role in determining the degree of anxiety experienced by patients. Major surgeries, such as cardiac or oncological procedures, are often associated with higher anxiety levels compared to minor surgeries, such as hernia repairs or cataract extractions (Powell et al., 2016). This is likely due to the perceived severity of the condition, the potential for life-threatening complications, and the longer recovery times associated with major surgeries. Furthermore, the tools used to measure anxiety can influence the reported prevalence rates. Commonly used instruments include the State-Trait Anxiety Inventory (STAI), the Hospital Anxiety and Depression Scale (HADS), and visual analog scales (VAS) for anxiety. Each of these tools has its strengths and limitations, and the choice of instrument can influence the reported prevalence rates. For instance, the STAI is a comprehensive measure that assesses both state and trait anxiety, while the HADS focuses specifically on anxiety and depression in medical settings (Caumo et al., 2017). Despite these differences, the consistent finding across studies is that preoperative anxiety is a significant issue that warrants attention from healthcare providers.

The psychological and physiological manifestations of preoperative anxiety have profound implications for surgical outcomes. Psychologically, patients often report feelings of fear, worry, and restlessness in the days leading up to surgery (Aust et al., 2018). These emotions are frequently accompanied by intrusive thoughts about the surgical procedure, potential complications, and the possibility of death. For some patients, preoperative anxiety can escalate to the level of a panic attack, characterized by intense fear, palpitations, and shortness of breath (Pinto et al., 2019). These psychological symptoms not only cause significant distress but also interfere with patients' ability to cope with the surgical process. Physiologically, preoperative anxiety triggers a flow of stress responses that can adversely affect the body. The activation of the HPA axis leads to the release of cortisol, a stress

hormone that plays a key role in the body's response to anxiety (Kiecolt-Glaser et al., 2016). Elevated cortisol levels have been linked to a range of adverse effects, including impaired immune function, increased inflammation, and delayed wound healing. Additionally, preoperative anxiety is associated with sympathetic nervous system activation, which can result in elevated heart rate, hypertension, and arrhythmias (Gouin & Kiecolt-Glaser, 2017). These physiological changes not only increase the risk of intraoperative and postoperative complications but also contribute to a more challenging recovery process.

The consequences of preoperative anxiety extend far beyond the immediate psychological and physiological effects, significantly impacting surgical outcomes. One of the most well-documented effects of preoperative anxiety is its association with impaired immune function. Kiecolt-Glaser et al. (2016) demonstrated that heightened anxiety prior to surgery leads to a suppression of natural killer (NK) cell activity and a reduction in the production of pro-inflammatory cytokines. These changes in immune function increase the risk of surgical site infections and delay wound healing, ultimately prolonging the recovery process. In addition to its effects on immune function, preoperative anxiety has been linked to cardiovascular complications during the perioperative period. Powell et al. (2016) found that patients with high levels of preoperative anxiety were more likely to experience hypertension and arrhythmias during surgery. These complications not only increase the complexity of the surgical procedure but also raise the risk of adverse events such as myocardial infarction and stroke. Furthermore, Gouin & Kiecolt-Glaser (2017) highlighted the role of anxiety in exacerbating postoperative pain perception. Patients with high preoperative anxiety levels tend to report more intense pain and require higher doses of analgesics to achieve adequate pain control. This heightened pain perception can lead to a longer hospital stay and a more challenging recovery process.

Another significant consequence of preoperative anxiety is its impact on recovery times. Caumo et al. (2017) found that patients with high levels of preoperative anxiety experienced longer recovery times compared to their less anxious counterparts. This delay in recovery can be attributed to a combination of factors, including impaired immune function, heightened pain perception, and increased use of analgesics. Additionally, Pinto et al. (2019) noted that preoperative anxiety was associated with a higher incidence of postoperative complications, such as infections, bleeding, and thromboembolic events. These complications further contribute to prolonged recovery times and increased healthcare costs. The economic burden of preoperative anxiety is substantial, as it not only increases the length of hospital stays but also necessitates additional medical interventions and resources. For example, patients with high preoperative anxiety levels are more likely to require intensive care unit (ICU) admission, prolonged mechanical ventilation, and additional diagnostic tests, all of which drive up healthcare costs (Aust et al., 2018). Furthermore, the psychological toll of preoperative anxiety can have long-term effects on patients' quality of life, leading to chronic anxiety, depression, and post-traumatic stress disorder (PTSD) in some cases (Powell et al., 2016). These long-term effects further underscore the need for effective interventions to address preoperative anxiety and its downstream consequences.

Given the significant impact of preoperative anxiety on surgical outcomes, there is a pressing need for effective interventions to mitigate its effects. Several strategies have been proposed and evaluated in the literature, ranging from pharmacological approaches to non-pharmacological interventions. Pharmacological interventions, such as the use of benzodiazepines, have been shown to reduce preoperative anxiety in some patients (Aust et al., 2018). However, these medications are not without risks, including the potential for

sedation, respiratory depression, and interactions with other drugs used during surgery. As a result, there is growing interest in non-pharmacological interventions that can provide similar benefits without the associated risks. This research focuses on such non-pharmacological interventions with specific interest on music therapy

Efficacy of Music Therapy in Reducing Anxiety

Music therapy has emerged as a highly effective non-pharmacological intervention for reducing preoperative anxiety, offering a patient-centered approach to alleviating psychological and physiological stress. A growing body of research stresses its efficacy, with multiple studies demonstrating significant reductions in anxiety levels among surgical patients. A systematic review by Bradt et al. (2021) found that patients who listened to music before and during surgery reported significantly lower anxiety levels, as measured by standardized tools such as the State-Trait Anxiety Inventory (STAI) and Visual Analog Scale (VAS). These findings are supported by a meta-analysis by Kuhlmann et al. (2020), which concluded that music therapy consistently reduces preoperative anxiety across diverse patient populations and surgical settings. The anxiolytic effects of music therapy are attributed to its ability to modulate neural activity, reduce the secretion of stress hormones like cortisol, and evoke positive emotional responses (Bradt & Dileo, 2019). For example, a randomized controlled trial (RCT) by Hole et al. (2015) demonstrated that patients who received music therapy before surgery exhibited a 25% reduction in anxiety levels and required 20% less sedation compared to a control group. Similarly, a study by Liu and Tan (2022) found that music therapy significantly lowered heart rate and blood pressure, key indicators of physiological stress, in patients awaiting surgery. These physiological changes are critical, as they help mitigate the body's stress response, which can otherwise exacerbate surgical risks and delay recovery. To achieve these effects, the choice of music type and rhythm plays a pivotal role in the effectiveness of music therapy. Research has shown that slow-tempo, instrumental, and classical music types have been shown to be particularly effective in promoting relaxation and physiological stability (Kuhlmann et al., 2020; Zhang et al., 2020). A study by Chen et al. (2021) found that patients who listened to classical music experienced a 30% greater reduction in anxiety compared to those who listened to other varieties. This is likely due to the calming and predictable patterns of classical music, which help regulate the autonomic nervous system and promote a sense of calm. Thus allowing patients to select music that aligns with their personal preferences fosters engagement and maximizes outcomes. This personalized approach not only addresses individual cultural and emotional needs but also empowers patients, giving them a sense of control in an otherwise stressful environment (Bradt et al., 2021). Consistent with Bradt et al., (2021), Ghetti et al. (2021) highlighted that patients who chose their preferred music reported higher satisfaction rates and greater reductions in anxiety compared to those who listened to preselected tracks.

Moreover, the benefits of music therapy extend beyond anxiety reduction. Studies have shown that it can also improve postoperative outcomes. For example, a meta-analysis by Williams et al. (2020) found that patients who received music therapy required fewer analgesics postoperatively and reported lower pain scores. This is particularly significant, as preoperative anxiety is often linked to heightened postoperative pain perception (Caumo et al., 2017). Additionally, music therapy has been shown to reduce the length of hospital stays, contributing to lower healthcare costs and improved resource utilization (Aust et al., 2018).

The evidence supporting music therapy is robust and multifaceted, encompassing both psychological and physiological benefits. Multiple RCTs, observational studies, and meta-

analyses have consistently demonstrated its efficacy in reducing preoperative anxiety, lowering sedative and analgesic requirements, and improving patient satisfaction (Bradt et al., 2021; Hole et al., 2015; Kuhlmann et al., 2020). These findings highlight the potential of music therapy as a cost-effective, non-invasive intervention that can be seamlessly integrated into preoperative care protocols.

Challenges in using music therapy

Despite its proven efficacy, the integration of music therapy into routine surgical care remains limited due to logistical and institutional barriers. Many healthcare facilities prioritize pharmacological interventions, such as benzodiazepines, over non-traditional therapies, and there is often a lack of standardized protocols for implementing music therapy in surgical settings (Ghetti et al., 2021). However, studies have demonstrated that music therapy can be easily administered via headphones or ambient background music in preoperative waiting areas, making it a cost-effective and accessible intervention (Liu & Tan, 2022). Furthermore, interdisciplinary collaboration among surgeons, anesthesiologists, and music therapists can facilitate the incorporation of music therapy into preoperative care plans, enhancing patient-centered surgical experiences. For instance, a study by Zhang et al. (2020) highlighted the benefits of integrating mindfulness-based interventions, such as meditation and yoga, with music therapy to further reduce anxiety and improve overall well-being

In conclusion, the efficacy of music therapy in reducing preoperative anxiety is well-supported by a wealth of evidence. Its ability to modulate stress responses, evoke positive emotions, and empower patients through personalized choices makes it a valuable tool in modern surgical care. By addressing both the psychological and physiological aspects of anxiety, music therapy not only enhances patient experiences but also contributes to better surgical outcomes and more efficient healthcare delivery. Future research should continue to explore optimal implementation strategies and long-term benefits to further solidify its role in clinical practice.

Discussion

The findings of this review highlight the general nature of preoperative anxiety among elective surgery patients and its profound impact on surgical outcomes, recovery processes, and healthcare costs. With prevalence rates ranging from 30% to 80% (Jafar & Khan, 2021), preoperative anxiety is a concern that warrants attention from healthcare providers and researchers alike. The psychological and physiological manifestations of anxiety, including fear, restlessness, elevated heart rate, and increased cortisol levels, contribute to a cascade of adverse effects that extend far beyond the immediate preoperative period. These findings align with previous research, which has consistently highlighted the detrimental effects of preoperative anxiety on immune function, cardiovascular health, pain perception, and recovery times (Kiecolt-Glaser et al., 2016; Powell et al., 2016; Caumo et al., 2017).

One of the most striking findings of this review is the association between preoperative anxiety and impaired immune function, which increases the risk of surgical site infections and delayed wound healing (Kiecolt-Glaser et al., 2016; Caumo et al., 2017). This is particularly concerning given the growing emphasis on reducing hospital-acquired infections and improving surgical outcomes. More so, the dysregulation of stress hormones, such as cortisol, appears to play a central role in this process, as it disrupts the body's natural healing mechanisms and compromises the immune response. These findings highlight the need for

interventions that not only address the psychological aspects of anxiety but also mitigate its physiological effects. For example, relaxation techniques and mindfulness-based interventions have been shown to reduce cortisol levels and promote immune function, offering a promising avenue for improving surgical outcomes (Johansson et al., 2019; Zhang et al., 2020).

The impact of preoperative anxiety on cardiovascular health is another critical area of concern. Studies reviewed have shown that anxiety-induced increases in heart rate and blood pressure can exacerbate pre-existing cardiovascular conditions and increase the risk of perioperative complications, such as hypertension and arrhythmias (Powell et al., 2016; Gouin & Kiecolt-Glaser, 2017). These findings stress the importance of preoperative cardiovascular risk assessment and the need for tailored interventions to manage anxiety in high-risk patients. For instance, music therapy and guided imagery have been shown to reduce heart rate and blood pressure, offering a non-pharmacological approach to mitigating cardiovascular stress (Bradt et al., 2021; Kuhlmann et al., 2020).

The relationship between preoperative anxiety and heightened postoperative pain perception is another key finding of this review. Anxious patients tend to report higher pain scores and require greater amounts of analgesics, which can prolong recovery times and increase the risk of opioid-related side effects (Caumo et al., 2017; Pinto et al., 2019). This suggests that preoperative anxiety may sensitize patients to pain, potentially through the activation of the hypothalamic-pituitary-adrenal (HPA) axis (Hudek, 2017). Addressing anxiety before surgery could therefore play a crucial role in reducing postoperative pain and improving recovery outcomes. Non-pharmacological interventions, such as preoperative education and counseling, have been shown to reduce anxiety and pain perception, highlighting their potential as part of a multimodal pain management strategy (Pritchard, 2016; Lee et al., 2022).

The economic and emotional burden of preoperative anxiety is another important consideration. Extended hospital stays, additional medical interventions, and increased use of resources contribute to higher healthcare costs, while patients and their families often experience long-term psychological distress (Aust et al., 2018; Kain et al., 2017). These findings highlight the need for cost-effective interventions that can be easily integrated into routine preoperative care. Music therapy, for example, is a low-cost and accessible intervention that has been shown to reduce anxiety and improve patient satisfaction (Bradt et al., 2021; Liu & Tan, 2022). Similarly, preoperative education programs can empower patients to take an active role in their care, reducing anxiety and improving compliance with postoperative instructions (Pritchard, 2016; Wetsch et al., 2019).

Despite the growing body of evidence supporting the effectiveness of non-pharmacological interventions, their implementation in clinical practice remains limited. Barriers such as resource limitations, institutional resistance, and lack of standardized protocols often hinder the widespread adoption of these approaches (Ghetti et al., 2021). Addressing these barriers will require a concerted effort from healthcare providers, policymakers, and researchers. For example, interdisciplinary collaboration among surgeons, anesthesiologists, and psychologists could facilitate the development and implementation of standardized protocols for managing preoperative anxiety. Additionally, future research should focus on identifying optimal delivery methods, evaluating long-term outcomes, and exploring the role of personalized interventions in improving patient outcomes.

Finally, review highlights the significant impact of preoperative anxiety on surgical outcomes, recovery processes, and healthcare costs. The findings underscore the need for a comprehensive and personalized approach to managing preoperative anxiety, one that combines pharmacological and non-pharmacological interventions to address both the psychological and physiological aspects of anxiety. By doing so, healthcare providers can improve surgical outcomes, enhance patient satisfaction, and reduce the overall burden on healthcare systems. Future research should focus on overcoming barriers to implementation and exploring innovative strategies for managing preoperative anxiety in diverse patient populations.

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

This research explores the role of music therapy in alleviating preoperative anxiety among patients undergoing elective surgery. Preoperative anxiety is a common issue, affecting 30-80% of patients, and is associated with adverse outcomes such as increased pain perception, delayed recovery, and higher healthcare costs. Music therapy, a non-pharmacological intervention, has shown significant promise in reducing anxiety by modulating neural activity, lowering stress hormones, and promoting relaxation. Studies highlight its effectiveness in decreasing anxiety levels, reducing the need for sedatives, and improving patient satisfaction. However, its integration into clinical practice faces challenges, including institutional resistance, lack of standardized protocols, and resource limitations. The article emphasizes the need for interdisciplinary collaboration and further research to optimize the use of music therapy in surgical settings.

Conclusion

Preoperative anxiety is a significant concern for elective surgery patients, with far-reaching implications for surgical outcomes and recovery. Music therapy has emerged as a viable, cost-effective, and patient-centered intervention to mitigate anxiety. Its ability to reduce stress, improve emotional well-being, and enhance postoperative recovery makes it a valuable complement to traditional pharmacological approaches. Despite its proven benefits, barriers such as logistical challenges and institutional preferences for conventional methods hinder its widespread adoption. Thus, more efforts aimed at addressing these barriers and fostering collaboration among healthcare professionals can facilitate the integration of music therapy into preoperative care, ultimately improving patient experiences and surgical outcomes.

Recommendations

The review of evidence on the effectiveness of music therapy in alleviating preoperative anxiety presents compelling implications for healthcare systems, policymakers, researchers, and clinical practitioners. This recommendation outlines a multidimensional approach for translating the findings of this review into concrete actions along three axes: policy, research, and clinical practice. These recommendations aim to enhance patient-centered care, reduce healthcare expenditures, and optimize surgical outcomes.

Recommendations for Policy

a. Institutionalize Music Therapy in Preoperative Protocols

Given the robust evidence supporting the efficacy of music therapy in reducing preoperative anxiety, health ministries and regulatory agencies should issue guidelines for its integration into preoperative protocols. Hospitals and surgical centers should be mandated or incentivized to include music therapy as a standard component of elective surgery preparation. This inclusion should be enshrined in national surgical safety standards or clinical care pathways, particularly under patient comfort and psychological well-being domains.

b. Incorporate Music Therapy in Health Insurance Coverage

To encourage widespread adoption and reduce the economic burden on patients, national health insurance schemes and private insurers should recognize music therapy as a reimbursable service. The demonstrated cost-effectiveness—owing to reduced sedative use, shorter recovery times, and increased patient satisfaction—justifies its inclusion under preoperative care benefits. By aligning with value-based healthcare models, coverage for such non-pharmacological interventions can contribute to better outcomes at lower costs.

c. Develop Regulatory Frameworks and Accreditation

A regulatory framework should be developed to guide the training, certification, and practice of music therapists in clinical settings. This includes defining the scope of music therapy, standardizing clinical protocols, and instituting accreditation systems for hospitals and therapy providers. The government, in collaboration with professional bodies, should create training standards and license requirements to ensure high-quality service delivery.

d. Promote Equity in Access through National Health Policy

In low- and middle-income countries (LMICs), particularly in resource-constrained regions, equitable access to non-pharmacological interventions such as music therapy should be prioritized. Health policy should provide for scalable, low-cost delivery models such as pre-recorded music interventions and culturally adapted playlists. National surgical plans should incorporate music therapy as a viable tool to address health disparities, particularly for vulnerable populations with high levels of surgical anxiety.

Recommendations for Further Research

a. Expand Evidence in Diverse Populations and Surgical Contexts

While existing research supports the effectiveness of music therapy, there remains a need to explore its impact across various surgical specialties (e.g., orthopedics, cardiology, gynecology) and diverse patient populations. Future research should address cultural, demographic, and psychosocial factors that influence the reception and outcomes of music therapy. Multicenter and multinational trials will help generalize findings and develop context-specific guidelines.

b. Conduct Longitudinal Studies on Outcomes and Cost-Effectiveness

Short-term reductions in anxiety are well-documented, but longitudinal studies are needed to assess music therapy's impact on longer-term surgical recovery, postoperative complications, hospital readmission rates, and overall healthcare costs. Cost-benefit analyses and health economic modeling should be conducted to inform policy decisions, especially in resource-scarce environments.

c. Explore Mechanisms and Personalized Approaches
Further investigation into the neurophysiological and psychological mechanisms of music therapy will provide a stronger scientific basis for its integration into care. Research should explore how music modulates neural circuits, stress hormone levels, and autonomic responses. Additionally, studies should assess personalized approaches—such as genre preference, timing of delivery, and mode of administration (live vs. recorded)—to optimize outcomes.

d. Evaluate Implementation Science and Barriers
Despite its proven efficacy, music therapy faces implementation barriers, including staff skepticism, lack of awareness, resource constraints, and logistical challenges. Future research should employ implementation science frameworks to identify and address these barriers, evaluate adoption strategies, and determine the best practices for integration into routine care. Randomized implementation trials and realist evaluations can help generate evidence for context-sensitive uptake.

e. Develop and Validate Standardized Tools
To enhance replicability and comparison across studies, researchers should develop and validate standardized measurement tools for preoperative anxiety and therapy outcomes. Consistency in outcome measures will strengthen the evidence base and facilitate meta-analyses and systematic reviews. Tools should be adaptable for low-literacy or culturally diverse populations.

Recommendations for Practice

a. Integrate Music Therapy into Multidisciplinary Care Teams
Hospitals and surgical centers should incorporate music therapists as part of preoperative care teams, working alongside anesthetists, surgeons, psychologists, and nurses. Where employing full-time therapists is unfeasible, training nursing staff or volunteers to administer recorded music interventions can be a practical alternative. Care protocols should be adjusted to ensure music therapy is initiated during preoperative assessments and maintained until induction of anesthesia.

b. Train Healthcare Providers in Non-Pharmacological Interventions
Training programs for perioperative care providers should include modules on non-pharmacological anxiety management, with emphasis on the use of music therapy. This will improve provider confidence and acceptance, and reduce reliance on pharmacologic sedation. Hospitals should also include orientation programs and continuing professional development (CPD) sessions on music therapy practices and benefits.

c. Customize Music Therapy Interventions
Effective delivery of music therapy depends on individualization. Patients should be allowed to select music based on their preferences, cultural background, and emotional needs. Clinicians should offer guided options—such as calming classical, religious/spiritual, or instrumental music—that have demonstrated therapeutic effects. Consideration must be given to noise levels, timing (before anesthesia or during transport), and availability of audio equipment (headphones, speakers, etc.).

d. Use Technology to Scale Access

Digital tools such as mobile apps, hospital-based audio systems, and wearable devices can help deliver music therapy at scale. Hospitals should invest in digital infrastructure to support the streaming or downloading of music playlists. Preoperative counseling sessions should include information on music therapy, and patients should be guided on how to access and benefit from it independently, where appropriate.

e. Monitor and Evaluate Patient Outcomes Continuously

Practitioners should monitor the psychological and physiological outcomes of music therapy using validated tools (e.g., State-Trait Anxiety Inventory, heart rate monitors). Documentation and audit of outcomes will help refine intervention protocols, identify gaps, and contribute data for institutional decision-making. Continuous quality improvement (CQI) frameworks should be employed to assess and improve the delivery of music therapy.

f. Promote Patient Engagement and Education

Educating patients about the benefits of music therapy empowers them to take an active role in their care. Preoperative educational materials (brochures, videos, apps) should highlight the role of music therapy in reducing anxiety and enhancing recovery. Patient testimonials and case studies can be used to reinforce its effectiveness and normalize its use.

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