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Music Therapy for Preoperative Anxiety in Surgical Patients: An Integrative Review

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MUSIC THERAPY FOR PREOPERATIVE

ANXIETY IN SURGICAL PATIENTS:

AN INTEGRATIVE REVIEW

by

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Abstract

This integrative review compared the use of music interventions on the effects of preoperative anxiety in surgical patients. Preoperative anxiety can have detrimental effects such as increased blood pressure, increased heart rate, increased cortisol levels, increased infection risk, and delayed wound healing. Anesthetic complications include autonomic fluctuations, increased anesthetic requirements, tightening of the jaw, and possible coughing on induction of anesthesia. A search was completed using electronic databases including CINAHL, PubMed, and Medline. The PRISMA flowchart was utilized to identify research that was included and excluded in the review, with a final total of 10 studies. Studies were critically appraised using Polit and Beck's analysis tables and illustrated in individual tables identifying key aspects of the study. Outcomes included anxiety levels, vital signs, patient satisfaction including positive and negative emotions, length of procedure, and amount of medications used intraoperatively. Findings showed an overall decrease in anxiety levels when patients were exposed to some type of music intervention. Music interventions, including both live and prerecorded music, have been shown to have a positive impact on anxiety levels. Overall, this integrative review supported the use of music interventions as a safe, low-cost technique to help ease anxiety of patients awaiting surgery.

Table of Contents

Music Therapy for Preoperative Anxiety in Surgical Patients: An Integrative Review

Background/Statement of the Problem

According to the National Institute of Mental Health (NIMH, 2005), anxiety affects 18% of the population, approximately 40 million people in the United States. Anxiety is the most common mental illness over the age of 18 and is regarded as a normal phenomenon that happens prior to surgery (NIMH). The National Alliance on Mental Illness (NAMI) estimates a yearly cost of disability accompanying severe mental illness to be as high as $193 billion (2013). The Centers for Disease Control (CDC) estimates a lifetime prevalence of anxiety over 15% and is more prevalent in women than men (2018). Anxiety disorders are the most prevalent in any age group compared to other mental health disorders (American Psychiatric Association [APA], 2013).

The locus ceruleus of the brain has noradrenergic neurons and opioid receptors from which many potential emotional states such as panic, fear and anxiety are generated (Miller, 2015). These emotions are subjective and are manifested on an individual level as an increase in heart rate, blood pressure and/or respiratory rate. When physiologic changes become outside of normal limits, symptoms of anxiety are exhibited (Miller). Anxiety carries an increased risk for disability, and increasing premature mortality risk, especially in older adults (APA, 2013).

Anxiety is common prior to surgery and can affect patient outcomes. When patients are placed in unfamiliar environments such as the preoperative waiting area, they are exposed to medical professionals and are uncertain of the medical process, which tends to exaggerate anxiety levels. Individualized care is provided to meet specific patient needs, inclusive of type of procedure as well as comorbidities. Caring for patients with

anxiety has traditionally involved pharmacological approaches, specifically benzodiazepines (Miller, 2015). Midazolam, a benzodiazepine, is the standard drug given in the preoperative period and an ideal anxiolytic (Nagelhout & Plaus, 2014). The drug's rapid onset, short duration, and half-time make it appealing; however, unexpected respiratory depression and over-sedation are possible (Nagelhout & Plaus). Benzodiazepines work synergistically with opioids, but can significantly reduce arterial blood pressure and peripheral vascular resistance, as well as contributing to delayed recovery and discharge (Morgan & Mikhail et al., 2013).

Music therapy has been proposed to reduce anxiety by exposing the patient to a form of music during the preoperative period (Bradt, Dileo, & Shim, 2013). It has potential to be an inexpensive addition to help reduce anxiety in patients and offers a nonpharmacological/noninvasive holistic approach. Music therapy may be another tool to use when attempting to attain individualized care.

An integrative review was conducted to further investigate this issue and synthesize the available research. The purpose of this paper is to explore the impact of music therapy on preoperative anxiety in adult patients undergoing surgery. Evidence is needed to determine varying effects of music interventions and conclude whether anxiety levels were impacted as evidenced by physiological effects, such as decreased levels of heart rate, blood pressure, and/or respiratory rate, as well as possible improvement in emotional states in the preoperative adult patient.

Next, the review of literature will be presented.

Literature Review

Anxiety Definition and Characteristics.

According to the CDC, anxiety disorders include panic disorder, generalized anxiety disorder, post-traumatic stress disorder, specific phobias, and separation anxiety disorder (2018). In aggregate, they are considered the most common class of mental illnesses among the general population (CDC). The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) describes anxiety as an emotional, normal response to fear without a clear threat accompanied by increased muscle tension and vigilance (2013). In patients with other psychiatric disorders, it may be hard to distinguish characteristics of anxiety and differentiate between diagnoses (APA, 2013). Worldwide, anxiety prevalence is one in thirteen people, or 7.3% of the population (Coppard-Queensland, 2012). Variability factors influencing prevalence rate include age, gender, culture, socioeconomic status, and urbanicity (Baxter, Scott, Vos, & Whiteford, 2012).

Anxiety presents in the form of worry, fear, or apprehension (Pritchard, 2009). Anxiety is affected by previous experiences and presence of coping mechanisms (Kindler, Harms, Inde-Scholl, & Scheidegger, 2000). An individual's perception of the environment plays a vital role in anxiety development and varies considerably among individuals with a wide range of presenting symptoms (APA, 2013). Anxiety may be difficult to identify and distinguish from avoidance and fear, as these are both normal responses and coping mechanisms (Lenze, Wetherell, & Andreescu, 2006). Symptoms range from mild to severe and are characterized by feelings of dread or fear with psychological, physical, cognitive and behavioral aspects (World Health Organization

[WHO], 2016). Mild symptoms may be ambiguous and warrant a complete history and physical exam to rule out other potential differential diagnoses.

Emotional symptoms of anxiety include feelings of apprehension, tense, or jumpy, restlessness or irritability, anticipating the worse and increased awareness of signs of danger (NAMI, 2013). Physical symptoms include increased heart rate, shortness of breath, upset stomach, headaches, fatigue, insomnia, frequent urination, and/or frequent diarrhea (NAMI). Anxiety may present in the form of a brief episode, or may be unexpected and prolonged leading to a panic attack, a peak intensity of feelings of worry and/or fear, seen in other mental illnesses, not just anxiety (APA, 2013). Patients may be tempted to avoid certain situations to avoid panic attacks.

Anxiety disorders differ according to the DSM-5 based on type of objects and/or situation encountered or anticipated, giving rise to feelings of fear, anxiety, or avoidance behavior causing the brain to interpret and react to the perceived threat (APA, 2013). The disorders vary in terms of severity and chronicity (McGrandles & Duffy, 2012). In generalized anxiety disorder (GAD), there are six descriptive characteristics, including restlessness or feeling on edge or keyed up, easily fatigued, difficulty concentrating or mind going blank, irritability, muscle tension, and/or sleep disturbances (APA, 2013). The official diagnostic criteria of the DSM-5 suggests that patients with GAD may have symptoms for six months; however other research on GAD suggests symptoms may fluctuate and this criterion may not always be present (Kavan, Elsasser, & Barone, 2009).

It can be hard to distinguish manifestations of certain types of anxiety disorders; therefore, it is important to assess for certain triggers and/or situations that cause fear, as

well as other associated feelings or thoughts (APA, 2013). A clear explanation and cognitive ideation of anxiety is extremely valuable to differentiate the type of anxiety disorder, as well as triggers that may precipitate onset (APA).

Neurophysiology of Anxiety

Anxiety is thought to arise from the amygdala-prefrontal circuit in the brain, where emotional responses are derived (APA, 2013). It is postulated that deficient control of the prefrontal area in the brain and/or hyper-responsiveness of the amygdala are responsible for anxiety manifestations (APA). It is thought that over time, the brain becomes biased in anxious patients and the response of anxiety symptoms are the same upon activation of the circuitry (APA).

Several theoretical models exist to explain the etiology and neurophysiology behind anxiety. A common consensus among theories is that the dysregulation of worry and overactivation of certain brain areas are involved, in addition to potential genetic and environmental factors contributing to one's response to certain situations and/or objects (Locke, Kirst, N, & Shultz, 2015). Potential environmental factors include traumatic events, such as abuse, violence and/or prolonged illness which may be linked to the development of anxiety (NAMI, 2013).

In older adults, anxiety may be associated with accelerated cognitive decline and result from several potential causes. When anxiety is present in later years of life, the hypothalamic-pituitary-adrenal axis is activated, which increases cortisol levels and affects prefrontal function producing anxiety induced-neurodegeneration (APA, 2013).

According to the DSM-5, anxiety definitions are sometimes general and have unclear pathophysiologies and are far from having clear, evidenced-based explanations of categories based on underlying etiology of anxiety (APA, 2013). As mentioned previously, careful evaluation and thorough review of systems to rule out potential differential diagnoses is essential.

Impact of Anxiety

Fear and anxiety may overlap as symptoms. Fear is more often associated with an overwhelming arousal of the sympathetic nervous system, giving rise to thoughts of immediate danger and plans of 'escape,' rather than the more somatic tendencies shown with anxiety (APA, 2013). When the brain transmits an emotional response, a fight or flight situation occurs, in which neurotransmitters bring the impulse to the sympathetic nervous system and produce increased heart rate and breathing rate (Harvard Health Publications, 2017). At the same time, blood flow is directed from the abdomen to the brain and produces intense emotions (Harvard Health Publications). This process is a positive outcome when the body is in crisis, but turns counterproductive when prolonged (Harvard Health Publications)

If high levels of anxiety are not treated, people are at risk for increased blood pressure, increased heart rate, increased cortisol levels, delayed wound healing rates and increased risk of infections leading to unwanted physiological manifestations (Scott, 2004). Prolonged anxiety has been shown to co-exist in patients with heart disease, chronic respiratory diseases, as well as gastrointestinal diseases (Harvard Health Publications, 2017). When the body reacts to anxiety, it is in the form of stress, activated

by the hypothalamic-pituitary-adrenal axis and the autonomic nervous system causing increased concentrations of catecholamines and hormones (McCance & Huether, 2006). Catecholamines and hormones act as triggering agents and appear as symptoms of anxiety (McCance & Huether). It is of utmost importance to identify and treat symptoms of anxiety in a timely manner to help prevent unwanted complications.

Regardless of which type of anxiety disorder is present, anxiety is associated with impairment in mental health, social and role functioning, general health, pain, physical functioning and activities of daily living (Kavan, Elsasser, & Barone, 2009). In general, a mental illness may impair daily functioning by altering mood, behaviors, and ability to think clearly; it is said to be more disabling than that of cancer or heart disease (CDC, 2013). Certain types of anxiety, specifically GAD, are associated with self-treatment of alcohol and/or drugs and suicidal ideation (Kavan et al., 2009).

Anxiety Risk Factors

In a study performed by Blanco et al. (2014) via a one-factor model using the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), a sample that was nationally representative of the adult population of the United States was recruited. The purpose of the study was to explore risk factors of anxiety disorders. A total of 34, 653 participants were included in the face-to-face interview and several risk factors were identified and compared to major depressive disorder (MDD). Diagnoses were made based on the DSM-IV criteria and statistical analysis was completed. Female gender, family history of MDD, disturbed family environment, childhood sexual abuse, low self-esteem and lower educational status were all potential factors related to

increased risk in anxiety of all types, with the exception of obsessive compulsive disorder (Blanco et al.).

The DSM-5 included similar risk factors with the addition of single or divorced marital status, poor social support system, younger age, as well as white (APA, 2013). Increasing evidence supports that there are genetic links to anxiety and transmission of anxiety disorders (APA).

Anxiety Measurement

Several measurement tools have been used in the literature to assist health care providers in identifying and assessing anxiety. It is critical that the health care provider be adequately trained to recognize and interpret symptoms of anxiety so that sufficient treatment can be provided. When using any type of scale, it is important to be cognizant that patients may not recognize their symptoms and furthermore, providers may not identify symptoms, potentially lending symptoms to other diseases present (McGrandles & Duffy, 2012). Examples of scales used in the literature include Global Anxiety-Visual Analog Scale (GA-VAS), the Hamilton Anxiety Rating Scale (HAM-A), and the State-Trait Anxiety Inventory for Adults (STAI).

The GA-VAS first introduced by Aitken in 1969, is a self-assessment tool using a 100mm horizontal line, with one end of the scale (generally the left) representing no anxiety, with the other end (generally the right) representing extreme anxiety. The patient then marks the line to estimate their current level of anxiety and distance can be measured and used for statistical analysis (William, Morlock & Feltner, 2010). The scale is straightforward, simple to use and is known to be more effective when used over time,

rather than at one specific snapshot in time (William et al.). According to a study done by William et al., reviewing the effectiveness of the scale using a double blinded, randomized, placebo controlled with lorazepam and paroxetine for treatment of GAD, the GA-VAS was used to assess reliability, validity, responsiveness, and utility of the scale (2010). The study took place at clinic visits and at home for four weeks. Results showed marginally adequate test-retest stability, validity correlation with HAM-A, and demonstrated reliability, validity and responsiveness in these settings only (William et al.).

The Hamilton Anxiety Rating Scale (HAM-A) was first developed in 1959 by M. Hamilton and consists of a 14 self-assessment questionnaire to measure the severity of presenting anxiety symptoms (Hamilton, 1959). The well-known interview scale uses a five-point Likert-type scale ranging from 0-4, with a score of 0 representing symptoms not present, to a 4 representing symptoms are severe (Psychiatric Times, 2013). Scores >17/56 are associated with mild anxiety and scores >25-30 are considered moderate to severe anxiety (Thompson, 2015). The scale is most often used in patients with GAD (Psychiatric Times, 2013). This score is useful because it incorporates respiratory, gastrointestinal and cardiovascular symptoms that may be present in anxiety (McGrandles & Duffy, 2012). A study that investigated Parkinson's disease and anxiety, Kummer et al. found that the HAM-A resulted in a reliability score of 0.893 Cronbach alpha score, meaning it has good internal consistency in this setting assessing Parkinson's disease patients for GAD (2010). A meta-analysis by Wan, Zhang, Tedeschi, & Hackett showed a large body of data using the HAM-A across multiple trials and compared findings to show good reliability and validity (2006). One limitation of note is that the

scale may not adequately discriminate between symptoms of anxiety and depression (Matza, Morlock, Sexton, Malley, & Feltner, 2010).

Spielberger's State-Trait Anxiety Inventory (STAI) is an established and widely used instrument to measure anxiety developed by Charles Spielberger. The scale consists of a 40-item questionnaire using self-evaluation to assess for two types of anxiety; S-Anxiety scale or state anxiety and T-Anxiety scale or trait anxiety with 20 questions pertaining to each section (Spielberger, 1966). State anxiety assesses current mental states and how the patient feels at the present time, whereas trait anxiety measures general feelings of anxiety (Julian, 2011). Participants using the scale are required to rate intensity of feelings using a 4-point Likert scale (Pittman & Kridli, 2011). According to the APA, this scale can be used in clinical settings to diagnose anxiety and distinguish from depressive states (2017). The scale is simple to complete and takes about 10 minutes to complete (Quek, Low, Razack, Loh, & Chua, 2004). In a study of 237 participants, the STAI scale was used to study reliability and validity of patients with and without lower urinary tract symptoms (Quek et al.). The study showed excellent internal consistency and a Cronbach's alpha score of 0.86 showing high reliability. Validity was supported along with a high degree of sensitivity, as well as a high level of homogeneity (Quek et al.). A prospective randomized study of 200 patients undergoing spinal anesthesia referred to STAI as the 'gold standard' for measuring preoperative anxiety (Dias, Baliarsing, Barnwal, Mogal, & Gujjar, 2016).

Regardless of the scale used, a thorough history and review of patient comorbidities should be considered as these could alter manifestations of anxiety. The STAI scale is the most commonly used with multiple variations and can differentiate

between general state of anxiety or an acute state of anxiety, a factor that most other

scales lack.

Impact of Anxiety on Individuals in the Preoperative State

According to Caumo et al., preoperative anxiety has links to independent and

dependent risk factors (2001). Independent risk factors that are not directly correlated

with anxiety include (a) history of cancer, (b) smoking, (c) female, (d) psychiatric

disorders, (e) self-report of moderate to severe pain, (f) physical status, and (g) presence

of formal education. Dependent risk factors for anxiety have been identified as (a) fear of

the unknown, (b) separation from family and friends, (c) fear of death or disfigurement,

(d) concern regarding safety and/or pain, (e) fear of losing independence/control, and (f)

recovery time in the postoperative period (Caumo et al.). Cooke, Chaboyer, Schluter, and

Hiratos acknowledged that waiting time in the preoperative period can play a role in

developing anxiety and exacerbating symptoms (2005). It is through combination of these

factors that a patient becomes more vulnerable to experience the daunting emotion of

anxiety.

Anxiety may be prominent beginning from the time surgery was advised as a

treatment option and can progress to the day of surgery. Preoperative anxiety is reported

to affect about 60-80% of surgical patients (Nigussie, Belachew, & Wolancho, 2014).

Peripheral vasoconstriction is a physiological manifestation due to anxiety and stress,

potentially making the placement of an intravenous catheter and/or obtaining blood

specimens more difficult (Pritchard, 2009). In addition, delayed jaw relaxation, coughing

during induction of anesthesia, autonomic fluctuations and increased anesthetic

requirement have also been encountered (Nigussie et al., 2014). Other aspects of care that may be impacted include heightened senses, pain, depression symptoms, nausea and fatigue (Carr, Thomas, & Wilson-Barnet, 2005; Montgomery & Bovbjerg 2004; Pritchard, 2009). These issues are aspects of a patient's care that must be acknowledged in the preoperative period before surgery, to better suit positive patient outcomes.

Music Therapy Defined

According to Thaut, the concept of music is believed to stimulate perceptual responses, which may be related to emotional states and therefore impact stress and anxiety levels (1990). Regardless of the setting, auditory stimulation is hypothesized to occupy neurotransmitters, which may prevent extreme emotional states like anxiety (Thaut). Other authors have argued that music is a way of relaxing and calming the mind, which diverts attention to the music and creates a shift of focus. According to the American Music Therapy Association (AMTA), music is an outlet for expression of feelings and can facilitate motivation for patients (2017).

Music is an inexpensive intervention used in various settings in medicine to assist the needs of patients. There are different types of music interventions, specifically distinguished as music medicine and music therapy. Music medicine relates to prerecorded material administered by the health care professional and may be referred to as passive listening (Bradt et al., 2013). Music medicine is convenient and cheaper. Limitations of having only a specific set of music and genre may conflict with patient preference. Another limitation is the availability and access to headphones and maintaining infection control.

Music therapy designates trained music therapists to implement the intervention and are considered members of the health care team (Bradt et al., 2013). As a member of the interdisciplinary team, a music therapist must follow a specific protocol during encounters (AMTA, 2017). There is more variability with music therapy, as the therapist comes with a set of skills which may include choice of instrument with or without use of voice, different cultural background, as well as other combinations that are tailored to specific needs allowing more variability among patients (Bradt et al., 2013). For example, for a patient hard of hearing the therapist may choose to use a different tone or style of music. Music therapy has a benefit of fostering therapeutic relationships to meet and express physical, emotional, cognitive, and social needs of patients and may even be seen as a form of communication (AMTA, 2017).

The formal definition of 'music therapy' is associated with the use of evidence-based, trained personal performing music interventions (AMTA, 2017). However, it is of note that this term is often used loosely in clinical situations and may be used interchangeably with music interventions and/or music medicine to describe all types of music the patient may be exposed to. For example, a nurse administering music via a CD player for calming purposes may be described in some literature as administering music therapy. In the studies reviewed for the literature review, there is no consensus as to how interventions are defined or implemented. For purposes of this paper, music therapy is defined as any form of music intervention, in any setting and with any modality of music.

Effects of Music Interventions on Anxiety in General

Music modalities may be used to help patients both emotionally and physiologically, contribute to less medications, decrease potential postoperative pain, and

promote faster recovery times (Bradt et al., 2013). Music therapy is postulated to decrease cardiovascular variability and the nociceptive effects from anxiety (Bradt et al.). Music can be used a stress management technique, with the benefit of having no side effects and can be used alone or in combination with other anxiety relieving techniques (Miller, 2015).

A systematic review and meta-analysis was done to investigate behavioral and psychological symptoms, as well as cognitive function and activities of daily living, in dementia patients using music therapy (Ueda, Sukukamo, Sato, & Izumi, 2013). Music therapy had a moderate effect on anxiety, with a confidence interval (CI) of 95% and p value of 0.002. When music therapy was used for a duration greater than three months, the study showed large effects on anxiety, with a CI of 95% and a p value of 0.02 (Ueda et al.).

A randomized controlled trial investigating the use of music therapy on intensive care unit (ICU) patients on mechanical ventilation examined anxiety levels using cortisol blood levels, heart rate, blood pressure, as well as subjective questionnaires. The study recruited 85 patients admitted to the ICU for greater than 24 hours and on a mechanical ventilator, randomly assigned to music interventions (n=41) or the control group (n=44). Results showed the music group to have significantly lower (p < 0.02) anxiety levels on posttest measures as compared to the control group, with the exception to diastolic blood pressure (Lee et al., 2017a).

Another randomized controlled trial was done to explore effects of music on anxiety levels and physiological responses of surgical patients receiving spinal anesthesia (Lee et al., 2017b). The study was completed in the post anesthesia care unit (PACU)

using 100 participants. The experimental group (n=50) was exposed to 30 minutes of music intervention and standard nursing care, while the control group (n=50) received only standard routine nursing care. State trait anxiety inventory (STAI) scores were investigated, as well as heart rate, respiratory rate and blood pressure. Results showed a greater decrease in STAI scores in the experimental group as compared to the control group ($p < 0.001$). In addition, heart rate, respiratory rate and blood pressure were all significantly decreased in the experimental group as compared to the control ($p < 0.026$ (Lee et al., 2017b).

Impact of Music on Anxiety in the Preoperative State

Patients are often treated for preoperative anxiety with benzodiazepines, known to have side effects of respiratory depression and increased sedation. This is especially true for elderly, who may respond more dramatically due to aging effects on various body systems, including the kidneys and liver (Miller, 2015). Beyond the negative physiological issues caused by anxiety, the induction of anesthesia can be more complicated and the patient may experience a slower recovery time (Bradt et al. 2013). When patients are anxious, it is the responsibility of the practitioner to recognize and acknowledge the problem and treat it.

In a study of 239 patients, 168 patients in the preoperative period were identified to have high anxiety and described feelings of fear of death, fear of the unknown, fear of financial burden, fear of results of surgery, and/or fear of being awake during surgery (Nigussie et al., 2014). The study was performed on patients 15 years or older who were able to communicate and not taking antianxiety or antidepressants prior to surgery. A

version of the STAI scale with 40 questions was used to analyze anxiety. Regardless of the cause of anxiety, it was found that time of surgery was a major factor in anxiety occurrence and the authors reported a 2.8 decrease in anxiety of patients having surgery in the afternoon compared to the first cases of the day. Overall, 70% of participants reported significant anxiety and 65% of participants did not receive any information about anxiety. The authors concluded that in general preoperative anxiety is high and that this issue must be addressed to help patients.

In a clinical controlled trial conducted by Yung, Chui-Kam, French, & Chan, (2002), music interventions were explored related to the impact on preoperative anxiety in Chinese men undergoing a transurethral resection of the prostate (TURP). The study was completed with 30 patients, randomly divided into three groups with 10 in each group. One group was exposed to music, one group had a nurse present, while the last group was the control group. The Chinese version of STAI was used to measure anxiety and heart rate and blood pressure were recorded. Reduction in blood pressure was detected for all groups, as well as reduction in anxiety for the music group. Heart rate and anxiety showed no major changes in the nurse or control group (Yung et al.) Many limitations are noted in this study, including generalizability due to small sample size and specific procedures. Another limitation noted is control of extraneous variables that were not addressed. It is also of note that various nurse interactions may have taken place in the nurse group that could skew results.

With anxiety comes the potential need for increased medications, difficulty with induction and physiological changes (Bradt et al., 2013). Finding the right treatment for the patient, using the least invasive technique is optimal. Various studies have examined

the impact of music therapy on preoperative anxiety in surgical patients and these will be reviewed in detail in the results section.

Next, the theoretical framework utilized for this integrative review will be discussed.

Theoretical Framework

In 1966, Charles D. Spielberger took Raymond Cattell's theory on anxiety and expanded on his work to describe anxiety as having two components, state anxiety and trait anxiety. Spielberger's theory of anxiety further defines these two concepts, from which an anxiety scale to model his work was developed in order to make the theory measurable.

Spielberger's Theory of Anxiety

Spielberger's theory of anxiety helps to guide the topic of investigating music therapy interventions to decrease preoperative anxiety in adult surgical patients. The State –Trait Anxiety Inventory (STAI) developed by Spielberger attempts to examine both state and trait anxiety in a 20 item self-report measurement tool. According to Spielberger, anxiety arises from a combination of internal and external stimuli, cognitive factors, as well as defense mechanisms (1966). The two concepts of anxiety exist as a state of anxiety or trait anxiety. State anxiety occurs when one is stimulated from internal or external factors, which impact responses due to perceptions of threat producing behaviors to fight off perceived anxiety as shown by actions by the human body (Spielberger, 1966). State anxiety is how one is able to cognitively encounter perceived threatening states and is used to assess anxiety at a specific time. This type of anxiety tends to change from time to time and vary in intensity, whereas trait anxiety often is a continual pattern more attributable to a personality trait (Caumo et al., 2001). Trait anxiety is the learned action of previous state anxiety which may predispose the individual to encounter future states of anxiety. This is often used to measure anxiety as a general feeling rather than specific occurrence (Spielberger, 1966).

In terms of external criticism, Spielberger's theory of anxiety is reflective of reality convergence and contributes to real life situations of patients' experiences with anxiety, such as in the setting just prior to surgical procedures (Julian, 2011). This theory is useful, along with the anxiety scale (STAI), which has shown to be both a valid and reliable tool in several studies. The theory of anxiety is significant and addresses essential issues, which further contribute to knowledge development of the overall research. This theory can relate to multiple disciplines, not just the nursing profession. The scope of the theory is relatively broad but is narrowed down with the use of the STAI tool to measure anxiety.

Next, the methods section will be presented and discussed.

Method

Purpose

The purpose of this integrative review was to explore the impact of music therapy on preoperative anxiety in adult patients undergoing surgery.

Design

An integrative review was chosen to synthesize a wide array of diverse methodologies.

Inclusion/Exclusion Criteria

Inclusion criteria for this review included: (a) age greater or equal to 18; (b) surgical patients-inpatient, outpatient, emergency or non-emergency, major and minor surgeries; (c) the preoperative setting; (d) studies that measured anxiety by psychological and physiological factors; (e) quantitative and/or qualitative designs; (f) includes a form of music therapy as strategy to reduce anxiety; and (g) studies written in English.

Exclusion criteria included: (a) settings other than preoperative setting, unless preoperative was separately acknowledged; (b) ages less than 18; (c) strategies to decrease anxiety that does not include music therapy; (d) articles in foreign languages; (e) literature over 10 years; and (f) studies with less than 20 subjects. No limits on gender or ethnicity were included.

Search Strategy

The search strategies used were through electronic searches from PubMed, Medline, and CINAHL databases to retrieve articles. The ancestry approach was used with multiple articles to expand the search. The following key words were used to search for articles: music; preoperative anxiety; anxiety; anxiety measures; music interventions; and music therapy. An initial generalized search using keyword 'music therapy' yielded 5334 articles on Medline, 5005 located within CINAHL, and 5334 on PubMed. The search was narrowed using an additional keyword "preoperative anxiety". The search was significantly reduced to 73 articles within Medline, 65 within CINAHL, and 73 within PubMed. A final advanced search included English language, age criteria, and human subjects generated 7 articles from CINAHL, 14 articles by PubMed, and 6 by Medline. Next, any duplicate studies from the three search hosts were removed and articles were screened again for eligibility. If any full-text articles were removed, reasons for removal are noted and provided to the reader via a flowchart (Figure 1). The end result was a final number of 10 articles included in the integrative review.
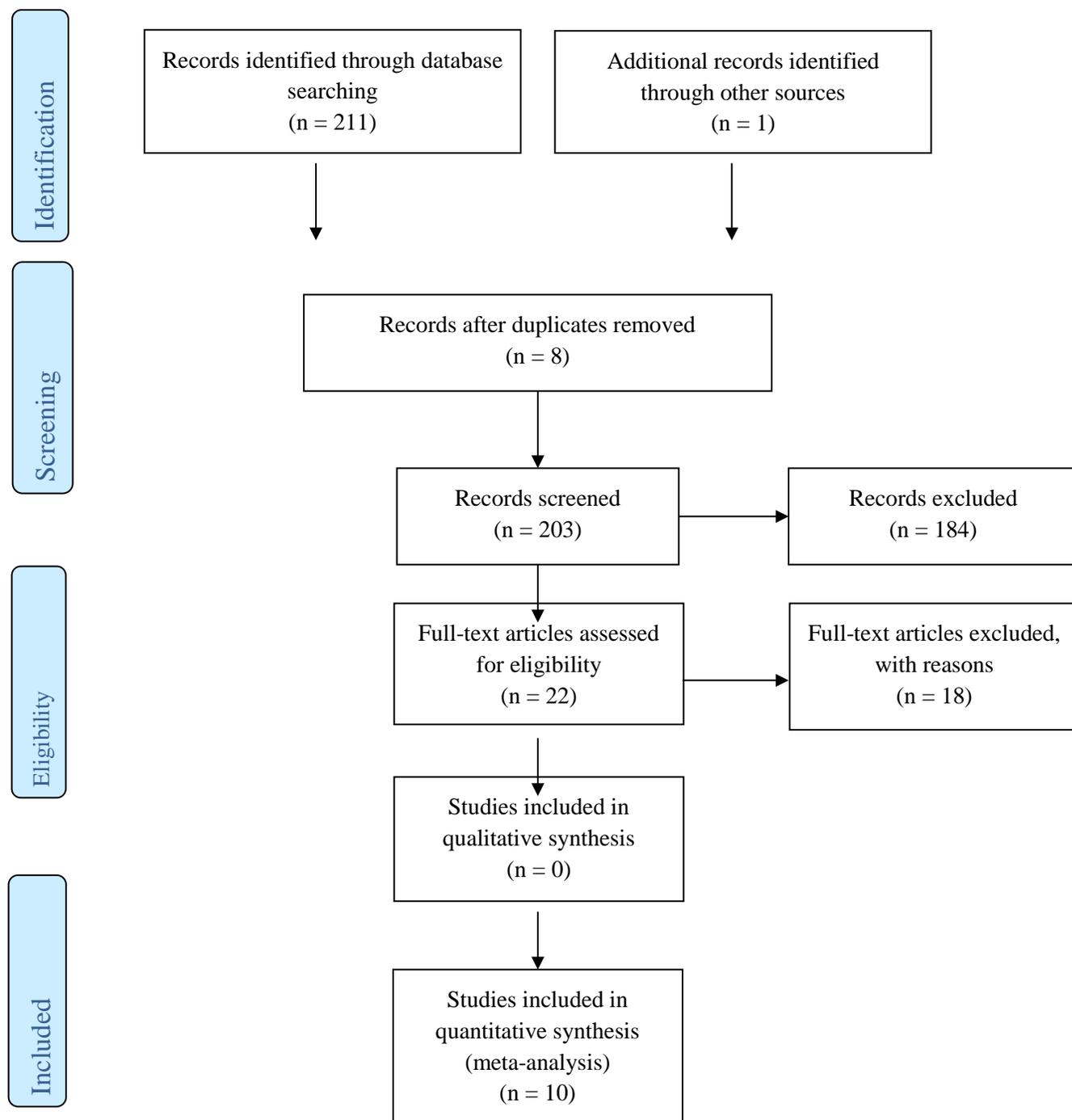
Figure 1. PRISMA Flow Diagram. This figure illustrates the PRISMA statements flow diagram used for the search strategy performed when conducting an integrative review to evaluate eligibility of studies included.

Data Collection Plan

Each of the articles were scanned and read to meet the inclusion and exclusion criteria. If articles did not meet the criteria, they were not included in the review and are recorded as such. Whittemore and Knafl's article, *The Integrative Review: Updated Methodology*, defined strategies of methodologies specific to integrative reviews in five succinct stages (2005). The first stage was problem identification where the concept, target population, problem and clarity of purpose was established. The next stage was literature search stage where keywords, search strategy, and databases were identified. The data evaluation included a grading scale for quality assessment. The next stage was data analysis where data reduction, display, comparison of data, conclusions, verification, and generating generalized ideas was completed (Whittemore & Knafl). The last stage was the presentation phase where a visual presentation was created and disseminated to a specific population for a purpose.

Critical Appraisal

Polit and Beck's Guide to an Overall Critique of Qualitative and Quantitative Research Report (2017) was used to critically evaluate articles included in the integrative review. With this method, articles can be evaluated and appraised quantitatively and qualitatively to ensure a wide array of studies. To critique a quantitative article, several questions were used as a guide to evaluate articles and included title, abstract, introduction, method, discussion and general issues about the article. Within the introduction evaluation, the statement of purpose was investigated, hypotheses or research questions, literature review, and theoretical framework. The method section was appraised by investigating protection of human rights, research design, population and

sample, data collection and measurement methods, procedures such as interventions, data analysis, and findings. Within the discussion section, interpretation of findings and implications/recommendations were further examined. Lastly, general issues regarding presentation, research credibility and summary assessment were explored.

In addition, Polit and Beck's critique (2017) included an evaluation of a literature review. The critique questioned if the review was thorough, recent, peer-reviewed and based on primary sources. Did the review critically appraise and compare key studies? Did the review use appropriate language and objective? Did the author use paraphrases or quotes from original sources? Was the review part of a research report for a new study or support the need for a new study? Lastly, did the review identify gaps in the literature, was it well organized and were the development of ideas clear?

Next, the results section will be discussed.

Results

Results for this integrative review are presented alphabetically by the first author's last name. Appendix A includes tables of critiques of quantitative studies and literature reviews included in the integrative review. Appendix B contains results with data from each study included in the review; for literature reviews, key findings are summarized.

Critique of the Literature

Arslan, Ozer, and Ozyurt (2008; Appendix A-1) conducted a quasi-experimental design using randomized controlled sampling of Turkish men undergoing urogenital surgery investigated the effects of music therapy on preoperative anxiety during 2007. The data were collected from a urology clinic in Aziziye Research Hospital, Suleyman Demirel Medical Centre and Ataturk University. The authors provided a clear statement of purpose, hypothesis and a thorough literature review. The method had a well thought out research design and included randomization of participants. The participants were divided into two groups; either routine preoperative care (control group) or exposed to music of choice for 30 minutes (experimental group). The sample size was well described and based off of a power analysis. The sample size was small and qualified as a limitation of the study. Other biases noted were selection bias of only men included in the study. Inclusion and exclusion criteria was adequately defined. A data collection questionnaire included information on demographics (marital status, education, age and reason for surgery) and State Trait Anxiety Inventory (STAI) was collected. The method in which data were reviewed was not explained and it is unknown if one or all of the authors reviewed the data and how they minimized biases. The method of data analysis was

addressed adequately, and findings were displayed in three tables. Statistical significance was defined as $p<0.05$.

The authors reported a decrease in anxiety score average in the experimental group compared to the control group that was statistically significant $p<0.001$ (Appendix B-1). Mean score before therapy were 39.59 and after therapy were 33.68 for the experimental group. For the control group, mean scores before therapy were 42.25 and after therapy 44.43. Results were not generalizable to all male patients undergoing urogenital surgery or to all Turkish patients due to small sample size from one geographical area of Turkey. The results of the study suggested that listening to preferred music was an effective tool to reduce preoperative anxiety, however in order to generalize results a larger sample size is needed. The discussion section incorporated past research, addressed implications of the findings, and recommended that music be incorporated into future patient encounters.

Dong and Li (2012; Appendix A-2) conducted a present prospective, randomized control study with a quantitative approach to evaluate the effect of music played preoperatively in women undergoing elective cesarean delivery during 2011. The data were collected from Shengjing Hospital. The authors provided a clear statement of purpose and a brief literature review but built a strong basis for a new study. There were no hypotheses or conceptual frameworks provided. The method was well thought out research design and included randomization via a computer-generated number table to assign participants. The participants were randomized into a study group, where the participants listened to music for 30 minutes before surgery and a control group. The sample size was described in sufficient detail and a power analysis was used to calculate

sample size needed. The sample size was small (N=60) and may have contributed to bias. Blinding was not used and could also have contribute to bias. Inclusion criteria were adequately defined. The outcome measures were visual analog scale (VAS) for pain, Zung Self-Rating Anxiety Scale (SAS), and heart rate variability (HRV) via a Holter monitor to look at low-frequency power (LF) and high-frequency power (HF). The method in which data were received was not explained and it is unknown if one or all of the authors reviewed the data. The method of data analysis was addressed adequately, and findings were summarized in two tables. Statistical significance was set at $p<0.05$.

The results of the study are summarized in Appendix B-2. Results showed that music can reduce preoperative anxiety, especially in cesarean delivery, and it can augment effects of anesthesia and maintain hemodynamic stability. The mean LF and LF/HF values were significantly lower and mean HF significantly higher after music therapy ($p<0.05$ for all). Overall differences in values for LF showed intervention group differences of 119.50 ± 201.58 and in the control group -15.86 ± 71.29. The HF showed differences in the intervention group of -113.00 ± 130.62 and control group 14.45 ± 51.40. LF/HF showed intervention group differences of 0.69 ± 0.51 within the intervention group and control group 0.00 ± 0.50. The mean SAS score was significantly less ($p<0.05$) and unchanged in the control group. Difference in values for the intervention group in terms of VAS scores were 7.20 ± 2.09 and 0.03 ± 3.50 for the control group. The changes between groups showed mean SAS score and HRV values were significantly greater than control ($p<0.01$). The authors did not attempt to generalize to areas outside of women undergoing cesarean delivery. The discussion section incorporated past research, addressed implications of the findings, and recommended that

music can reduce preoperative anxiety and ease tension in surgery. Specifically, in cesarean deliveries, music can augment effects of anesthesia and maintain hemodynamics, which can in turn decrease the rate of potential complications and improve overall outcomes of patients. A limitation of the study included the possibility of anesthetic drugs affecting the sympathetic nervous system and thereby affecting HRV values.

Ertuğ, Ulusoylu, Bal, and Özgür (2017; Appendix A-3) conducted a repeated-measures randomized controlled trial to determine and compare the effectiveness of nature sounds and relaxation exercises for reducing preoperative anxiety. The data were collected from a hospital in Ankara, Turkey. The authors provided a clear statement of purpose, hypothesis, and a thorough literature review that built a strong basis for a new study. The hypothesis stated that patients who are exposed to nature sounds or use relaxation techniques will have lower anxiety levels than patients resting silently during the preoperative period. The method included a well thought out research design and randomization of participants was done via a permuted block randomization with sealed envelopes to assign the three groups. To avoid bias, a person not included in the study arranged the envelopes. The three groups included a nature sound group, a relaxation exercise group and a control group. The sample size was described in sufficient detail. A pilot study was done to determine an adequate sample size using a power analysis. A flowchart was utilized to show participant enrollment, refusal, inclusion criteria and total number analyzed in each group. The study was not blinded, and this may have contributed to bias. In addition, participants were exposed to relatives for 30 minutes between the second and third measurement and this may have influenced anxiety levels.

The outcomes were measured using State Anxiety Inventory (SAI) and Visual Analog Scale (VAS). The method in which data were reviewed and by whom was clearly outlined. The method of data analysis was addressed adequately, and findings were displayed in two tables and two figures in which VAS and SAI scores were plotted over time.

Findings are summarized in Appendix B-3. A p value of <0.005 was accepted as statistically significant. The results showed that nature sounds and relaxation exercises were found to reduce preoperative anxiety in the intervention groups compared to the control group. A p value of <0.005 was accepted as statistically significant. VAS scores after the 30-minute intervention were lower in nature sounds groups and relaxation exercises group than the control group (3.10 ± 1.68, 3.28 ± 1.80, 5.44 ± 2.66; p=0.011). Post hoc analysis showed that the control group have higher VAS scores (p<0.016). According to a Pearson correlation analysis, a strong correlation was found between VAS and SAI scores. The authors did not attempt to generalize results. The discussion section incorporated past research, addressed implications of findings, and recommended music as an aid in reducing preoperative anxiety in patients getting general anesthesia. The authors reasonably identified the need for further study recommendations including long period of sessions conducted and objective measurements utilized.

Ghetti et al. (2013; Appendix A-4) conducted a randomized, pre- and post-test experimental design evaluating the use of music therapy, specifically using an emotional-approach coping on preprocedural anxiety in patients undergoing cardiac catheterization. The data were collected from an outpatient cardiovascular treatment and recovery unit from a Midwestern teaching hospital. The authors provided a clear statement of purpose

and thorough and succinct literature review. No hypothesis was included in the study. The method had a well thought out research design and included randomization of participants. Informed consent was obtained, and protection of human rights was maintained. The sample size was small (N=37) and qualified as a limitation of the study. Other biases included a sole researcher, as well as participants and researcher were not blinded. However, the nurses and the interventional cardiologist were blinded. Inclusion criteria were adequately defined. It is of note that only 72% of participants who signed informed consent and met inclusion criteria completed the entire study. The reason for withdrawal was due to patient needing procedure before completing study measures, receiving medications before the end of the procedure or canceled due to lab results. Participants were divided randomly into three groups: one group with music therapy and emotional-approach coping; an emotional-approach coping group; and a control group with standard care. The researcher examined psychological, physiological and procedural variables to make comparisons between groups. Psychological variables included the Positive and Negative Affect Schedule (PANAS) to measure mood states. Physiological variables were measured using vital signs. Procedural variables included length of procedure in minutes, amount of benzodiazepine (Versed) in milligrams, and amount of analgesic (Fentanyl) required for the procedure in micrograms. The method of data analysis was addressed adequately, and findings were displayed in three tables and figures.

Findings are summarized in Appendix B-4. Statistical significance was set at $\alpha=0.05$, which is consistent with the music therapy literature. The results of the study showed that music therapy (MT) with emotional-approach coping (EAC) group led to

improved positive affect states and the EAC group and control group did not. Positive affect results in the MT/EAC group showed pre (28.54) and post (33.46); the EAC group showed pre (31.48) and post (32.29); and the control group showed pre (30.60) and post (30.50). In terms of negative effects, the MT/EAC group showed pre (15.62) and post (12.69); the EAC group showed pre (19.93) and post (17.86); the control group showed pre (14.30) and post (14.30). All groups showed a significant decrease in negative affect. The MT/EAC group showed a statistically significant increase in systolic blood pressure (129.36 MT/EAC group compared to 128.67 in the control group; p=0.012), but not clinically significance as this may be due to active engagement in the activity of music making. In addition, results showed the MT/EAC group to have the shortest procedure lengths and least amount of benzodiazepines required, but not statistically significant (p=0.285). The results of the study were not generalizable outside patients awaiting cardiac catherization and overtly stately this in the study. The discussion section incorporated past research and addressed implications of findings and recommended using a bigger sample size, longer treatment times, as well as including inpatient and outpatient populations.

Kovac (2014; Appendix A-5) conducted a literature review investigating music interventions for the treatment of preoperative anxiety. The review was thorough and included all major studies related to the topic. Recent research was included and relative to the publication date. Appropriate studies from other disciplines were included. Mostly primary sources were used and from peer-reviewed sources. The review was primarily a summary of existing work and adequately compared key studies and brought concepts together. Gaps in the current literature were identified in the review. Overall, the review

was organized and the development of ideas to the reader was adequately understood. There was appropriate language and the review was objective, with a substantial amount of citing from original sources incorporated to report results of previous work done on the topic. Overall, the literature review drew reasonable conclusions about practice implications regarding music therapy and effectiveness on preoperative anxiety.

Kushnir, Friedman, Ehrenfeld, and Kushnir (2012; Appendix A-6) conducted a pre- and posttest experimental design with random assignment to assess the effects of listening to selected music while waiting for a cesarean section on emotional reactions, cognitive appraisal of the threat of surgery, and stress-related physiological reactions. The data were collected from a large regional hospital in Israel. The authors provided a clear statement of purpose, hypothesis, and a strong literature review. The method had a well thought out research design and included randomization of participants. However, researchers themselves were not blinded to randomization of subjects and may contribute to bias. Participants were divided into two groups, an experimental group, exposed to preferred music for 40 minutes and a control group with standard care. Other procedures with a potential for bias included a nonblinded technique. The sample size was small (N=60) and was not based off of a power analysis. Inclusion and exclusion criteria were briefly described. Data collection included vital signs, a Mood State Scale, and a Perceived Threat of Surgery Scale, which are both reported to be reliable. The method in which data was reviewed was not explained and it is unknown if one or all of the authors reviewed the data and how they minimized biases. The method of data analysis was addressed adequately and findings were displayed in two tables and one figure showing subjective measures.

Findings are summarized in Appendix B-6. Simple effects analyses showed that after 40 minutes of music in the experimental group (4.10 ± 0.85), positive emotions were higher than the control group (3.83 ± 1.05), in addition to lower negative emotions (experimental group 3.49 ± 0.86; control group 4.06 ± 0.83) and perceived threat (experimental group 3.19 ± 0.65; control group 3.27 ± 0.73) compared to baseline values ($p<0.0001$ for all subjective measures). Significance regarding systolic blood pressure (SBP) (experimental group 122.07 ± 12.35; control group 124.03 ± 13.30; $p<0.05$), diastolic blood pressure (DBP) (experimental group 74.11 ± 9.49; control group 77.38 ± 20.04; $p<0.01$) and respiratory rate (RR) (experimental group 21.75 ± 2.15; control group 21.87 ± 2.38; $p<0.0001$). Diastolic blood pressure and respiratory rate remained unchanged compared to baseline in the experimental group. However, in the control group, diastolic blood pressure and respiratory rate were higher after 40 minutes compared to baseline. The discussion section incorporated past research and addressed implications of findings and recommended music be incorporated into patient encounters prior to surgery. Results were not able to be generalized outside of women undergoing cesarean sections due to small sample size.

Labrague and McEnroe-Petitte (2016; Appendix A-7) conducted a pre- and post-test experimental design study to determine the influence of music on anxiety levels and the physiologic parameters in women undergoing gynecologic surgery. The data were collected from a 150-bed government hospital in Samar Province, Philippines. The authors provided a clear statement of purpose and a thorough literature review with synthesis of evidence using past literature relevant to the topic. The method had a well thought out research design, but did not include randomization of participants, which may

have contributed to bias. The sample size was well described and purposive sampling was utilized. The sample size was adequate (N= 97). Inclusion criteria were clearly stated. Data collection measures included vital signs and State Trait Anxiety Inventory (STAI). Participants were placed in either a control group with standard care or a music group with three different types of prerecorded music to choose from. The method in which data was reviewed was not explained and it is unknown if one or both authors reviewed the data and how they minimized bias. The method of data analysis was clearly described and findings were summarized in three tables.

Findings are summarized in Appendix B-7. Statistical significance was set at $p<0.05$. The results showed decreases in STAI scores (before 40.75 ± 1.97; after 36.43 ± 1.86; $t=0.61$), systolic blood pressure (before 127.60 ± 5.20; after 123.04 ± 4.25; $t=7.99$), diastolic blood pressure (before 75.93 ± 5.15; after 73.81 ± 4.91; $t=4.16$) and pulse rate (before 75.39 ± 4.87; after 71.39 ± 4.28; $t=5.33$) for the experimental group. Overall, results showed women in the experimental group had lower STAI scores than the control group. Statistically significant increases in STAI scores were noted (before 41.18 ± 2.16; after 43.30 ± 2.02; $p<0.05$) and pulse rate (before 74.82 ± 4.35; after 77.51 ± 3.95; $p<0.05$). Independent t test analyses showed the experimental group had lower STAI scores ($t= 17.41$; $p<0.05$) than the control group. The discussion section incorporated past research and addressed implications of findings and recommended music be incorporated into patient encounters prior to surgery. Results were not able to be generalized outside of women undergoing gynecologic surgery.

Lee et al. (2011; Appendix A-8) conducted a three-group randomized controlled trial investigating the anxiety relieving effect of broadcast versus headphone music

playing for patients before surgery during 2009. The data were collected from a teaching

hospital in Taiwan. The authors provided a clear statement of purpose and a brief,

succinct literature review. The method had a satisfactory research design and included

randomization of participants. A random table was applied to divide numbers 1-30 into

three groups to identify each day of the month as being assigned to one of the three

groups. Participants were randomized to either a control group, a headphone group, or a

broadcast group. The study lacked a pre- and post-test comparison, but to offset this a

control group was added to act as a reference point. The study was designed to minimize

bias and threats to internal validity. Blinding was not used and may have contributed to

bias. The sample size was described in sufficient detail and based off of a power analysis.

The sample size was large (N=167). Inclusion criteria were clearly identified. Data

collection measures included Visual Analog Scale (VAS) and heart rate variability

(HRV). The method in which data was reviewed was not explained and it is unknown if

one or all of the authors reviewed the data and how they minimized bias. The method of

data analysis was addressed adequately and findings were summarized in three tables.

Findings are summarized in Appendix B-8. Statistical significance was defined as

$p<0.05$. Results showed the mean anxiety level for the control group was significantly

higher than the headphone and the broadcast group (5.1 ± 2.7; 4.4 ± 1.6; $p<0.05$). There

was a significant difference in high frequency HR variability among the three groups

(broadcast 42.5, headphone 42.9 and control 35.4; $p<0.01$). In addition, there was

significance in the low frequency HR variability among the three groups (broadcast 54.8,

headphone 57.1 and control 64.6; $p<0.01$). The discussion section incorporated past

research and addressed implications of findings and recommended that music has an

immediate effect on anxiety reduction, however the retention of this is unclear. Results were able to be generalized to patients waiting for surgery. The findings of this study may provide a basis for future studies evaluating music therapy in different surgical procedures.

Ni et al. (2011; Appendix A-9) conducted a randomized controlled clinical trial to evaluate the effects of musical intervention on preoperative anxiety and vital signs in patients undergoing day surgery. The data were collected from an outpatient surgery department. The authors provided a clear statement of purpose, hypothesis and literature review. The method had a well thought out research design and included randomization of participants. The sample size was well described and not based off of a power analysis, but appeared to be adequate (N=172). Randomization was used, but blinding was not and may have contributed to bias. The authors acknowledged that the use of an interviewer who administered the questionnaire may have introduced positive bias in scores. The design attempted to minimize bias by using objective outcome measures. Exclusion criteria were clearly defined. Participants were randomly divided into two groups, a music group with music delivered by earphones for 20 minutes and a control group without music. Data collection measures included State Trait Anxiety Inventory (STAI) and vital signs. Evidence that STAI was previously validated and exhibited high internal consistency (0.90-0.94) was provided. The method in which data was reviewed was not explained and it is unknown if one or all of the authors reviewed the data. The method of data analysis was addressed adequately and findings were displayed in two tables and one figure showing the flowchart of participants.

Findings are summarized in Appendix B-9. Statistical significance was defined at p<0.05. Significant decreases in STAI scores from baseline were seen in both groups (p<0.001). Statistical significance was also seen between the music and control groups in terms of STAI scores (p<0.001). STAI scores decreased my means of 5.83 and 1.72 in the music and control groups, respectively. Decreases in heart rate (music group -5.01 ± 0.79; control group -3.76 ± 0.63), systolic blood pressure (music group -7.72 ± 1.16; control group -12.89 ± 1.16) and diastolic blood pressure (music group -4.26 ± 0.87; control group -4.23 ± 0.78) were seen in both groups from baseline. The authors did not attempt to generalize and overtly stated findings were not generalizable to areas outside of day surgery. The discussion section incorporated past research and addressed implications of findings. The authors concluded that results of the study may indicate patients may benefit from listening to music before surgery as seen by reduced levels of anxiety and physiological indicators of anxiety.

Palmer, Lane, Mayo, Schluchter, and Leeming (2015; Appendix A-10) conducted a three-group randomized controlled trial to investigate the effect of live and recorded music therapy on anesthesia requirements, anxiety levels, recovery time, and patient satisfaction in women experiencing surgery for diagnosis or treatment of breast cancer. The data were collected from University Hospitals Case Medical Center in Cleveland, Ohio and University Hospitals Richmond Medical Center in Richmond Heights, Ohio. The authors provided a clear statement of purpose, hypotheses, and a brief, but good synthesis of evidence in the literature review. The sample size was well described, based off of a power analysis, and adequate (N=201). Eligibility requirements were described in sufficient detail. Purposive sampling was used. An online randomization module was

used to ensure adequate concealment. The method had a well thought out research design and included randomization of participants. The design was set up to minimize bias and threats to internal validity. A permuted block randomization scheme was used to prevent personnel performing the study from guessing the next assignment. Participants were placed in one of three groups: a live music group; a prerecorded music group; or a usual care group without the use of music. Nurses in the study were not blinded and this may have contributed to bias. Data collection measures included the Global Anxiety-Visual Analog Scale (GA-VAS) scores, patient satisfaction, amount of Propofol required to reach a BIS of 70, vital signs, and time to discharge readiness. The method in which data was reviewed was not explained and it is unknown if one or all of the authors reviewed the data. The method of data analysis was addressed adequately and findings were summarized in three tables and two figures.

Findings are summarized in Appendix B-10. Statistical significance was defined as $p<0.025$. Results showed that patient satisfaction overall was high with no difference between control and music groups or between recorded and live music groups independently. Both music groups showed a decrease in anxiety and both differed significantly from the control group (-30.9 ± 36.3 and -26.8 ± 29.3; $p<0.001$). There was no difference observed in GA-VAS scores between the music groups. Shorter discharge times were observed for the live music group when compared to the recorded music group (difference in 12 minutes; CI= -22.5 to -2.2; $p=0.018$). The authors stated that findings may provide a basis for future studies regarding evaluating music therapy in different surgical procedures. They did not attempt to generalize results and overtly stated they were not generalizable to areas outside of women undergoing breast surgery. The

discussion section incorporated past research and addressed implications of findings and recommended the need for further studies regarding therapeutic values of music therapy, specifically in the perioperative setting.

Cross-Study Analysis

Appendix C illustrates findings across studies and illustrates a few recurring themes. The first theme is that preoperative music before surgery clearly influences anxiety levels in patients. Arslan et al. (2008), Dong and Li (2012), Ertug et al. (2012), Labrague and Mcenroe-Petitte (2014), Lee et al. (2011), Ni et al. (2011), and Palmer et al. (2015) all reported decreases in anxiety as measured by some type of anxiety scale. Four authors, Arslan et al. (2008), Ertug et al. (2017), Labrague and Mcenroe-Petitte (2014) and Ni et al. (2011) utilized the State Trait Anxiety Scale, which has been shown to be both reliable and valid in the literature. Even though these authors used the same State Trait Anxiety Scale, no same author used the same version of the scale, as it is translated into various languages. In addition, as with any scale used to measure anxiety, there can be uncontrollable factors such as family members present that may ultimately affect levels of anxiety. Ghetti (2013) and Kushnir et al. (2012) also reported decreases in anxiety, but measured anxiety using emotional scales examining positive and negative emotions. Lee et al. (2011) and Palmer et al. (2015) used visual analog scales to measure anxiety. With all the measurements used, the patient completed their own assessment, making them subjective. In addition, generally the use of blinding of the investigators and nurses was not utilized and may contribute to bias. It should also be noted that in the control groups there may have been an effect on scores due to presence of a caring professional, as noted by Ertug et al. (2017), Ghetti (2013), Ni et al. (2011) and Palmer et

al. (2015). Ghetti noted that decreased wait times to receive care and the possible extra attention may have helped to decrease anxiety levels (2013). Ni et al. posed that use of an interviewer aware of the study may have introduced positive bias and may have impacted anxiety levels (2011). Retention of these anxiety reducing effects remain unknown and was only mentioned briefly in Dong and Li (2012) and Lee et al. (2011).

Another recurring theme was the type of music utilized in the study. Only three authors, Arslan et al. (2008), Kovac (2014), and Palmer et al. (2015), evaluated patients' anxiety using the patient's preference of type of music. Arslan et al. stated that not all patients are likely to prefer all of the same type of music and may differ in regard to age and culture (2008). Palmer et al. discussed how preferred music may stimulate the relaxation response by activating the parasympathetic part of the autonomic nervous system (2015). None of the studies allowed the use of patients' own music. Three authors, Labrague and Mcenroe-Petitte (2014), Lee et al. (2011), and Ni et al. (2011), used headphones as a method of delivery. Labrague and Mcenroe-Petitte identified that using headphones versus speakers may cause different listening experiences, which may ultimately influence anxiety levels (2014). In addition, infection control was a concern with the use of headsets. Only three authors, Ghetti (2013), Kovac (2014) and Palmer et al. (2015), investigated live music on preoperative anxiety. As noted by Palmer et al., there is a logistical challenge of using live music in a fast-paced environment like the preoperative setting and this may not be a realistic option for everyday use (2015).

Six authors, Dong and Li (2012), Ghetti (2013), Kushnir et al. (2012), Labrague and Mcenroe-Petitte (2014), Lee et al. (2011) and Ni et al. (2011), utilized vital signs in addition to the anxiety measures. These secondary outcomes were adjuncts to

determining if a patient was anxious as noted by the autonomic nervous system responses. However, changes in vital signs could also be attributed to increased arousal levels, activity level, and if applicable, related to the physical act of making music. In the study by Dong and Li, a decrease in LF value and LF/HF ratio and rise of HF value indicated that there was reduction in sympathetic nervous system activation and therefore consistent with reduced anxiety levels, as seen by the reduced anxiety scores by the intervention group (2012). Lee et al. found the same results in terms of heart rate variability, showing that the low frequency and the low-to-high frequency LF/HF ratio of the broadcast and headphone groups were significantly lower in comparison to the control group (2011). In terms of physiological variables in the study done by Ghetti, no variation of respiratory rate, heart rate, or oxygen saturation were noted to be significant (2013). An increase in systolic blood pressure was noted, but this may have been related to the physical act of making music and not an accurate indicator of anxiety. The Kushnir et al. study showed a decrease in systolic blood pressure, diastolic blood pressure, and respiratory rate in the music intervention group compared to the control group, which was attributed to lower stress levels after listening to music at the 40-minute mark (2012). The same was true for the study done by Labrague and Mcenroe-Petitte, where results showed decreases in systolic blood pressure, diastolic blood pressure and pulse rate for the experimental group exposed to music (2014). Ni et al. found a decrease in heart rate, systolic blood pressure, and diastolic blood pressure in both groups (2011). However, results were explained to be attributed to "trait-related differences in sympathetic system response to stress, cultural expectations regarding the public display of emotion and previous experience with the stressor" (p.623).

Generalizability of studies do not appear adequate due to small sample size found in several articles. Four authors, Arslan et al. (2008), Dong & Li (2012), Ghetti (2013) and Kushnir et al. (2012), identified small sample size as a limitation. The samples sizes ranged from 37 to 207 participants, with an average number of 113 participants. However, of all of the articles, the highest number of participants was only 207. Six authors, Arslan et al. (2008), Dong & Li (2012), Ghetti (2013), Kushnir et al. (2012), Labrague & Mcenroe-Petitte (2014) and Palmer et al. (2015), conducted studies on specific types of surgeries, including urogenital surgery, cesarean delivery, cardiac catheterization, gynecologic surgery and breast surgery. Four of these authors, Arslan et al. (2008), Kushnir et al. (2012), Labrague & Mcenroe-Petitte (2014) and Palmer et al. (2015), narrowed it down to gender specific surgeries. As noted by Kushnir et al., men may react differently to anxiety and thus, may result in different results in terms of anxiety levels (2012). In pregnant women, anxiety and psychosocial factors may lead to complications during pregnancy and birth; something men do not experience (Kushnir). In addition, responses to music may differ based on gender.

Finally, a lack of blinding was reported by four authors, Ertug et al. (2017), Ghetti (2013), Ni et al. (2011) and Palmer et al. (2015). All four authors attributed this to type of design utilized, all of which were randomized controlled trials. Ertug et al. stated blinding of both investigators and participants was not possible due to nature of the study and does not specify why (2017). However, due to treatment intervention options, it was obvious which group participants were in, i.e. silent room for control, nature sounds, or relaxation exercises. Ghetti explained that participants' awareness of receiving or not receiving music intervention made it difficult to fully blind participants, which was conducted by

the same researcher (2013). However, in this study, interventional cardiologists and nurses who administered medications during the cardiac catheterization were blinded to participation in the study. In the study conducted by Ni et al., the individuals collecting data were aware of who was in each group, as there was only one investigator in the study noted (2011). In addition, it was not noted whether or not participants in the control group had head phones on which would make blinding more difficult. In the study by Palmer et al., blinding was not possible due to the use of live music and the nature of the treatment options (2015). Five authors conducted randomized controlled trials and included Ertug et al. (2017), Ghetti (2013), Lee et al. (2011), Ni et al. (2011) and Palmer et al. (2015). One study conducted by Arslan et al. was a quasi-experimental design with randomized controlled sampling (2008). Another study was a present prospective randomized control study by Dong and Li (2012). There were two studies done with pre-posttest designs by Kushnir et al. (2012) and Labrague & Mcenroe-Petitte (2014). Finally, a literature review was conducted by Kovac (2014).

Next, the summary and conclusions will be presented.

Summary and Conclusions

An integrative review was conducted to examine the impact of music therapy on preoperative anxiety. Untreated anxiety may lead to increased blood pressure and heart rate, as well as increased cortisol levels and delayed wound healing with an increased risk of infection (Scott, 2004). Increased preoperative anxiety levels have been shown to result in delayed jaw relaxation, coughing during induction of anesthesia, autonomic fluctuations, and increased anesthetic requirement (Nigussie et al., 2014). The CINAHL, Medline, and PubMed databases were searched to find articles relevant to the proposed topic. A comprehensive literature review was conducted to highlight the impact of preoperative anxiety on patients undergoing surgery and anesthesia and the potential negative outcomes that may occur. Many articles found on preoperative anxiety were related to nurse influence, preoperative medications administered, and distraction techniques in general. In addition, the literature review defined the difference between music therapy and music intervention. Anxiety scales such as STAI and VAS were used, as well as physiological variables measured, such as vital signs and heart rate variability. In addition, procedural variables were measured in a few studies examining use of medications perioperatively and postoperatively and length of procedure time. The need for an integrative review was apparent upon review of the literature. Studies were screened for inclusion and exclusion criteria and only included if those were met. Results were recorded in the PRISMA flowchart (Figure 1).

Whittemore and Knafl's article, *The Integrative Review: Updated Methodology*, was utilized to identify strategies and methodologies specific to integrative reviews (2005). Polit and Beck's guide to an overall critique of qualitative and quantitative

research was used to critically evaluate the selected literature (2017). The critical appraisal of each article was completed in either a quantitative, qualitative, or literature review format and presented into a corresponding table.

There were a few limitations to this integrative review. Most of the studies had small sample sizes, limiting the ability to generalize. Another limitation was the unexpected potential for bias from influence of external factors such as family members. Family members could potentially have had positive or negative influences on patients and could have skewed overall outcomes of the included studies. The use of non-blinded nurses or investigators could also have skewed outcomes by influencing the type and amount of interaction with the subjects. The timing and type of music included in each study were different in each study, making it difficult to compare overall results to each other. Lastly, the use of only three databases to search for articles was a limitation.

The majority of the studies showed that use of preoperative music before surgery influenced anxiety levels in patients. Arslan et al. (2008), Dong and Li (2012), Ertug et al. (2012), Labrague and Mcenroe-Petitte (2014), Lee et al. (2011), Ni et al. (2011), and Palmer et al. (2015) all reported decreases in anxiety as measured by some type of anxiety scale. Ghetti (2013) and Kushnir et al. (2012) also reported decreases in anxiety, but measured anxiety indirectly using emotional scales examining positive and negative emotions. In terms of music intervention, only three authors, Arslan et al. (2008), Kovac (2014), and Palmer et al. (2015), evaluated patients' anxiety using the patients' preference for type of music and none of the studies allowed the use of patients' own music. Three authors, Labrague and Mcenroe-Petitte (2014), Lee et al. (2011), and Ni et al. (2011), used headphones as a method of delivery. Labrague & Mcenroe-Petitte

identified that using headphones versus speakers may cause different listening experiences, which may ultimately influence anxiety levels (2014). Lastly, only three authors, Ghetti (2013), Kovac (2014) and Palmer et al. (2015), investigated live music on preoperative anxiety, which was most likely related to cost and convenience in a preoperative setting.

In summary, the literature included in the integrative review supported music being utilized for anxiety in the preoperative setting. With anxiety comes the potential need for increased medications, difficulty with induction, and physiological changes (Bradt et al., 2013). Finding the right treatment for the patient, using the least invasive technique, is optimal. Use of music is a low-cost intervention with minimal risk to patients that should be further studied, implemented, and evaluated.

Recommendations and implications for advanced nursing practice will be discussed in the next section.

Recommendations and Implications for Advanced Nursing Practice

Integrative reviews provide a synthesis of existing knowledge and give the reader the ability to then apply this information into practice using an evidence-based approach. The goal of a Certified Registered Nurse Anesthetist (CRNA) is to provide safe care to patients using standards of care, as well as incorporating evidence-based practice through up-to-date research to guide practice techniques. Preoperative anxiety is not always amenable to medications and may have a severe, negative impact on patient outcomes. When choosing an option to treat preoperative anxiety, a vigilant provider must use all of the tools available. Music intervention is one technique that has been shown to decrease anxiety in patients awaiting surgery.

Anxiety occurs frequently in the preoperative setting and may cause severe adverse effects like increased heart rate, blood pressure, cortisol levels, as well as delayed wound healing and increased anesthetic requirements. It is clear that for the advanced practice nurse, especially the CRNA, control of anxiety is extremely important to patients' overall well-being. The CRNA should utilize evidenced-based practices to minimize the effects of untreated anxiety. One way that anxiety may be minimized is with music intervention. It is an inexpensive and non-invasive technique that eliminates the potential side effects of medications needed to minimize anxiety levels just before surgery. Ten out of 10 of the articles included in this review demonstrated that the use of some type of music minimized preoperative anxiety to some degree. Using this practice may help to minimize or eliminate the potential side effects of medications such as benzodiazepines. Although it was not proven that music intervention worked better than anti-anxiety medications, it may benefit as an adjunct. Caution should be taken when

using music intervention solely to treat severe anxiety, as this may not be adequate to manage anxiety.

Within the scope of CRNA practice, one patient is under his/her care at one time. There is sometimes a very narrow window of time to complete thorough preoperative assessments in-between cases and these may be completed by an anesthesiologist or a CRNA. At times, the act of initiating music intervention for preoperative anxiety may present a challenge. It is important for the CRNA to collaborate with the anesthesiologist and preoperative nurses as to what would be best for the patient experiencing preoperative anxiety. Anesthesiologists and preoperative nurses could be trained to set up and initiate a music intervention with the use of the music device, including headphones. A possible option is to have built in speakers into each of the rooms or a channel on the TV to plug headphones in or purchasing individual music devices and disposable headphones. The built-in speaker option may be costly and not suitable to all patients in the preoperative area. This may also impact patient care as a type of added distraction in an already busy environment.

In addition, teaching fellow CRNAs would be imperative. An evidence-based teaching presentation would help convey the importance and potential positive outcome of this intervention. Training skills would be minimal and would simply require operating a music device and retrieving the device and headphones. There are minimal ethical considerations in terms of music intervention. If patients become uncomfortable with the music at any time, simply shutting the device off would be adequate to meet patient anxiety level needs.

From the articles reviewed, there have were no recommendations for policy change when it comes to using music interventions in the preoperative setting. However, CRNAs can collaborate with preoperative nurses and anesthesiologists to discuss and implement a policy for the institution that results in safety of patients and improved outcomes. To implement the policy of allowing music therapy into the preoperative area, the CRNA or chief CRNA may request to meet with management and administration of the hospital to discuss the possible options and propose the purchase of equipment that will be needed by emphasizing and encouraging the potential benefit to patients.

Future research may be done to assess the use of music interventions against the use of antianxiety medications, as well as evaluating the overall therapeutic value of music therapy. A study regarding music intervention compared to anti-anxiety relieving techniques including medications may help quantify overall significance of this practice. The studies assessed in this review all used similar methods of evaluation for anxiety, however they differed in the type of music and amount of time exposed to music. Further research may investigate the amount of time exposed to music intervention and the impact on preoperative anxiety. In addition, the method of evaluation when assessing anxiety may be subjective when using anxiety scales alone. Future studies may consider using blood levels of cortisol and other potential markers of anxiety in addition to vital signs and anxiety scales to serve as a more objective adjunct when evaluating anxiety. When lab results are used exclusively to measure anxiety, there may be other reasons for elevation, including sympathetic response to stress and should be used with caution.

This integrative review showed the benefits of using music as an aide in decreasing anxiety and this author has concluded that music is an acceptable intervention

to be used in practice by the CRNA. With the use of this knowledge, advanced practice nurses may be better able to identify and treat preoperative anxiety in a variety of ways shown to have a significant effect on anxiety levels. Investigating these additional studies would help improve overall safety of patients and refine protocols already in place.

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Appendix A-1

Arslan, S., Ozer, N., & Ozyurt, F. (2008). Effect of music on preoperative anxiety in men undergoing urogenital surgery. *Australian Journal of Advanced Nursing*, *26*(2), 46–54

Aspect of the Report	Critiquing Questions	Detailed Critiquing Guidelines
Title	• Is the title a good one, succinctly suggesting key variables and the study population?	The title clearly identified the subject, location, and time frame of the study.
Abstract	• Did the abstract clearly and concisely summarize the main features of the report (problem, methods, results, conclusions)?	The abstract thoroughly summarized the main features and includes objective, design, settings, subjects, intervention, main outcome measures, results and conclusion.
Introduction Statement of the problem	• Was the problem stated unambiguously, and was it easy to identify? • Is the problem statement build a persuasive argument for the new study? • Was there a good match between the research problem and the methods used –that is, was a quantitative approach appropriate?	The problem was easily identified and clear to the reader. Introduction suggested benefits of music and its anxiolytic effects and builds an adequate persuasive argument for a new study. The study's relevance to nursing clinical practice was clearly stated. A quasi-experimental design was conducted and participants were selected using randomized controlled sampling.
Hypotheses or research questions	• Were research questions and/or hypotheses explicitly stated? If not, was their absence justified? • Were questions and hypotheses appropriately worded, with clear specification of key variables and the study population? • Were the questions/hypotheses consistent with existing knowledge?	The aim of the study was clearly stated as well as the hypothesis. The hypothesis was correctly worded and included key variables and study population. The key variable was anxiety levels as measured by the State Trait Anxiety Inventory (STAI) scale with pre- and post-test measurements. The hypothesis was consistent with existing knowledge.

Literature review	• Was the literature review up-to-date and based mainly on primary sources? • Did the review provide a state-of-the-art synthesis of evidence on the problem? • Did the literature review provide a strong basis for the new study?	The literature review section was thorough and discussed previous studies conducted on topic. The review provided a good synthesis of evidence and a strong basis for a new study.
Conceptual/theoretical framework	• Were key concepts adequately defined conceptually? • Was a conceptual/theoretical framework articulated—and, if so, was it appropriate? If not, is the absence of a framework justified? • Were the questions/hypotheses consistent with the framework?	There was no theoretical framework identified. Concepts were adequately defined and thoroughly described.
Method Protection of human rights	• Were appropriate procedures used to safe-guard the rights of study participants? • Was the study externally reviewed by an IRB/ethics review board? • Was the study designed to minimize risks and maximize benefits to participants?	The study used appropriate procedures designed to safeguard rights of patients and included an ethics section describing the process. Written permission for the study to be conducted was obtained. It was noted that a formal ethical approval was not required in Turkey because this study does not pose a threat to human life. Verbal informed consent was obtained from all participants.
Research design	• Was the most rigorous design used, given the study purpose? • Were appropriate comparisons made to enhance interpretability of the findings? • Was the number of data collection points appropriate? • Did the design minimize biases and threats to the internal, construct, and	The design used was consistent with study goals and purpose and fit the research question. Participants were selected using randomized controlled sampling. Appropriate comparisons were made and the number of data points were adequate (N=64).

	external validity of the study (e.g., was blinding used, was attrition minimized)?	
Population and sample	• Was the population identified? Was the sample described in sufficient detail? • Was the best possible sampling design used to enhance the sample's representativeness? Were sampling biases minimized? • Was the sample size based on a power analysis?	The population was identified in detail in the introduction section. The sample was clearly identified and described as being recruited from a urology clinic in Aziziye Research Hospital, Suleyman Demirel Medical Centre and Ataturk University. No flowchart was made to identify sample size or early termination. Biases included small sample size, as well as selection bias as it was only men were eligible and who agreed to participate in one geographical area of Turkey. The sample size was based on a power analysis. Alpha level was set at 0.05 and reliability was 95% during calculation of power analysis. Although the sample size was noted to be small, it is comparable to previous studies performed on same topic and it was based on a power analysis.
Data collection and measurement	• Were the operational and conceptual definitions congruent? • Were key variables measured using an appropriate method (e.g., interviews, observations, and so on)? • Were specific instruments adequately described and were they good choices, given the study population and the variables being studied? • Did the report provide evidence that the data collection methods yielded data that were reliable, valid and responsive?	The authors performed the study how they conceptualized it. Key variables were measured appropriately using STAI scores. The report provided evidence that measurement (STAI) was valid and reliable. It was translated and discussed with a group of experts to determine content validity as well. Cronbach's alpha of STAI yielded score of 0.94.

Procedures	• If there was an intervention, was it adequately described, and was it rigorously developed and implemented? Did most participants allocated to the intervention group actually receive it? Was there evidence of intervention fidelity? • Were data collected in a manner that minimized bias? Were the staff who collected data appropriately trained?	Intervention was adequately described. All 32 participants in control group remained in that group. All 32 participants in music group actually received music. All interventions were administered as intended. It was not noted if the staff were trained or not.
Data Analysis	• Were analyses undertaken to address each research question or test each hypothesis? • Were appropriate statistical methods used, given the level of measurement of the variables, number of groups being compared, and assumptions of the texts? • Was a powerful analytic method used? (e.g., did the analysis help to control for confounding variables)? • Were type I and Type II errors avoided or minimized? • In intervention studies, was an intention-to-treat analysis performed? • Were problems of missing values evaluated and adequately addressed?	The data were well analyzed to address the research question. The statistical method was appropriate. Powerful analytic methods were not used. Data were coded and used in database using SPSS version 10.0. Demographic information was compared using chi-square and independent samples t-tests were used to compare scores of experimental and control groups. Paired t-tests were used to examine significant differences between pre- and posttest STAI. Intention-to-treat analysis was not performed. No missing values were identified, nor were they addressed.
Findings	• Was information about statistical significance presented? Was information about effect size and precision of estimates (confidence intervals) presented?	Statistical significance of STAI scores was conducted and the level for this study was 0.05. The findings were adequately summarized including three tables. Information was not provided about confidence intervals.

	• Were the findings adequately summarized, with good use of tables and figures? • Were findings reported in a manner that facilitates a meta-analysis, and with sufficient information needed for EBP?	
Discussion Interpretation of the findings	• Were all major findings interpreted and discussed within the context of prior research and/or the study's conceptual framework? • Were casual inferences, if any, justified? • Was the issue of clinical significance discussed? • Were interpretations well-founded and consistent with the study's limitations? • Did the report address the issue of the generalizability of the findings?	The findings were discussed in the context of the research question. Casual inferences were made and justified given the results of the study. Clinical significance was discussed and interpretations appropriate. The study did not attempt to generalize and overtly stated it is not generalizable to all male patients undergoing urogenital surgery or to all Turkish people.
Implications/ recommendations	• Did the researchers discuss the implications of the study for clinical practice or further research—and were those implications reasonable and complete?	There was an implication for nursing practice section included which was reasonable and complete.
General Issues Presentation	• Was the report well-written, organized, and sufficiently detailed for critical analysis? • In intervention studies, was a CONSORT flowchart provided to show the flow of participants in the study? • Was the report written in a manner that makes the findings accessible to practicing nurses?	The report was easy to follow, well organized and sufficiently detailed. Report was written in a manner that is accessible for practicing nurses.
Researcher credibility	• Do the researchers' clinical, substantive, or methodologic qualifications and experience enhance	There was information about the authors' qualifications and experience on the first page which included their titles and

	confidence in the findings and their interpretation?	place of employment/ affiliation.
Summary assessment	• Despite any limitations, do the study findings appear to be valid—do you have confidence in the *truth* value of the results? • Does the study contribute any meaningful evidence that can be used in nursing practice or that is useful to the nursing discipline?	Study appears to be valid and to have truth value of the results. The study identified a problem and showed a need for further research in the male population with a larger sample size.

Appendix A-2

Dong, Y. & Li, Y. (2012). Preoperative music intervention for patients undergoing cesarean delivery. *International Journal of Gynecology & Obstetrics,119*(1), 81-83. doi:10.1016/j.ijgo.2012.05.017

Aspect of the Report	Critiquing Questions	Detailed Critiquing Guidelines
Title	• Is the title a good one, succinctly suggesting key variables and the study population?	The title clearly identified the subject, location, and time frame of the study.
Abstract	• Did the abstract clearly and concisely summarize the main features of the report (problem, methods, results, conclusions)?	The abstract thoroughly outlined all the components of the study and included objective, methods, results and conclusions.
Introduction Statement of the problem	• Was the problem stated unambiguously, and was it easy to identify? • Is the problem statement build a persuasive argument for the new study? • Was there a good match between the research problem and the methods used –that is, was a quantitative approach appropriate?	The problem was easily identified, clear, and suggested a need for a new study. The introduction suggested benefits of music and its anxiolytic effects and built a persuasive argument investigating maternal anxiety. A present prospective, randomized control study was a quantitative approach and appropriate for the research problem.
Hypotheses or research questions	• Were research questions and/or hypotheses explicitly stated? If not, was their absence justified? • Were questions and hypotheses appropriately worded, with clear specification of key variables and the study population? • Were the questions/hypotheses consistent with existing knowledge?	The objective of the study was clearly stated. No hypotheses were presented or explicitly stated. No research questions were explicitly included. The research problem was consistent with existing knowledge.
Literature review	• Was the literature review up-to-date and based mainly on primary sources? • Did the review provide a state-of-the-art synthesis of evidence on the problem?	The literature review was brief, but built a strong basis for new study. Primary sources used with mix of up-to-date and not up-to-date sources included.

	• Did the literature review provide a strong basis for the new study?	
Conceptual/theoretical framework	• Were key concepts adequately defined conceptually? • Was a conceptual/theoretical framework articulated—and, if so, was it appropriate? If not, is the absence of a framework justified? • Were the questions/hypotheses consistent with the framework?	Concepts were adequately defined and no theoretical framework was identified.
Method Protection of human rights	• Were appropriate procedures used to safe-guard the rights of study participants? • Was the study externally reviewed by an IRB/ethics review board? • Was the study designed to minimize risks and maximize benefits to participants?	The study used appropriate procedures to safeguard rights of patients. The study was approved by the Ethics Committee of China Medical University affiliated with Shengjinj Hospital. Informed consent was obtained from all participants. The authors overtly stated it was done in a safe noninvasive way, to minimize risks and maximize benefits to the participants.
Research design	• Was the most rigorous design used, given the study purpose? • Were appropriate comparisons made to enhance interpretability of the findings? • Was the number of data collection points appropriate? • Did the design minimize biases and threats to the internal, construct, and external validity of the study (e.g., was blinding used, was attrition minimized)?	The design used was consistent with study goals and most rigorous. Randomization was done by a computer generated random number table to assign participants to the control and study group. Appropriate comparisons were made between study and control group. The outcome measures compared differences in anxiety scores and heart rate variability, as well as pain scores. Number of data points was adequate (N=60).
Population and sample	• Was the population identified? Was the sample	The population was identified in the introduction. The sample

	described in sufficient detail? • Was the best possible sampling design used to enhance the sample's representativeness? Were sampling biases minimized? • Was the sample size based on a power analysis?	was described in sufficient detail. Power analysis was used to calculate sample size needed, rendering 80% power to detect a clinically significant difference at α=0.05 and β=0.20. A flowchart was not utilized. The study did not include if blinding was used and this may have contributed to bias. Sample size was comparable to other studies done on similar topic.
Data collection and measurement	• Were the operational and conceptual definitions congruent? • Were key variables measured using an appropriate method (e.g., interviews, observations, and so on)? • Were specific instruments adequately described and were they good choices, given the study population and the variables being studied? • Did the report provide evidence that the data collection methods yielded data that were reliable, valid and responsive?	The authors performed the study how they conceptualized it. Key variables were adequately described. Outcomes were measured using a visual analog scale (VAS) for pain, Zung Self-Rating Anxiety Scale (SAS), and heart rate variability (HRV) via a Holter Monitor. No evidence was provided to show collection methods were reliable and/or valid.
Procedures	• If there was an intervention, was it adequately described, and was it rigorously developed and implemented? Did most participants allocated to the intervention group actually receive it? Was there evidence of intervention fidelity? • Were data collected in a manner that minimized bias? Were the staff who collected data appropriately trained?	The intervention performed was adequately described, but would have benefitted from more detail and expansion. The study included a total of 60 participants, with 30 participants randomized to the study group and 30 participants randomized to the control group. All interventions were administered as intended. It was not noted if the staff were trained or not.
Data Analysis	• Were analyses undertaken to address each research	The data were well analyzed to address the research question.

	question or test each hypothesis? • Were appropriate statistical methods used, given the level of measurement of the variables, number of groups being compared, and assumptions of the texts? • Was a powerful analytic method used? (e.g., did the analysis help to control for confounding variables)? • Were type I and Type II errors avoided or minimized? • In intervention studies, was an intention-to-treat analysis performed? • Were problems of missing values evaluated and adequately addressed?	The statistical method was appropriate. Data were analyzed using SPSS version 13.0. Paired t-tests were used to compare changes and differences between groups. $P<0.05$ was considered significant. Intention-to-treat analysis was not performed. No missing values were identified, nor were they addressed.
Findings	• Was information about statistical significance presented? Was information about effect size and precision of estimates (confidence intervals) presented? • Were the findings adequately summarized, with good use of tables and figures? • Were findings reported in a manner that facilitates a meta-analysis, and with sufficient information needed for EBP?	The findings were summarized in two tables. Information was provided about confidence intervals and effect size. Information provided was sufficient for EBP.
Discussion Interpretation of the findings	• Were all major findings interpreted and discussed within the context of prior research and/or the study's conceptual framework? • Were casual inferences, if any, justified? • Was the issue of clinical significance discussed? • Were interpretations well-founded and consistent with the study's limitations?	The findings were discussed in the context of the research question. Casual inferences were made and justified given the results of the study. Clinical significance was discussed and interpretations appropriate. The study did not attempt to generalize to areas outside of women undergoing cesarean delivery.

	• Did the report address the issue of the generalizability of the findings?	
Implications/ recommendations	• Did the researchers discuss the implications of the study for clinical practice or further research—and were those implications reasonable and complete?	The authors reasonably identified the need for further study comparing music interventions with other methods that would decrease sympathetic and increase parasympathetic activity. The implications made were reasonable and complete.
General Issues Presentation	• Was the report well-written, organized, and sufficiently detailed for critical analysis? • In intervention studies, was a CONSORT flowchart provided to show the flow of participants in the study? • Was the report written in a manner that makes the findings accessible to practicing nurses?	The report was easy to follow, well organized and adequately detailed. The report was written in a manner that is accessible for practicing nurses.
Researcher credibility	• Do the researchers' clinical, substantive, or methodologic qualifications and experience enhance confidence in the findings and their interpretation?	There was information about the author's qualifications and experience on the first page.
Summary assessment	• Despite any limitations, do the study findings appear to be valid—do you have confidence in the *truth* value of the results? • Does the study contribute any meaningful evidence that can be used in nursing practice or that is useful to the nursing discipline?	The study appeared to be valid and appeared to have truth value of the results. The study identified a problem and showed a need for further research, possibly comparing music interventions with other methods that would decrease sympathetic and increase parasympathetic activity.

Appendix A-3

Aspect of the Report	Critiquing Questions	Detailed Critiquing Guidelines
Title	• Is the title a good one, succinctly suggesting key variables and the study population?	The title clearly identified the subject, location, and time frame of the study.
Abstract	• Did the abstract clearly and concisely summarize the main features of the report (problem, methods, results, conclusions)?	The abstract outlined all the components of the study and included objective, methods, results and conclusions.
Introduction Statement of the problem	• Was the problem stated unambiguously, and was it easy to identify? • Is the problem statement build a persuasive argument for the new study? • Was there a good match between the research problem and the methods used –that is, was a quantitative approach appropriate?	The problem was easily identified, clear, and suggested a need for a new study. The introduction suggested benefits of music, specifically nature sounds and relaxation exercise and its anxiolytic effects and built a persuasive argument investigating preoperative anxiety. A repeated measures randomized controlled trial was used, with two intervention group and a control group.
Hypotheses or research questions	• Were research questions and/or hypotheses explicitly stated? If not, was their absence justified? • Were questions and hypotheses appropriately worded, with clear specification of key variables and the study population? • Were the questions/hypotheses consistent with existing knowledge?	The objective of the study was clearly stated, with key variables identified. The key variables included nature sounds and relaxation exercises. The hypothesis was explicitly stated, with clear specification of variables and study population. The hypothesis was consistent with existing knowledge. No research questions were explicitly included.
Literature review	• Was the literature review up-to-date and based mainly on primary sources?	The literature review was thorough and built a strong basis for new study. Primary sources were used with mix of up-to-date and not

		up-to-date sources included, i.e. greater than 10 years from publication.
	• Did the review provide a state-of-the-art synthesis of evidence on the problem? • Did the literature review provide a strong basis for the new study?	
Conceptual/theoretical framework	• Were key concepts adequately defined conceptually? • Was a conceptual/theoretical framework articulated—and, if so, was it appropriate? If not, is the absence of a framework justified? • Were the questions/hypotheses consistent with the framework?	Concepts were adequately defined and no theoretical framework identified.
Method Protection of human rights	• Were appropriate procedures used to safe-guard the rights of study participants? • Was the study externally reviewed by an IRB/ethics review board? • Was the study designed to minimize risks and maximize benefits to participants?	The study used appropriate procedures to safeguard rights of participants. The study was approved by the Turgut Özal University Research Ethics Committee, and written permission was obtained from the hospital. Informed consent was obtained from all participants. The authors stated the interventions did not harm or compromise participants in any way. The authors informed patients that participation was voluntary and that they could withdraw at any time.
Research design	• Was the most rigorous design used, given the study purpose? • Were appropriate comparisons made to enhance interpretability of the findings? • Was the number of data collection points appropriate? • Did the design minimize biases and threats to the internal, construct, and	The design used was consistent with study goals and most rigorous. A permuted-block randomization with sealed envelopes was used to assign patients randomly to the three groups. Groups included a nature sounds group (n=53), a relaxation exercise group (n=53) and a control group (n=53). To avoid bias with this technique, a person not involved in the study randomly

	external validity of the study (e.g., was blinding used, was attrition minimized)?	placed participants' names into envelopes. There were appropriate comparisons made between study and control group. The outcome measures compared differences in anxiety scores using State Anxiety Inventory scores (SAI) and visual analog scale (VAS), both to measure anxiety levels. The number of data points were adequate (N=159).
Population and sample	• Was the population identified? Was the sample described in sufficient detail? • Was the best possible sampling design used to enhance the sample's representativeness? Were sampling biases minimized? • Was the sample size based on a power analysis?	The population was identified thoroughly in the introduction. The sample was described in sufficient detail. A pilot study was conducted to determine a sample size of 159 patients necessary using a power analysis with $\alpha=0.05$ and $\beta=0.20$. A flowchart was utilized and showed participant enrollment, refusal, inclusion criteria, and total number analyzed in each group. The study was not blinded and may have contributed to bias. Another reason for bias was that participants spent 30 minutes with relatives between second and third measurement and that may have influenced anxiety levels. The sample size was comparable to other studies done on similar topic.
Data collection and measurement	• Were the operational and conceptual definitions congruent? • Were key variables measured using an appropriate method (e.g., interviews, observations, and so on)? • Were specific instruments adequately described and were they good choices, given the study population	The authors performed the study how they conceptualized it. The key variables were adequately described. The outcome measures SAI and VAS to measure anxiety levels. No evidence was provided to show collection methods were adequately reliable and/or valid.

	and the variables being studied? • Did the report provide evidence that the data collection methods yielded data that were reliable, valid and responsive?	
Procedures	• If there was an intervention, was it adequately described, and was it rigorously developed and implemented? Did most participants allocated to the intervention group actually receive it? Was there evidence of intervention fidelity? • Were data collected in a manner that minimized bias? Were the staff who collected data appropriately trained?	The intervention performed was thoroughly described. The study included a total of 159 participants, with 30 participants randomized to each of the three groups, each containing 53 participants. All interventions were administered as intended. The staff were not noted to be trained or not.
Data Analysis	• Were analyses undertaken to address each research question or test each hypothesis? • Were appropriate statistical methods used, given the level of measurement of the variables, number of groups being compared, and assumptions of the texts? • Was a powerful analytic method used? (e.g., did the analysis help to control for confounding variables)? • Were type I and Type II errors avoided or minimized? • In intervention studies, was an intention-to-treat analysis performed? • Were problems of missing values evaluated and adequately addressed?	The data were well analyzed to address the research question. The statistical method was appropriate. The data were analyzed using SPSS version 21.0. The chi-square test was used to evaluate the homogeneity of the participants within groups. One-way analysis of variance (ANOVA) was completed to compare anxiety levels between groups through measurement of time. Independent variables were evaluated with independent t-test and one-way ANOVA. Post hoc analysis was performed to look at differences between groups. A P value of <0.005 was accepted as statistically significant, the repeated-measures ANOVA significance level was set at $P \leq 0.016$. Intention-to-treat analysis was not performed.

		There were no missing values identified, nor were they addressed.
Findings	• Was information about statistical significance presented? Was information about effect size and precision of estimates (confidence intervals) presented? • Were the findings adequately summarized, with good use of tables and figures? • Were findings reported in a manner that facilitates a meta-analysis, and with sufficient information needed for EBP?	The findings were summarized in two tables and two figures. The figures identified VAS and SAI scores over time plotted over time. No information was provided about confidence intervals and effect size. Information provided was sufficient for EBP.
Discussion Interpretation of the findings	• Were all major findings interpreted and discussed within the context of prior research and/or the study's conceptual framework? • Were casual inferences, if any, justified? • Was the issue of clinical significance discussed? • Were interpretations well-founded and consistent with the study's limitations? • Did the report address the issue of the generalizability of the findings?	The findings were discussed in the context of the research question. Casual inferences were made and justified given the results of the study. Clinical significance was discussed and interpretations were appropriate. The study did not attempt to generalize results. The interpretations of the authors were consistent with limitations.
Implications/ recommendations	• Did the researchers discuss the implications of the study for clinical practice or further research—and were those implications reasonable and complete?	The authors reasonably identified the need for further study comparing different types of music, i.e. nature sounds, as well as relaxation exercises to help with preoperative anxiety. Recommendations for future studies included long period of sessions conducted and objective measurements utilized. The implications made were reasonable and complete.

General Issues Presentation	• Was the report well-written, organized, and sufficiently detailed for critical analysis? • In intervention studies, was a CONSORT flowchart provided to show the flow of participants in the study? • Was the report written in a manner that makes the findings accessible to practicing nurses?	The report was easy to follow, well organized and adequately detailed. The report was written in a manner that is accessible for practicing nurses.
Researcher credibility	• Do the researchers' clinical, substantive, or methodologic qualifications and experience enhance confidence in the findings and their interpretation?	There was information about the authors' qualifications and experience on the first page.
Summary assessment	• Despite any limitations, do the study findings appear to be valid—do you have confidence in the *truth* value of the results? • Does the study contribute any meaningful evidence that can be used in nursing practice or that is useful to the nursing discipline?	The study appeared to be valid and results had truth value.

Appendix A-4

Ghetti, C. M. (2013). Effect of music therapy with emotional-approach coping on Preprocedural Anxiety in Cardiac Catheterization: A Randomized Controlled Trial. *Journal of Music Therapy,50*(2), 93-122. doi:10.1093/jmt/50.2.93

Aspect of the Report	Critiquing Questions	Detailed Critiquing Guidelines
Title	• Is the title a good one, succinctly suggesting key variables and the study population?	The title clearly identified the subject, location, and time frame of the study.
Abstract	• Did the abstract clearly and concisely summarize the main features of the report (problem, methods, results, conclusions)?	The abstract thoroughly outlined all the components of the study and included background, objective, methods, results and conclusions.
Introduction Statement of the problem	• Was the problem stated unambiguously, and was it easy to identify? • Is the problem statement build a persuasive argument for the new study? • Was there a good match between the research problem and the methods used –that is, was a quantitative approach appropriate?	The problem was easily identified, clear, and suggests a need for study. Introduction suggested benefits of music and its' anxiolytic effects. It also built a persuasive argument for empirical evidence. A (RCT) randomized, pre- and posttest experimental design was the best match for the research problem.
Hypotheses or research questions	• Were research questions and/or hypotheses explicitly stated? If not, was their absence justified? • Were questions and hypotheses appropriately worded, with clear specification of key variables and the study population? • Were the questions/hypotheses consistent with existing knowledge?	The objective of the study was clearly stated. No hypotheses were presented or explicitly stated. The study included three research questions. Within these, key variables and the study population are easily identified. Key variables included psychological, physiological and procedural variables. The research problem was consistent with existing knowledge.
Literature review	• Was the literature review up-to-date and based mainly on primary sources?	The literature review was thorough and succinct, with good synthesis of evidence on problem. This section built a strong basis for new study.

	• Did the review provide a state-of-the-art synthesis of evidence on the problem? • Did the literature review provide a strong basis for the new study?	Primary sources were used with a mix of up-to-date and not up-to-date sources.
Conceptual/theoretical framework	• Were key concepts adequately defined conceptually? • Was a conceptual/theoretical framework articulated—and, if so, was it appropriate? If not, is the absence of a framework justified? • Were the questions/hypotheses consistent with the framework?	The concepts were thoroughly defined and a conceptual framework was articulated and appropriate for the study. The research questions were consistent with framework.
Method Protection of human rights	• Were appropriate procedures used to safe-guard the rights of study participants? • Was the study externally reviewed by an IRB/ethics review board? • Was the study designed to minimize risks and maximize benefits to participants?	There were appropriate procedures used to safeguard rights of patients. The study was approved by the hospital's IRB and informed consent was obtained from all participants. The study was designed to minimize risks and maximize benefits to participants.
Research design	• Was the most rigorous design used, given the study purpose? • Were appropriate comparisons made to enhance interpretability of the findings? • Was the number of data collection points appropriate? • Did the design minimize biases and threats to the internal, construct, and external validity of the study (e.g., was blinding used, was attrition minimized)?	The design used was consistent with study purpose and most rigorous design was utilized. The design was random, but did not include blinding, which may contribute to bias. In addition, the sample size was limited and included a sole researcher. It is of note that the researcher was not blinded, but the interventional cardiologists and nurses were blinded. There were appropriate comparisons made between three groups; one group with music therapy and emotional-approach coping, one group of emotional-approach coping and lastly, a control group. The

		researcher examined psychological, physiological and procedural variables to make comparisons between groups. Number of data points were minimal (N=37). 41% of individuals who were approached for the study declined.
Population and sample	• Was the population identified? Was the sample described in sufficient detail? • Was the best possible sampling design used to enhance the sample's representativeness? Were sampling biases minimized? • Was the sample size based on a power analysis?	The population was extensively identified. The sample was thoroughly described. The study was conducted in a large Midwestern teaching hospital and utilized purposive sampling. A flowchart was made to show participants' course throughout the study and included reasons for declining the study, as well as participants not included due to having a procedure prior to randomization. The sample size was based on a power analysis using a G*Power 3.1 and repeated measures ANOVA. The sample size was smaller than projected power analysis and less than previous studies done on the same topic. Sample size was smaller than power analysis due to time-limitation and scheduling factors external to the study and therefore target sample size was not achieved.
Data collection and measurement	• Were the operational and conceptual definitions congruent? • Were key variables measured using an appropriate method (e.g., interviews, observations, and so on)? • Were specific instruments adequately described and were they good choices,	The authors performed the study how they conceptualized it. Key variables were thoroughly described and broken down into psychological, physiological, and procedural variables. Key variables were measured appropriately pre- and post-tests and included vital signs and psychological measures

	given the study population and the variables being studied? • Did the report provide evidence that the data collection methods yielded data that were reliable, valid and responsive?	i.e. PANAS, pain, coping self-efficacy, and patient satisfaction. Cronbach alpha scores for the PANAS showed 0.89 for positive affect scale and 0.85 for negative affect scale, demonstrating adequate reliability.
Procedures	• If there was an intervention, was it adequately described, and was it rigorously developed and implemented? Did most participants allocated to the intervention group actually receive it? Was there evidence of intervention fidelity? • Were data collected in a manner that minimized bias? Were the staff who collected data appropriately trained?	The intervention was thoroughly described and rigorously developed and implemented. The study included a total of 37 participants. The group randomized to MT/EAC group started with 15 with 14 completing measures and 13 included in analyses. The group randomized to EAC started with 16 and 14 completed measures and were included in analyses. The control group started with 17 with only 10 completing measures and included in analyses. Reasons for drop out of each group after randomization was not provided. All interventions were administered as intended. It was not noted if the staff were trained or not.
Data Analysis	• Were analyses undertaken to address each research question or test each hypothesis? • Were appropriate statistical methods used, given the level of measurement of the variables, number of groups being compared, and assumptions of the texts? • Was a powerful analytic method used? (e.g., did the analysis help to control for confounding variables)?	The data were well analyzed to address the research question. The statistical method was appropriate. Data were analyzed using PASW 18.0 statistical software package. The level of significance was set at $\alpha=0.05$, which is consistent with music therapy literature. Little's Missing Completely at Random (MCAR) chi-square test was used to evaluate missing data and categorical analysis. ANOVA was used to compare data points. Paired t-tests were also used in

	• Were type I and Type II errors avoided or minimized? • In intervention studies, was an intention-to-treat analysis performed? • Were problems of missing values evaluated and adequately addressed?	scenarios that required follow-up and different time points among variables. Intention-to-treat analysis was not performed. There were occasional occurrences of missing data for physiological parameters across all treatment groups.
Findings	• Was information about statistical significance presented? Was information about effect size and precision of estimates (confidence intervals) presented? • Were the findings adequately summarized, with good use of tables and figures? • Were findings reported in a manner that facilitates a meta-analysis, and with sufficient information needed for EBP?	Statistical significance was presented and set at $\alpha = 0.05$, consistent with music therapy literature. The findings were well summarized including three tables and 3 figures. Information was provided about confidence intervals and effect size. The findings reported in a manner that does not facilitate a meta-analysis due to small sample size.
Discussion Interpretation of the findings	• Were all major findings interpreted and discussed within the context of prior research and/or the study's conceptual framework? • Were casual inferences, if any, justified? • Was the issue of clinical significance discussed? • Were interpretations well-founded and consistent with the study's limitations? • Did the report address the issue of the generalizability of the findings?	The findings were discussed in the context of the research question. Casual inferences were made and justified given the results of the study. Clinical significance was discussed and interpretations appropriate. The study did not attempt to generalize and overtly stated findings were not generalizable to areas outside of patients awaiting cardiac catheterization.
Implications/ recommendations	• Did the researchers discuss the implications of the study for clinical practice or further research—and were those implications reasonable and complete?	The author reasonably identified the need for further study using a bigger sample size, possible longer treatment times, as well as including in-patient and outpatient patient populations. The implications from the study were reasonable and complete.

General Issues Presentation	• Was the report well-written, organized, and sufficiently detailed for critical analysis? • In intervention studies, was a CONSORT flowchart provided to show the flow of participants in the study? • Was the report written in a manner that makes the findings accessible to practicing nurses?	The report was easy to follow, well organized and very detailed. The report was written in a manner that is accessible for practicing nurses.
Researcher credibility	• Do the researchers' clinical, substantive, or methodologic qualifications and experience enhance confidence in the findings and their interpretation?	There was information about the author's qualifications and experience on the first page.
Summary assessment	• Despite any limitations, do the study findings appear to be valid—do you have confidence in the *truth* value of the results? • Does the study contribute any meaningful evidence that can be used in nursing practice or that is useful to the nursing discipline?	The study appears to be valid and appears to have truth value of the results. The study identifies a problem and shows a need for further research with a bigger sample size, stating the results of this study are only preliminary.

Appendix A-5

Kovac, M. (2014). Music interventions for the treatment of preoperative anxiety. *Journal of Consumer Health on the Internet*,*18*(2), 193-201. doi:10.1080/15398285.2014.902282

Critiquing Questions	Critique Responses
1. Is the review thorough—does it include all major studies on the topic? Does it include recent research (studies published within previous 2-3 years)? Are studies from other related disciplines included, if appropriate?	The review was thorough and included all major studies related to topic. Recent research was included and relative to publication date. Studies from other disciplines i.e. music were included in brief detail.
2. Does the review rely mainly on primary source research articles? Are the articles from peer-reviewed journals?	The review used primary source research articles and from peer-reviewed sources.
3. Is the review merely a summary of existing work, or does it critically appraise and compare key studies? Does the review identify important gaps in the literature?	The review was primarily a summary of existing work, but adequately compared key studies and brought concepts together. It also identified gaps in the literature.
4. Is the review well organized? Is the development of ideas clear?	The review was adequately organized, but would benefit from section headers. The development of ideas was adequate and sequential for ease of the reader.
5. Does the review use appropriate language, suggesting the tentativeness of prior findings? Is the review objective? Does the author paraphrase, or is there an overreliance on quotes from original sources?	The review used appropriate language and appeared to be objective. There was minimal use of direct quotes. However, there was a substantial amount of citing noted from original sources to report results of previous studies done.
6. If the review is part of a research report for a new study, does the review support the need for the study?	This review was not part of a new study, but did support the need for the study.
7. If it is a review designed to summarize evidence for clinical practice, does the review draw reasonable conclusions about practice implications?	The review drew very reasonable conclusions about practice implications which were made clear to reader.

Appendix A-6

Kushnir, J. et al. (2012). Coping with preoperative anxiety in cesarean section: physiological,
cognitive, and emotional effects of listening to favorite music. Retrieved from
http://onlinelibrary.wiley.com/doi/10.1111/j.1523-536X.2012.00532.x/abstract

Aspect of the Report	Critiquing Questions	Detailed Critiquing Guidelines
Title	• Is the title a good one, succinctly suggesting key variables and the study population?	The title clearly identified the subject, location, and time frame of the study.
Abstract	• Did the abstract clearly and concisely summarize the main features of the report (problem, methods, results, conclusions)?	The abstract was descriptive and included background, methods, results and a conclusion section.
Introduction Statement of the problem	• Was the problem stated unambiguously, and was it easy to identify? • Is the problem statement build a persuasive argument for the new study? • Was there a good match between the research problem and the methods used –that is, was a quantitative approach appropriate?	The problem was easily identified, clear, and suggested a need for study. The authors built a persuasive argument for a new study, as most of the studies done in past were related to perioperative and postoperative time periods and focused on negative outcomes, rather than positive ones. Relevance to nursing clinical practice was clearly stated. A pre- and posttest experimental design with random assignment was appropriate for research problem.
Hypotheses or research questions	• Were research questions and/or hypotheses explicitly stated? If not, was their absence justified? • Were questions and hypotheses appropriately worded, with clear specification of key variables and the study population? • Were the questions/hypotheses consistent with existing knowledge?	The research question was not stated. However, the aim of the study was stated in the abstract and the beginning of the study. The hypothesis was clearly stated, but lacked specification of study population. The key variables identified included mood and threat perception and vital signs. The hypothesis was consistent with existing knowledge.

Literature review	• Was the literature review up-to-date and based mainly on primary sources? • Did the review provide a state-of-the-art synthesis of evidence on the problem? • Did the literature review provide a strong basis for the new study?	The literature review discussed previous studies done and built a strong basis for a new study, using both subjective and objective measures. The literature review was thorough and provided good synthesis of evidence on problem.
Conceptual/theoretical framework	• Were key concepts adequately defined conceptually? • Was a conceptual/theoretical framework articulated— and, if so, was it appropriate? If not, is the absence of a framework justified? • Were the questions/hypotheses consistent with the framework?	There was no theoretical framework identified. Concepts were adequately defined and thorough.
Method Protection of human rights	• Were appropriate procedures used to safe-guard the rights of study participants? • Was the study externally reviewed by an IRB/ethics review board? • Was the study designed to minimize risks and maximize benefits to participants?	No information was provided regarding safe-guarding the rights of study participants. However, the authors stated that it was approved by the ethics (Helsinki) committee. The study was designed to minimize risks and maximize benefits to the participants. Participants in active labor or medical complications, or women with babies with life-threatening problems, were not eligible to participate in the study.
Research design	• Was the most rigorous design used, given the study purpose? • Were appropriate comparisons made to enhance interpretability of the findings? • Was the number of data collection points appropriate? • Did the design minimize biases and threats to the	The design used was consistent with study goals and purpose, using a qualitative and quantitative approach. Randomization was used with regard to participants, but not random to investigators, which may contribute to bias Appropriate comparisons were made. Number of data points were adequate (N=60) and

	internal, construct, and external validity of the study (e.g., was blinding used, was attrition minimized)?	comparable to other studies using a similar topic.
Population and sample	• Was the population identified? Was the sample described in sufficient detail? • Was the best possible sampling design used to enhance the sample's representativeness? Were sampling biases minimized? • Was the sample size based on a power analysis?	The population was identified in the first section of the study. The sample was adequately identified and described in sufficient detail. The study was conducted in a regional hospital in Israel. No flowchart was made for identifying patient inclusion or exclusion data. However, exclusion criteria were included. Bias included small sample size and that the study used a non-blinded approach. The sample size was not based on a power analysis and was small in comparison to other studies performed on the same topic.
Data collection and measurement	• Were the operational and conceptual definitions congruent? • Were key variables measured using an appropriate method (e.g., interviews, observations, and so on)? • Were specific instruments adequately described and were they good choices, given the study population and the variables being studied? • Did the report provide evidence that the data collection methods yielded data that were reliable, valid and responsive?	The authors performed the study how they conceptualized it. Key variables were measured appropriately. Variables included a mood state scale, perceived threat of surgery scale and vital signs. The scales to measure variables were adequately described. The study provided evidence that the Mood State Scale and the Perceived Threat of Surgery Scale are reliable scales and included the Cronbach alpha scores. The Cronbach alpha score for the negative and positive moods state scales were 0.86 and 0.77 respectively. The Cronbach alpha score for the perceived threat scale was 0.87.
Procedures	• If there was an intervention, was it adequately described, and was it rigorously	The intervention was thoroughly described. A total of 60 women were included in the study. There

	developed and implemented? Did most participants allocated to the intervention group actually receive it? Was there evidence of intervention fidelity? • Were data collected in a manner that minimized bias? Were the staff who collected data appropriately trained?	were 28 women in the experimental group and 32 in the control group. It was not stated if the participants actually received the designated intervention, as well as if there were any drop outs at any point in time during the study for any reason. It was not noted if the staff were trained or not.
Data Analysis	• Were analyses undertaken to address each research question or test each hypothesis? • Were appropriate statistical methods used, given the level of measurement of the variables, number of groups being compared, and assumptions of the texts? • Was a powerful analytic method used? (e.g., did the analysis help to control for confounding variables)? • Were type I and Type II errors avoided or minimized? • In intervention studies, was an intention-to-treat analysis performed? • Were problems of missing values evaluated and adequately addressed?	The data were well analyzed to address the research question. The statistical method was appropriate. Powerful analytic method was used. Discrete analysis of covariance (ANCOVA) was performed for each outcome measure. Potential confounding variables were identified. Intention-to-treat analysis was not performed. No missing values were identified, nor were they addressed.
Findings	• Was information about statistical significance presented? Was information about effect size and precision of estimates (confidence intervals) presented? • Were the findings adequately summarized, with good use of tables and figures? • Were findings reported in a manner that facilitates a meta-analysis, and with	Statistical significance and information about effect size were presented. No confidence intervals were provided. The findings were summarized in two tables and one figure showing subjective measures.

	sufficient information needed for EBP?	
Discussion Interpretation of the findings	• Were all major findings interpreted and discussed within the context of prior research and/or the study's conceptual framework? • Were casual inferences, if any, justified? • Was the issue of clinical significance discussed? • Were interpretations well-founded and consistent with the study's limitations? • Did the report address the issue of the generalizability of the findings?	The findings were discussed in the context of the research question. Casual inferences were made and justified given the results of the study. Clinical significance was discussed and interpretations were appropriate. The study did not attempt to generalize and overtly stated it is not generalizable due to relatively small sample size, as well as possible contribution of bias from nonblinding of investigators.
Implications/ recommendations	• Did the researchers discuss the implications of the study for clinical practice or further research—and were those implications reasonable and complete?	The study identified a problem and showed a need for further research on whether the option of choosing music has an effect on anxiety levels and also if different types of music have different influences on stress.
General Issues Presentation	• Was the report well-written, organized, and sufficiently detailed for critical analysis? • In intervention studies, was a CONSORT flowchart provided to show the flow of participants in the study? • Was the report written in a manner that makes the findings accessible to practicing nurses?	The report was easy to follow, adequately organized and very detailed. The report was written in a manner that is accessible for practicing nurses.
Researcher credibility	• Do the researchers' clinical, substantive, or methodologic qualifications and experience enhance confidence in the findings and their interpretation?	There was information about the authors' qualifications and experience on the first page with a footnote in detail.
Summary assessment	• Despite any limitations, do the study findings appear to be valid—do you have confidence in the *truth* value of the results?	The study appeared to be valid and to have truth value. The authors acknowledged limitations and potential bias.

	• Does the study contribute any meaningful evidence that can be used in nursing practice or that is useful to the nursing discipline?	The study contributes meaningful evidence that can be using in nursing practice.

Appendix A-7

Labrague, L. J. & Mcenroe-Petitte, D. M. (2014). Influence of music on preoperative anxiety and physiologic parameters in women undergoing gynecologic surgery. *Clinical Nursing Research,25*(2), 157-173. doi:10.1177/1054773814544168

Aspect of the Report	Critiquing Questions	Detailed Critiquing Guidelines
Title	• Is the title a good one, succinctly suggesting key variables and the study population?	The title clearly identified the subject, location, and time frame of the study.
Abstract	• Did the abstract clearly and concisely summarize the main features of the report (problem, methods, results, conclusions)?	The abstract thoroughly outlined all the components of the study.
Introduction Statement of the problem	• Was the problem stated unambiguously, and was it easy to identify? • Is the problem statement build a persuasive argument for the new study? • Was there a good match between the research problem and the methods used –that is, was a quantitative approach appropriate?	The problem was easily identified, clear, and suggested a need for a new study. Introduction suggested benefits of music and its anxiolytic effects and built a persuasive argument for empirical evidence. Relevance to nursing clinical practice was clearly stated. A pre- and post-test experimental design with nonrandom assignment was appropriate for research problem.
Hypotheses or research questions	• Were research questions and/or hypotheses explicitly stated? If not, was their absence justified? • Were questions and hypotheses appropriately worded, with clear specification of key variables and the study population? • Were the questions/hypotheses consistent with existing knowledge?	The aim of the study was stated in the abstract, as well as in a separate section following the background, which clearly identified the topic. There was no research question or hypothesis explicitly stated in the study.
Literature review	• Was the literature review up-to-date and based mainly on primary sources?	The literature review provided up-to-date and mainly primary sources. The literature review provided a state-of-the-art

Population and sample	• Was the population identified? Was the sample described in sufficient detail? • Was the best possible sampling design used to enhance the sample's representativeness? Were sampling biases minimized? • Was the sample size based on a power analysis?	The population of women experiencing high levels of anxiety was identified thoroughly in the introduction. The sample size was adequately identified and described as being recruited from a 150-bed capacity government hospital in a purposive sampling method. A flowchart was provided to identify patient early termination and encompassed reasons for not including, i.e. hearing problems and refusal by participants. The design was adequate, but several biases are present. The participants were not randomized, the researchers were not blinded and participants were from one hospital. The sample size was not based on a power analysis. Sample size was adequate (N=97) and comparable to previous studies performed on same topic.
Data collection and measurement	• Were the operational and conceptual definitions congruent? • Were key variables measured using an appropriate method (e.g., interviews, observations, and so on)? • Were specific instruments adequately described and were they good choices, given the study population and the variables being studied? • Did the report provide evidence that the data collection methods yielded data that were reliable, valid and responsive?	The authors performed the study how they conceptualized it. Key variables were measured appropriately using STAI scores and vital signs. The method in which the findings were analyzed was well described and a good choice. The report provided evidence that methods (STAI) were highly valid and reliable. It was translated and discussed with a group of experts to determine content validity as well. Cronbach's alpha of STAI was reported at 0.92.
Procedures	• If there was an intervention, was it adequately described, and was it rigorously	Intervention was adequately described and rigorously developed and implemented.

		developed and implemented? Did most participants allocated to the intervention group actually receive it? Was there evidence of intervention fidelity? • Were data collected in a manner that minimized bias? Were the staff who collected data appropriately trained?	All 49 participants in control group remained in that group. All 48 participants in music group actually received music. All interventions were administered as intended. Data were collected in manner with minimal bias. It was not noted if staff were trained or not.
Data Analysis		• Were analyses undertaken to address each research question or test each hypothesis? • Were appropriate statistical methods used, given the level of measurement of the variables, number of groups being compared, and assumptions of the texts? • Was a powerful analytic method used? (e.g., did the analysis help to control for confounding variables)? • Were type I and Type II errors avoided or minimized? • In intervention studies, was an intention-to-treat analysis performed? • Were problems of missing values evaluated and adequately addressed?	The data were appropriately analyzed to address the research question. The statistical method was appropriate. Descriptive statistics were used to quantify demographical information. Chi-square analysis/Fisher's exact test were used to test homogeneity and normality of two groups. Paired t-tests were used to examine significant differences between pre- and posttest STAI, as well as physiologic parameters for the groups. Intention-to-treat analysis was not performed. No missing values were identified, nor were they addressed.
Findings		• Was information about statistical significance presented? Was information about effect size and precision of estimates (confidence intervals) presented? • Were the findings adequately summarized, with good use of tables and figures? • Were findings reported in a manner that facilitates a meta-analysis, and with	Statistical significance was presented and set at $p < 0.05$. The findings were well summarized including presentation of three tables. Information was provided about confidence intervals regarding posttest scores. The findings suggested the need for further studies on music interventions on preoperative anxiety in the women population.

	• sufficient information needed for EBP?	
Discussion Interpretation of the findings	• Were all major findings interpreted and discussed within the context of prior research and/or the study's conceptual framework? • Were casual inferences, if any, justified? • Was the issue of clinical significance discussed? • Were interpretations well-founded and consistent with the study's limitations? • Did the report address the issue of the generalizability of the findings?	The findings were discussed in the context of the research question. Casual inferences were made and justified given the results of the study. Clinical significance was discussed and interpretations appropriate. The study did not attempt to generalize and overtly stated that findings were s not generalizable to areas outside of women in gynecologic surgery.
Implications/ recommendations	• Did the researchers discuss the implications of the study for clinical practice or further research—and were those implications reasonable and complete?	The authors reasonably identified the need for further study using different types of music with varied listening duration time. They also suggested considering self-selected music and varied populations. The objective would be to determine the extent to which music would result in maximum anxiety reduction.
General Issues Presentation	• Was the report well-written, organized, and sufficiently detailed for critical analysis? • In intervention studies, was a CONSORT flowchart provided to show the flow of participants in the study? • Was the report written in a manner that makes the findings accessible to practicing nurses?	The report was easy to follow, well organized and very detailed. It was written in a manner that is accessible for practicing nurses.
Researcher credibility	• Do the researchers' clinical, substantive, or methodologic qualifications and experience enhance confidence in the findings and their interpretation?	There was information about the authors' qualifications and experience on the first page with a footnote, as well as the last page with a section titled author biographies.
Summary assessment	• Despite any limitations, do the study findings appear to	Study findings appeared to be valid and to have truth value.

	be valid—do you have confidence in the *truth* value of the results? • Does the study contribute any meaningful evidence that can be used in nursing practice or that is useful to the nursing discipline?	The study identified a problem and demonstrated a need for further research in the women population.

Appendix A-8

Lee, K. et al. (2011). Effectiveness of different music-playing devices for reducing preoperative anxiety: A clinical control study. *International Journal of Nursing Studies,48*(10), 1180-1187. doi:10.1016/j.ijnurstu.2011.04.001

Aspect of the Report	Critiquing Questions	Detailed Critiquing Guidelines
Title	• Is the title a good one, succinctly suggesting key variables and the study population?	The title clearly identified the subject, location, and key variables of the study.
Abstract	• Did the abstract clearly and concisely summarize the main features of the report (problem, methods, results, conclusions)?	The abstract thoroughly outlined all the components of the study and included background, objectives, design, setting, participants, methods, results, conclusion and relevance to clinical practice.
Introduction Statement of the problem	• Was the problem stated unambiguously, and was it easy to identify? • Is the problem statement build a persuasive argument for the new study? • Was there a good match between the research problem and the methods used –that is, was a quantitative approach appropriate?	The problem was easily identified, clear, and suggested a need for study. The study built a persuasive argument for a new study and presented information about what is already known about the topic and what the article added to this body of knowledge. Relevance to nursing clinical practice was clearly stated. A three-group randomized controlled trial was conducted, but lacks a pretest-posttest comparison analysis piece.
Hypotheses or research questions	• Were research questions and/or hypotheses explicitly stated? If not, was their absence justified? • Were questions and hypotheses appropriately worded, with clear specification of key variables and the study population? • Were the questions/hypotheses consistent with existing knowledge?	The objective of the study was explicitly stated. A proposed hypothesis was not included in the study. The research aim was consistent with existing knowledge.

Literature review	• Was the literature review up-to-date and based mainly on primary sources? • Did the review provide a state-of-the-art synthesis of evidence on the problem? • Did the literature review provide a strong basis for the new study?	The literature review discussed previous studies and built a strong basis for a new study using broadcasted music vs headphones and the impact on preoperative anxiety. The literature review was brief, but provided a good synthesis of evidence on the problem.
Conceptual/theoretical framework	• Were key concepts adequately defined conceptually? • Was a conceptual/theoretical framework articulated— and, if so, was it appropriate? If not, is the absence of a framework justified? • Were the questions/hypotheses consistent with the framework?	There was no theoretical framework identified. Concepts were adequately defined.
Method Protection of human rights	• Were appropriate procedures used to safe-guard the rights of study participants? • Was the study externally reviewed by an IRB/ethics review board? • Was the study designed to minimize risks and maximize benefits to participants?	Appropriate procedures were used to safeguard rights of patients. Study was approved by the Institutional Review Board of the teaching hospital located in Taiwan with the approved code included in the study. Written informed consent was obtained from all participants. The study was designed to minimize risks and maximize benefits to participants.
Research design	• Was the most rigorous design used, given the study purpose? • Were appropriate comparisons made to enhance interpretability of the findings? • Was the number of data collection points appropriate? • Did the design minimize biases and threats to the internal, construct, and	The design used was consistent with study goals and purpose. A random table was applied to divide numbers 1-30 into three groups to determine each day of the month to be one of the three groups. The design lacked pretest-posttest comparisons, therefor there is no baseline to reference data back to. The three groups included a control group, a headphone group and

	external validity of the study (e.g., was blinding used, was attrition minimized)?	a broadcast group. The study included a control group to offset lack of pretest, as a reference for comparison of the headphone and broadcast groups. The study was designed to minimize bias and threats to internal validity. It was not noted if blinding was used. The number of data points were adequate, N=167.
Population and sample	• Was the population identified? Was the sample described in sufficient detail? • Was the best possible sampling design used to enhance the sample's representativeness? Were sampling biases minimized? • Was the sample size based on a power analysis?	The population was adequately identified in the introduction. The sample was described in sufficient detail. The sample size was G power software. The study considered an attrition rate of 30% due to short stay in the waiting area, a sample size of about 50 was set. A flowchart was provided and showed participants' refusal and number of completed participants. Sample size (N=167) was adequate based on the power analysis.
Data collection and measurement	• Were the operational and conceptual definitions congruent? • Were key variables measured using an appropriate method (e.g., interviews, observations, and so on)? • Were specific instruments adequately described and were they good choices, given the study population and the variables being studied? • Did the report provide evidence that the data collection methods yielded data that were reliable, valid and responsive?	The authors performed the study as they conceptualized it. Key variables were measured appropriately using VAS scores, heart rate variability (HRV) and were appropriate for this study. The report provided evidence for VAS scale as a valid measurement of anxiety. No evidence was provided for validity or reliability of HRV.

Procedures	• If there was an intervention, was it adequately described, and was it rigorously developed and implemented? Did most participants allocated to the intervention group actually receive it? Was there evidence of intervention fidelity? • Were data collected in a manner that minimized bias? Were the staff who collected data appropriately trained?	Intervention was adequately described and rigorously developed and implemented. 66 out of 66 randomly assigned to the broadcast group were included in analysis. 53 out of 58 randomly to control group were included in analysis. Lastly, 48 out of 56 randomly assigned to headphone group were included in analysis. Dropouts and reasons were included in the flowchart All interventions were administered as intended. Data were collected in manner consistent with minimal bias, with a randomized technique. No blinding was used. It was not noted if staff were trained.
Data Analysis	• Were analyses undertaken to address each research question or test each hypothesis? • Were appropriate statistical methods used, given the level of measurement of the variables, number of groups being compared, and assumptions of the texts? • Was a powerful analytic method used? (e.g., did the analysis help to control for confounding variables)? • Were type I and Type II errors avoided or minimized? • In intervention studies, was an intention-to-treat analysis performed? • Were problems of missing values evaluated and adequately addressed?	The data were appropriately analyzed to address the research question. The statistical method was appropriate. Powerful analytic method was not used. Intention-to-treat analysis was performed to analyze data. Data were analyzed with SPSS 15.0. A Chi-squared test was used to evaluate differences between the three groups. A one-way ANOVA test was used to look at differences between VAS and HRV parameters among the three groups. When a significant difference was identified, a Scheffe test was done to examine the paired difference. Incomplete values were identified and excluded from analysis.
Findings	• Was information about statistical significance presented? Was information about effect size and precision of	Information regarding statistical tests was presented. There were no confidence intervals included in analysis.

	estimates (confidence intervals) presented? • Were the findings adequately summarized, with good use of tables and figures? • Were findings reported in a manner that facilitates a meta-analysis, and with sufficient information needed for EBP?	The findings were well summarized including three tables. Due to lack of pretest-posttest evaluation, the study does not facilitate a meta-analysis.
Discussion Interpretation of the findings	• Were all major findings interpreted and discussed within the context of prior research and/or the study's conceptual framework? • Were casual inferences, if any, justified? • Was the issue of clinical significance discussed? • Were interpretations well-founded and consistent with the study's limitations? • Did the report address the issue of the generalizability of the findings?	The findings were discussed in the context of the research question. Casual inferences were made and justified given the results of the study. Clinical significance was discussed and interpretations appropriate. The study did not attempt to generalize. The study stated that findings may provide a basis for future studies regarding evaluating music therapy in different surgical procedures. Limitations were overtly stated and reasonable.
Implications/ recommendations	• Did the researchers discuss the implications of the study for clinical practice or further research—and were those implications reasonable and complete?	The authors reasonably identified the need for future studies to evaluate the lasting effects of music lowering anxiety levels during the intraoperative and postoperative stages of surgery.
General Issues Presentation	• Was the report well-written, organized, and sufficiently detailed for critical analysis? • In intervention studies, was a CONSORT flowchart provided to show the flow of participants in the study? • Was the report written in a manner that makes the findings accessible to practicing nurses?	The report was easy to follow, well organized and very detailed. It was written in a manner that is accessible for practicing nurses.
Researcher credibility	• Do the researchers' clinical, substantive, or	Information was provided on the first page about the

	methodologic qualifications and experience enhance confidence in the findings and their interpretation?	authors' qualifications, in addition to contact information via email, telephone or fax.
Summary assessment	• Despite any limitations, do the study findings appear to be valid—do you have confidence in the *truth* value of the results? • Does the study contribute any meaningful evidence that can be used in nursing practice or that is useful to the nursing discipline?	The study appeared to be valid and results appeared to have truth value. The study identified a problem and showed a need for further research regarding the therapeutic value of music therapy, particularly in the preoperative setting.

Appendix A-9

Ni, C. et al. (2011). Minimising preoperative anxiety with music for day surgery patients- a randomised clinical trial. *Journal of Clinical Nursing, 21*(5-6), 620-625. Doi:10.1111/j.1365-2702.2010.03466.x

Aspect of the Report	Critiquing Questions	Detailed Critiquing Guidelines
Title	• Is the title a good one, succinctly suggesting key variables and the study population?	The title clearly identified the subject, location, and time frame of the study.
Abstract	• Did the abstract clearly and concisely summarize the main features of the report (problem, methods, results, conclusions)?	The abstract thoroughly outlined all the components of the study.
Introduction Statement of the problem	• Was the problem stated unambiguously, and was it easy to identify? • Is the problem statement build a persuasive argument for the new study? • Was there a good match between the research problem and the methods used –that is, was a quantitative approach appropriate?	The problem was easily identified, clear, and suggested a need for further study. Introduction suggested benefits of music and its anxiolytic effects and introduces prior research with mixed results. The authors presented a persuasive argument for new study. The relevance to nursing clinical practice was clearly stated. A randomized controlled clinical trial was completed and quantitatively looked at anxiety levels based on a scale, as well as vital signs.
Hypotheses or research questions	• Were research questions and/or hypotheses explicitly stated? If not, was their absence justified? • Were questions and hypotheses appropriately worded, with clear specification of key variables and the study population? • Were the questions/hypotheses consistent with existing knowledge?	There was no research question explicitly stated; however, the aim and objective of the study were clearly stated in the abstract as well as the introduction section. There was a hypothesis that was explicitly stated.

Literature review	• Was the literature review up-to-date and based mainly on primary sources? • Did the review provide a state-of-the-art synthesis of evidence on the problem? • Did the literature review provide a strong basis for the new study?	A limited literature review was presented in the background section. The author presented a strong basis for a new study with an attempt to overcome limitations of other studies, i.e. by using a randomized controlled study design.
Conceptual/theoretical framework	• Were key concepts adequately defined conceptually? • Was a conceptual/theoretical framework articulated— and, if so, was it appropriate? If not, is the absence of a framework justified? • Were the questions/hypotheses consistent with the framework?	There was no theoretical framework identified. Concepts were adequately defined but could have been more thorough.
Method Protection of human rights	• Were appropriate procedures used to safe-guard the rights of study participants? • Was the study externally reviewed by an IRB/ethics review board? • Was the study designed to minimize risks and maximize benefits to participants?	Appropriate procedures were used to safeguard rights of patients. Study was reviewed by IRB. Informed consent was obtained from all participants. Study was designed to minimize risks and maximize benefits to participants.
Research design	• Was the most rigorous design used, given the study purpose? • Were appropriate comparisons made to enhance interpretability of the findings? • Was the number of data collection points appropriate? • Did the design minimize biases and threats to the internal, construct, and external validity of the study (e.g., was blinding	The most rigorous design, a RCT, was used and was consistent with study goals and purpose. Appropriate comparisons were made. Randomization was used, but blinding was not which could contribute to bias. The design attempted to minimize bias by using objective outcome measures. The factors that could have contributed to bias included the individual(s) collecting data were not blinded.

	used, was attrition minimized)?	Participants were placed in two groups: a music group, with music delivered by earphones; and a control group, without music for 20 minutes before surgery.
Population and sample	• Was the population identified? Was the sample described in sufficient detail? • Was the best possible sampling design used to enhance the sample's representativeness? Were sampling biases minimized? • Was the sample size based on a power analysis?	The population was adequately identified in the introduction section. The sample was described in sufficient detail. A table was provided regarding demographic information and baseline characteristics. A flowchart was presented for subjects who completed the study and the number of participants that withdrew from the study. The sample design was random and from 1 hospital over 3 years. The study attempted to minimize sampling biases by using a randomized approach and objective outcome measures. The sample size was not based on a power analysis but appeared to be adequate (N=172).
Data collection and measurement	• Were the operational and conceptual definitions congruent? • Were key variables measured using an appropriate method (e.g., interviews, observations, and so on)? • Were specific instruments adequately described and were they good choices, given the study population and the variables being studied? • Did the report provide evidence that the data collection methods yielded data that were reliable, valid and responsive?	The authors performed the study how they conceptualized it. Key variables were measured appropriately using STAI scores and vital signs. The method in which the findings were analyzed was well described. Evidence that measure (STAI) was previously validated and exhibited high internal consistency (0.90-0.94) was presented.
Procedures	• If there was an intervention, was it	The intervention was adequately described and

	adequately described, and was it rigorously developed and implemented? Did most participants allocated to the intervention group actually receive it? Was there evidence of intervention fidelity? • Were data collected in a manner that minimized bias? Were the staff who collected data appropriately trained?	rigorously developed and implemented. All 86 participants in control group remained in that group. All 86 participants in music group actually received music. All interventions were administered as intended. The data were collected by individuals who were not blinded. These individuals were not noted to be trained or not. The authors acknowledged that the use of an interviewer who administered the questionnaire may have introduced positive bias in scores. However, this interviewer collected data for both control and music group.
Data Analysis	• Were analyses undertaken to address each research question or test each hypothesis? • Were appropriate statistical methods used, given the level of measurement of the variables, number of groups being compared, and assumptions of the texts? • Was a powerful analytic method used? (e.g., did the analysis help to control for confounding variables)? • Were type I and Type II errors avoided or minimized? • In intervention studies, was an intention-to-treat analysis performed? • Were problems of missing values evaluated and adequately addressed?	The data were analyzed to address the research question. The statistical method was appropriate. Independent two-sample t-tests were used to detect group differences in baseline to postintervention changes. Categorical variables were analyzed using Chi-square analysis/Fisher's exact test. Intention-to-treat analysis was not performed. No missing values were identified, nor were they addressed.
Findings	• Was information about statistical significance presented? Was information about effect size and precision of estimates (confidence intervals) presented?	Statistical significance was presented. The findings were well summarized including tables and figures. The findings suggested the need for further studies to

	• Were the findings adequately summarized, with good use of tables and figures? • Were findings reported in a manner that facilitates a meta-analysis, and with sufficient information needed for EBP?	include blood levels of various outcomes, as well as urine levels.
Discussion Interpretation of the findings	• Were all major findings interpreted and discussed within the context of prior research and/or the study's conceptual framework? • Were casual inferences, if any, justified? • Was the issue of clinical significance discussed? • Were interpretations well-founded and consistent with the study's limitations? • Did the report address the issue of the generalizability of the findings?	The findings were discussed in the context of the research question. Casual inferences were made and justified given the results of the study. Clinical significance was discussed and interpretations appropriate. The authors did not attempt to generalize and overtly stated findings were not generalizable to areas outside of day surgery.
Implications/ recommendations	• Did the researchers discuss the implications of the study for clinical practice or further research—and were those implications reasonable and complete?	The authors reasonably identified the need for further study into blood levels of neurotransmitters, cortisol, skin temperatures, as well as urine levels. Implications of the study were reasonable.
General Issues Presentation	• Was the report well-written, organized, and sufficiently detailed for critical analysis? • In intervention studies, was a CONSORT flowchart provided to show the flow of participants in the study? • Was the report written in a manner that makes the findings accessible to practicing nurses?	The report was easy to follow, well organized and somewhat detailed. The report was written in a manner that is accessible for practicing nurses.
Researcher credibility	• Do the researchers' clinical, substantive, or methodologic qualifications and experience enhance confidence in the findings and their interpretation?	There was little information about the authors' qualifications and experience, presented only in a footnote on first page.

Summary assessment	• Despite any limitations, do the study findings appear to be valid—do you have confidence in the *truth* value of the results? • Does the study contribute any meaningful evidence that can be used in nursing practice or that is useful to the nursing discipline?	Study findings appeared to be valid and to have truth value. The study identified a problem and demonstrated a need for further research with more variables.

Appendix A-10

Palmer, J. B. et al. (2015). Effects of music therapy on anesthesia requirements and anxiety in women undergoing ambulatory breast surgery for cancer diagnosis and treatment: a randomized controlled trial. *Journal of Clinical Oncology,33*(28), 3162-3168. doi:10.1200/jco.2014.59.6049

Aspect of the Report	Critiquing Questions	Detailed Critiquing Guidelines
Title	• Is the title a good one, succinctly suggesting key variables and the study population?	The title clearly identified the subject, location, and key variables of the study.
Abstract	• Did the abstract clearly and concisely summarize the main features of the report (problem, methods, results, conclusions)?	The abstract thoroughly outlined all the components of the study and broke it up into separate sections for clarity.
Introduction Statement of the problem	• Was the problem stated unambiguously, and was it easy to identify? • Is the problem statement build a persuasive argument for the new study? • Was there a good match between the research problem and the methods used –that is, was a quantitative approach appropriate?	The problem was easily identified, clear, and suggested a need for study. The introduction suggested the benefits of music and its' anxiolytic effects, as well as decreased anesthetic requirements. The authors build s a persuasive argument for testing live music as opposed to prerecorded music. Relevance to nursing clinical practice was clearly stated. A three-group randomized controlled trial was conducted, which is an excellent match for the research problem and methods used.
Hypotheses or research questions	• Were research questions and/or hypotheses explicitly stated? If not, was their absence justified? • Were questions and hypotheses appropriately worded, with clear specification of key variables and the study population? • Were the questions/hypotheses consistent with existing knowledge?	The objective of the study was explicitly stated, as well as primary and secondary hypotheses. Hypotheses were clear and included appropriate key variables and study population. Key variables were anxiety levels, anesthetic requirement, recovery time and patient satisfaction. The hypotheses were consistent with existing knowledge.

Literature review	• Was the literature review up-to-date and based mainly on primary sources? • Did the review provide a state-of-the-art synthesis of evidence on the problem? • Did the literature review provide a strong basis for the new study?	The literature review discussed previous studies and built a strong basis for a new study using live music as opposed to prerecorded music. The literature review was brief, but provided a good synthesis of evidence on the problem.
Conceptual/theoretical framework	• Were key concepts adequately defined conceptually? • Was a conceptual/theoretical framework articulated— and, if so, was it appropriate? If not, is the absence of a framework justified? • Were the questions/hypotheses consistent with the framework?	There was no theoretical framework identified. Concepts were adequately defined.
Method Protection of human rights	• Were appropriate procedures used to safe-guard the rights of study participants? • Was the study externally reviewed by an IRB/ethics review board? • Was the study designed to minimize risks and maximize benefits to participants?	Appropriate procedures were used to safeguard rights of patients. Study was approved by The University Hospitals Case Medical Center IRB. Written informed consent was obtained from all participants. The study was designed to minimize risks and maximize benefits to participants.
Research design	• Was the most rigorous design used, given the study purpose? • Were appropriate comparisons made to enhance interpretability of the findings? • Was the number of data collection points appropriate? • Did the design minimize biases and threats to the internal, construct, and external validity of the study (e.g., was blinding	The design used was consistent with study goals and purpose. An online randomization module was used, which ensured adequate concealment. The design used appropriate comparisons of the three groups to enhance interpretability. The three groups included a live music group, a prerecorded music group and a usual care group without music. The study was designed to minimize bias and threats to internal validity. A permuted

	used, was attrition minimized)?	block randomization scheme was used to prevent personnel performing study to guess next assignment. Nurses were not able to be blinded, however. The number of data points were adequate, N=201.
Population and sample	• Was the population identified? Was the sample described in sufficient detail? • Was the best possible sampling design used to enhance the sample's representativeness? Were sampling biases minimized? • Was the sample size based on a power analysis?	The population was briefly and adequately identified in the introduction. The sample was recruited from two hospitals in Ohio. Purposive sampling was used. A flowchart (CONSORT diagram) was made to identify patient early termination and random selection of participants in each group. The reason for exclusion was provided as well in the flowchart, i.e. cancelled surgery, missing post-test due to time restraints and recovery data not collected. The design was adequate for r this type of study. A power analysis was used. Sample size (N=201) was adequate based on the power analysis.
Data collection and measurement	• Were the operational and conceptual definitions congruent? • Were key variables measured using an appropriate method (e.g., interviews, observations, and so on)? • Were specific instruments adequately described and were they good choices, given the study population and the variables being studied? • Did the report provide evidence that the data collection methods yielded data that were reliable, valid and responsive?	The authors performed the study as they conceptualized it. Key variables were measured appropriately using GA-VAS cores, patient satisfaction, amount of Propofol required to reach BIS level of 70, vital signs, and time to discharge readiness; all were appropriate for this study. The report provided no evidence that the GA-VAS is valid or reliable.

Procedures	• If there was an intervention, was it adequately described, and was it rigorously developed and implemented? Did most participants allocated to the intervention group actually receive it? Was there evidence of intervention fidelity? • Were data collected in a manner that minimized bias? Were the staff who collected data appropriately trained?	Intervention was adequately described and rigorously developed and implemented. 68 out of 69 randomly assigned to the live and recorded music were included in analysis. 68 out of 70 randomly assigned to recorded music only were included in analysis. Lastly, 65 out of 68 randomly assigned to usual care and noise blocking earmuffs were included in analysis. All interventions were administered as intended. Data were collected in manner consistent with minimal bias, with randomized and blinding techniques. It was not noted if staff were trained.
Data Analysis	• Were analyses undertaken to address each research question or test each hypothesis? • Were appropriate statistical methods used, given the level of measurement of the variables, number of groups being compared, and assumptions of the texts? • Was a powerful analytic method used? (e.g., did the analysis help to control for confounding variables)? • Were type I and Type II errors avoided or minimized? • In intervention studies, was an intention-to-treat analysis performed? • Were problems of missing values evaluated and adequately addressed?	The data were appropriately analyzed to address the research question. The statistical method was appropriate. Powerful analytic method was not used. Intention-to-treat analysis was performed to analyze data. Pairwise Wilcoxon rank sum tests were used to compare outcomes between study arms. It is of note that no multiple testing correction was made to account for two primary outcomes and that results would not change if such a correction was made. A pretest and post-test method was used to analyze GA-VAS scores. Study data were collected and managed using Research Electronic Data Capture (REDcap) tools. Audit trails were kept. No missing values were identified, nor were they addressed.

Findings	• Was information about statistical significance presented? Was information about effect size and precision of estimates (confidence intervals) presented? • Were the findings adequately summarized, with good use of tables and figures? • Were findings reported in a manner that facilitates a meta-analysis, and with sufficient information needed for EBP?	Information regarding statistical tests was presented, as well as confidence intervals. The findings were well summarized including three tables and a plot diagram. The findings suggested the need for further studies regarding therapeutic value of music therapy, specifically in the perioperative setting.
Discussion Interpretation of the findings	• Were all major findings interpreted and discussed within the context of prior research and/or the study's conceptual framework? • Were casual inferences, if any, justified? • Was the issue of clinical significance discussed? • Were interpretations well-founded and consistent with the study's limitations? • Did the report address the issue of the generalizability of the findings?	The findings were discussed in the context of the research question. Casual inferences were made and justified given the results of the study. Clinical significance was discussed and interpretations appropriate. The study did not attempt to generalize and overtly stated it is not generalizable to areas outside of women undergoing breast surgery. The study stated that findings may provide a basis for future studies regarding evaluating music therapy in different surgical procedures.
Implications/ recommendations	• Did the researchers discuss the implications of the study for clinical practice or further research—and were those implications reasonable and complete?	The authors reasonably identified the need for further quantitative study as stated above.
General Issues Presentation	• Was the report well-written, organized, and sufficiently detailed for critical analysis? • In intervention studies, was a CONSORT flowchart provided to show the flow of participants in the study?	The report was easy to follow, well organized and very detailed. It was written in a manner that is accessible for practicing nurses.

	• Was the report written in a manner that makes the findings accessible to practicing nurses?	
Researcher credibility	• Do the researchers' clinical, substantive, or methodologic qualifications and experience enhance confidence in the findings and their interpretation?	Information was provided on the first page about the authors' hospital affiliations. The last page of the article included authors' contributions and disclosures. The authors' qualifications and experience were not explicitly included.
Summary assessment	• Despite any limitations, do the study findings appear to be valid—do you have confidence in the *truth* value of the results? • Does the study contribute any meaningful evidence that can be used in nursing practice or that is useful to the nursing discipline?	The study appeared to be valid and results appeared to have truth value. The study identified a problem and showed a need for further research regarding the therapeutic value of music therapy, particularly in the perioperative setting.

Appendix B-1

Arslan, S., Ozer, N., & Ozyurt, F. (2008). Effect of music on preoperative anxiety in men undergoing urogenital surgery. *Australian Journal of Advanced Nursing*, *26*(2), 46–54

Purpose	Findings	Limitations to the study	Suggestions or interventions to improve
To investigate the effect of music therapy on preoperative anxiety levels in Turkish men undergoing urogenital surgery.	Anxiety mean scores between groups after music therapy were statistically significant (p<0.001). Measured using State Trait Anxiety Inventory (STAI) scores. Results included: Before therapy mean score of 39.59 and after therapy 33.68 for experimental group. Before therapy mean score of 42.25 and after therapy 44.43 for the control group.	Small sample size (N=64). Confined to one geographical area in Turkey.	The authors suggested to improve the study, a larger sample size would be needed. The authors investigating effectiveness of listening to preferred music for other patient populations.

Appendix B-2

Dong, Y. & Li, Y. (2012). Preoperative music intervention for patients undergoing cesarean
      delivery. *International Journal of Gynecology & Obstetrics,119*(1), 81-83.
      doi:10.1016/j.ijgo.2012.05.017

Purpose	Findings	Limitations to the study	Suggestions or interventions to improve
To evaluate the effects of music played preoperatively in women undergoing elective cesarean delivery.	No significant differences in demographics between the two groups were detected. The two groups included a study group exposed to music for 30 minutes (n=30) and a control group who received standard care (n=30). Changes within groups: mean LF and LF/HF values were significantly lower and mean HF significantly higher after music therapy (p<0.05 for all). Overall differences in values for LF showed intervention group differences of 119.50 ± 201.58 and in the control group -15.86 ±71.29. The HF showed differences in the intervention group of -113.00 ± 130.62 and control group 14.45 ± 51.40. LF/HF showed intervention group differences of 0.69 ± 0.51 within the intervention group and control group 0.00 ± 0.50. The control group changes in mean values for LF, HF, and LF/HF ratio were not significant. The mean SAS score was significantly less (p<0.05) and unchanged	Anesthetic drugs influence HRV values.	The authors suggested including the evaluation of intraoperative and postoperative differences. Authors suggested future studies to combine music intervention with other nonpharmacologic methods considered apt to decrease sympathetic and increase parasympathetic nervous system activity.

	in control group. Difference in values for the intervention group in terms of VAS scores were 7.20 ± 2.09 and 0.03 ± 3.50 for the control group. Changes between groups: mean SAS score and HRV values were significantly greater than control ($p<0.01$).		

Appendix B-3

Ertuğ, N., Ulusoylu, Ö, Bal, A., & Özgür, H. (2017). Comparison of the effectiveness of two
different interventions to reduce preoperative anxiety: A randomized controlled
study. *Nursing & Health Sciences,19*(2), 250-256. doi:10.1111/nhs.12339

Purpose	Findings	Limitations to the study	Suggestions or interventions to improve
To determine and compare the effectiveness of nature sounds and relaxation exercises for reducing preoperative anxiety.	Measured using State Anxiety Inventory (SAI) and Visual Analog Scale (VAS). Results included: A p value of <0.005 was accepted as statistically significant. There was no statistically significant difference in the VAS (p=0.441) or SAI (p=0.063) scores between the three groups. VAS scores after the 30-minute intervention were lower in nature sounds groups and relaxation exercises group than the control group (3.10 ± 1.68, 3.28 ± 1.80, 5.44 ± 2.66; p=0.011). Post hoc analysis showed that the control group have higher VAS scores (p<0.016). SAI scores 30-minutes after intervention were lower in both the nature sounds and relaxation groups (p<0.01), but no statistically significant difference noted between those two groups (p=0.0870). According to a Pearson correlation analysis, a strong correlation was found between VAS and SAI scores.	Not blinded. Intervention lasted for only one session. Interaction between participant and relative for 30 minutes in between measurements.	The authors suggested conducting multiple sessions to compare results. The VAS and SAI are self-reporting scales and therefore subjective. In addition, they suggested using a more objective tool to measure anxiety levels.

Appendix B-4

Ghetti, C. M. (2013). Effect of music therapy with emotional-approach coping on Preprocedural Anxiety in Cardiac Catheterization: A Randomized Controlled Trial. *Journal of Music Therapy,50*(2), 93-122. doi:10.1093/jmt/50.2.93

Purpose	Findings	Limitations to the study	Suggestions or interventions to improve
To evaluate the use of music therapy, with a specific emphasis on emotional-approach coping, immediately prior to cardiac catherization on preprocedural anxiety and periprocedural outcomes.	Measured using physiological variables, i.e. vital signs, psychological variables (PANAS) and procedural variables (use of medications and length of procedure. Results included: Participants receiving music therapy showed significant increase in positive affect from pre- to posttest, but EAC and control groups did not. Positive affect results in the MT/EAC group showed pre (28.54) and post (33.46); the EAC group showed pre (31.48) and post (32.29); and the control group showed pre (30.60) and post (30.50). In terms of negative affects, the MT/EAC group showed pre (15.62) and post (12.69); the EAC group showed pre (19.93) and post (17.86); the control group showed pre (14.30) and post (14.30). No statistical significance between groups of any of the psychological or physiological variables at the pretest. Psychological variables: t-tests showed that music therapy(MT)/emotional-approach coping (EAC) group showed statistical significance with positive affect from pre- to posttest scores (-8.21 to -1.64; p=0.007). The EAC group did not change from pre- to posttest regarding positive affect, however the MT group only showed an increase in positive	Small sample size (N=37). High rate of rejection of participants.	An intervention to refine the study per the author may include a larger sample size. The author suggested longer treatment times. In addition, they suggested the inclusion of inpatient and outpatient populations to enhance generalizability.

	affect from pre- to posttest scores. For negative affects, no statistical significance was found from pre-to posttest scores for both EAC, MT/EAC and control group. Physiological variables: Respiratory rate, heart rate and oxygen saturation did not vary significantly throughout the study. There was a statistically significant increase in systolic blood pressure for the MT/EAC group (129.36 MT/EAC group compared to 128.67 in the control group; p=0.012), as well as a statistically significant increase in diastolic blood pressure for the EAC group (71.50 EAC group compared to 65.56 in the control group; p=0.001). Procedural variables: Shorter procedure length for MT/EAC group, but differences between means were not significant (p=0.285). No statistical significance found between use of analgesics and benzodiazepines for the EAC group and MT/EAC group respectively.		

Appendix B-5

Kovac, M. (2014). Music interventions for the treatment of preoperative anxiety. *Journal of Consumer Health on the Internet*,*18*(2), 193-201. doi:10.1080/15398285.2014.902282

Purpose	Findings	Limitations to the review	Future research
Literature review to investigate different types of music interventions for the treatment of preoperative anxiety.	Music interventions both passive and active, influence patients physiologically (vital signs) and emotionally (i.e. anxiety).	Logistical problems: No standardization across studies. Preferred music not offered by researchers. Difficulty with headphones.	According to the author there is no consensus on whether provider-selected music or patient-selected music is more beneficial.

Appendix B-6

Kushnir, J. et al. (2012). Coping with preoperative anxiety in cesarean section: physiological, cognitive, and emotional effects of listening to favorite music. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1523-536X.2012.00532.x/abstract

Purpose	Findings	Limitations to the study	Suggestions or interventions to improve
To assess the effects of listening to selected music while waiting for a cesarean section on emotional reactions, cognitive appraisal of the threat of surgery and stress-related physiological reactions.	Measured using Mood State Scale, Perceived Threat of Surgery Scale and vital signs. Results included: There were no differences found between the two groups regarding positive mood states and threat perception at baseline. Simple effects analyses showed that after 40 minutes of music in the experimental group (4.10 ± 0.85), positive emotions were higher than the control group (3.83 ± 1.05), in addition to lower negative emotions (experimental group 3.49 ± 0.86; control group 4.06 ± 0.83) and perceived threat (experimental group 3.19 ± 0.65; control group 3.27 ± 0.73) compared to baseline values ($p<0.0001$ for all subjective measures). Significance regarding systolic blood pressure (SBP) (experimental group 122.07 ± 12.35; control group 124.03 ± 13.30; $p<0.05$), diastolic blood pressure (DBP) (experimental group 74.11 ± 9.49; control group 77.38 ± 20.04; $p<0.01$) and respiratory rate (RR) (experimental group 21.75 ± 2.15; control group 21.87 ± 2.38; $p<0.0001$). It was	Small sample size (N=60). No randomization to researchers only participants.	Authors suggested to investigate effectiveness of selecting music has an effect on anxiety and whether different types of music have different influences on stress. This author would suggest future studies use a larger sample size and increase generalizability of results.

	found that SBP was lower in the experimental group compared to baseline and DBP and RR remain unchanged compared to baseline in the experimental group. However, in the control group, DBP and RR were higher and SBP remained unchanged after 40 minutes compared to baseline.		

Appendix B-7

Labrague, L. J. & Mcenroe-Petitte, D. M. (2014). Influence of music on preoperative anxiety and physiologic parameters in women undergoing gynecologic surgery. *Clinical Nursing Research,25*(2), 157-173. doi:10.1177/1054773814544168

Purpose	Findings	Limitations to the study	Suggestions or interventions to improve
To determine the influence of music on anxiety levels and the physiologic parameters in women undergoing gynecologic surgery.	Statistical significance was set at $p<0.05$. Measured using State Trait Anxiety Inventory (STAI) scores and vital signs. Results included: The results showed that in the experimental group, statistically significant (all variables $p<0.05$) decreases in STAI scores (before 40.75 ± 1.97; after 36.43 ± 1.86; $t=0.61$), systolic blood pressure (before 127.60 ± 5.20; after 123.04 ± 4.25; $t=7.99$), diastolic blood pressure (before 75.93 ± 5.15; after 73.81 ± 4.91; $t=4.16$) and pulse rate (before 75.39 ± 4.87; after 71.39 ± 4.28; $t=5.33$) for the experimental group. For the control group, no significant changes noted on the systolic blood pressure, diastolic blood pressure and respiratory rate. Statistically significant increases in STAI scores were noted (before 41.18 ± 2.16; after 43.30 ± 2.02; $p<0.05$) and pulse rate (before 74.82 ± 4.35; after 77.51 ± 3.95; $p<0.05$). Independent t test analyses showed experimental group had lower STAI scores ($t=17.41$; $p<0.05$) than the control group.	Nonrandomization of participants. Participants from one single hospital facility.	Authors suggested to conduct a study comparing different types of music with varied listening duration time to determine extent of which music would exert maximum benefit in decreasing anxiety. In addition, investigating the difference between self-selected music and researcher-selected music in decreasing anxiety among various patient population in surgery.

Appendix B-8

Lee, K. et al. (2011). Effectiveness of different music-playing devices for reducing preoperative anxiety: A clinical control study. *International Journal of Nursing Studies,48*(10), 1180-1187. doi:10.1016/j.ijnurstu.2011.04.001

Purpose	Findings	Limitations to the study	Suggestions or interventions to improve
To investigate the anxiety relieving effect of broadcast versus headphone music playing for patients before surgery.	Statistical significance was defined as p<0.05. Measured using Visual Analog Scale (VAS) and Heart Rate Variability (HRV). Results included: No statistical significance between VAS anxiety levels between broadcast and headphone group (p=0.1). The mean anxiety level for the control group was significantly higher than the headphone and the broadcast group (5.1 ± 2.7; 4.4 ± 1.6; p<0.05). The average heart rates of the broadcast, headphone and control group were not statistically significant (p<0.17). Significant difference in high frequency HR variability among the three groups (broadcast 42.5, headphone 42.9 and control 35.4; p<0.01), but no significance between broadcast and headphone groups. Significance in the low frequency HR variability among the three groups (broadcast 54.8, headphone 57.1 and control 64.6; p<0.01). VAS scores were significantly correlated to the frequency-domain parameters of HR	No pretest-posttest comparison. Participants unable to choose their favorite music.	The authors suggested future studies determine if reducing anxiety has lasting effect on outcomes during intraoperative and postoperative periods. In addition, improve research design and add pretest to determine change.

	variability (p<0.05), but not with time-domain ones.		

Appendix B-9

Ni, C. et al. (2011). Minimising preoperative anxiety with music for day surgery patients- a randomised clinical trial. *Journal of Clinical Nursing, 21*(5-6), 620-625. Doi:10.1111/j.1365-2702.2010.03466.x

Purpose	Findings	Limitations to the study	Suggestions or interventions to improve
To evaluate the effects of musical intervention on preoperative anxiety and vital signs in patients undergoing day surgery.	Statistical significance defined as p<0.05. Measured using State Trait Anxiety Inventory (STAI) scores and vital signs. Results included: No statistical significance of STAI scores and vital signs between the two groups (p>0.05). Significant decreases in STAI scores from baseline were seen in both groups (p<0.001). STAI scores decreased my means of 5.83 and 1.72 in the music and control groups, respectively. Statistical significance between the music and control groups (p<0.001). Decreases in heart rate (music group -5.01 ± 0.79; control group -3.76 ± 0.63), systolic blood pressure (music group -7.72 ± 1.16; control group -12.89 ± 1.16) and diastolic blood pressure (music group -4.26 ± 0.87; control group -4.23 ± 0.78) were seen in both groups from baseline.	No blinding utilized.	Future studies to include blood levels of various outcomes as well as urine levels, according to the authors.

Appendix B-10

Palmer, J. B. et al. (2015). Effects of music therapy on anesthesia requirements and anxiety in
women undergoing ambulatory breast surgery for cancer diagnosis and treatment: a
randomized controlled trial. *Journal of Clinical Oncology,33*(28), 3162-3168.
doi:10.1200/jco.2014.59.6049

Purpose	Findings	Limitations to the study	Suggestions or interventions to improve
To investigate the effect of live and recorded music therapy on anesthesia requirements, anxiety levels, recovery time, and patient satisfaction in women experiencing surgery for diagnosis or treatment of breast cancer.	Statistically significance defined as p<0.025. Measured using Global Anxiety-Visual Analog Scale (GA-VAS) scores, patient satisfaction, amount of Propofol required to reach a BIS of 70, vital signs and time to discharge readiness. Results included: Amount of Propofol needed to reach a BIS of 70 showed that neither of the music groups differed from the usual care group (p=0.17). Patient satisfaction showed a high level overall with no difference between music groups and usual care or between recorded and live music groups independently. The live music and recorded music groups showed a decrease in anxiety and both differed significantly from the control group (-30.9 ± 36.3 and -26.8 ± 29.3; p<0.001). The live and recorded music groups did not differ in terms of GA-VAS scores (p=0.39). According to the scatter plot created to look at changes of the GA-VAS scores showed that reductions in scores were seen when the baseline score was high, as opposed to low. Slopes of regressions of change in scores versus pretherapy GA-VAS scores were significantly less than zero for the live music and recorded music groups (p<0.001), but not for the usual	Nurses were not blinded.	Need for further studies regarding therapeutic value of music therapy, specifically in the perioperative setting, according to the authors.

128

	care group (p=0.10). Estimated slopes for LM (-0.492, RM (-0.448) and UC (-0.0138). The slopes of the live and recorded music groups did not differ, but they both differed from the usual care group (p≤0.002), with data as shown above. Time to discharge readiness did not differ between either music group and the control group. However, shorter discharge times were noted for the live music group compared to the recorded music group (difference in 12 minutes; CI= -22.5 to -2.2; p=0.018).		

Appendix C

Cross Table Analysis

Author	Arslan, S. et al. (2008).
Key Findings	-Decrease in anxiety score average in the experimental group compared to the control group using patient selected music. -Mean score before therapy were 39.59 and after therapy were 33.68 for the experimental group. -Mean scores for the control group before therapy were 42.25 and after therapy 44.43.
Recommendations	Larger sample size. <u>Limitation:</u> -Study only performed on male patients undergoing urologic surgery.
Author	Dong, Y. & Li, Y. (2012).
Key Findings	-Showed that music can reduce preoperative anxiety, especially in cesarean delivery, and it can augment effects of anesthesia and maintain hemodynamic stability. -The mean SAS score was significantly less than before procedure started in study group and unchanged for control group. -When groups were compared (study and control) the mean changes in SAS and HRV values were greater than control group. -6 hours after surgery, the mean VAS score was significantly lower in the study group compared to the control group. -The mean LF and LF/HF values were significantly lower and mean HF significantly higher after music therapy ($p<0.05$ for all).
Recommendations	-The authors suggested including the evaluation of intraoperative and postoperative differences. -Authors suggested future studies to combine music intervention with other nonpharmacologic methods considered apt to decrease sympathetic and increase parasympathetic nervous system activity. -Results not generalizable to areas outside of women undergoing cesarean delivery. <u>Limitation:</u> anesthetic drugs influence HRV values.
Author	Ertuğ, N., Ulusoylu, Ö, Bal, A., & Özgür, H. (2017).
Key Findings	-Results showed that nature sounds and relaxation exercises were found to reduce preoperative anxiety in the intervention groups compared to the control group in patients receiving general anesthesia. - VAS scores after the 30-minute intervention were lower in nature sounds groups and relaxation exercises group than the control group. -SAI scores 30-minutes after intervention were lower in both the nature sounds and relaxation groups, but no statistically significant. -A strong and positive relationship between VAS and SAI scores was found according to Pearson correlation analysis.

Recommendations	-The authors suggested conducting multiple sessions to compare results. -Suggested using a more objective tool to measure anxiety levels. Limitations: - Not blinded. - Intervention lasted for only one session. - Interaction between participant and relative for 30 minutes in between measurements.
Author	Ghetti, C. M. (2013).
Key Findings	-Showed that music therapy with emotional-approach coping group led to improved positive affect states and the EAC group and control group did not. -All three groups showed a significant decrease in negative affect. -The MT/EAC group showed a statistically significant increase in systolic blood pressure, but not clinically significance as this may be due to active engagement in the activity of music making. - MT/EAC group had shorter procedure lengths and least amount of benzodiazepines required, but not statistically significant.
Recommendations	-Larger sample size. -Longer treatment times. -Inclusion of inpatient and outpatient populations to enhance generalizability. Limitations: - Small sample size - High rate of rejection of participants.
Author	Kovac, M. (2014).
Key Findings	-No consensus on whether provider-selected music or patient-selected music is more beneficial. -Music interventions both passive and active, influence patients physiologically (vital signs) and emotionally (i.e. anxiety).
Recommendations	Logistical problems: -No standardization across studies. -Preferred music not offered by researchers. -Difficulty with headphones.
Author	Kushnir, J. et al. (2012).
Key Findings	-Women who listened to music before cesarean section showed increase in positive emotions, decrease in negative emotions and perceived threat of the situation compared to the control group, who experienced decrease in positive emotions and increase in perceived threat. -SBP, DBP and RR were noted to be lower in experimental compared to the control group. -Experimental group: SBP lower compared to baseline at the 40 minute mark of listening to music. -Control group: DBP and RR were higher after 40 minutes compared to baseline.

Recommendations	-Future studies to investigate effectiveness of selecting music has an effect on anxiety and whether different types of music have different influences on stress. -Use a larger sample size and increase generalizability of results. <u>Limitations:</u> • Small sample size. • No Randomization to researchers.
Author	Labrague, L. J. & Mcenroe-Petitte, D. M. (2014).
Key Findings	-Results showed decreases in STAI scores, systolic blood pressure, diastolic blood pressure and pulse rate for the experimental group. -Overall, results showed women in the experimental group had lower STAI scores than the control group. -Independent t test analyses showed experimental group had lower STAI scores than the control group.
Recommendations	-Authors suggested to conduct a study comparing different types of music with varied listening duration time to determine extent of which music would exert maximum benefit in decreasing anxiety. -Investigating the difference between self-selected music and researcher-selected music in decreasing anxiety among various patient population in surgery. <u>Limitations:</u> • Nonrandomization of participants. • Participants from one single hospital facility.
Author	Lee, K. et al. (2011).
Key Findings	-Results showed the mean anxiety level for the control group was significantly higher than the headphone and the broadcast group. -Significant difference noted in high frequency HR variability among the three groups. -VAS score showed significant decrease for headphone and broadcast groups, but not for control group. -Data shows clear reduction in anxiety through music, but retention of the effect is unclear.
Recommendations	-Future studies examine lasting effects of anxiety on outcomes during intraoperative and postoperative periods. -Improve research design and add pretest to determine change. <u>Limitations:</u> • No pretest-posttest comparison. • Participants unable to choose their favorite music.
Author	Ni, C. et al. (2011).
Key Findings	-Significant decreases in STAI scores from baseline were seen in both groups, however the mean STAI score was significantly lower in the music group compared to control. -Decreases in heart rate, systolic blood pressure and diastolic blood pressure were seen in both groups from baseline.
Recommendations	-Future studies to include blood levels of various outcomes as well as urine levels, according to the authors.

	Limitation: • No blinding utilized. • Results not generalizable beyond day surgery setting
Author	Palmer, J. B., et al. (2015).
Key Findings	-Results showed that patient satisfaction overall was high. -Both music groups showed a decrease in anxiety and both differed significantly from the control group. -There was no difference observed in GA-VAS scores between the music groups. -Shorter discharge times were observed for the live music group when compared to the recorded music group (difference in 12 minutes).
Recommendations	-Need for further studies regarding therapeutic value of music therapy, specifically in the perioperative setting, according to the authors. Limitations: • Nurses were not blinded. • Not generalizable to areas outside of women undergoing breast surgery.