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Examining the Effects of Music Therapy on Physical and Psychological Symptoms Among Cancer Patients Undergoing Chemotherapy

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MUSIC INTERVENTION CHEMOTHERAPY INDUCED SYMPTOMS

Examining the Effects of Music Therapy on Physical and Psychological Symptoms Among Cancer Patients Undergoing Chemotherapy

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NURS 4500 Nursing Research and Senior Thesis

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Abstract

Background: Patients undergoing chemotherapy experience undesirable physical and psychological effects in which medications are the preferred method of management. However, standard medications are often insufficient for patients. Failure to attend to the adverse effects can lead to worsening of the patient's cancer diagnosis and quality of life. The importance of managing chemotherapy symptoms creates an urgent need to implement an approach that is noninvasive, non-pharmacological, and one that still meets the physical and psychological needs of patients receiving chemotherapy.

Objective: The purpose of this thesis is to examine the effects of music therapy (MT) on physical and psychological symptoms induced by chemotherapy and to better understand adult cancer-patient experiences about the role of music interventions on chemotherapy symptoms.

Literature Review: Primary articles were recruited from Google Scholar, PubMed, and CINAHL databases. Studies found MT to be effective in decreasing pain and anxiety and minimizing the severity of nausea/vomiting.

Proposal: After a review of research literature, a proposal for further study will utilize a mixed methods design with 33 participants admitted as inpatients to receive chemotherapy. Participants will be divided into three groups: Group one will partake in a session of MT where they will create music under the guidance of a music therapist, group two will listen to pre-recorded music, and group three will serve as the control. Before and after the session, participants will report their pain, anxiety, and nausea/vomiting levels. Within 24 hours of therapy, participants will join in an interview, in which they will share their experiences about the music intervention.

Clinical Significance: The findings of this literature review and the objective of the proposed study are critical in the field of oncology nursing because they represent a unique approach that

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has the potential to bring comfort to patients who experience undesirable symptoms from chemotherapy.

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Introduction

Patients diagnosed with cancer undergoing chemotherapy (CT) can experience a variety of physiological and psychological symptoms (Tang et al., 2021). Among these symptoms, pain is the most common symptom that occurs in about 40% of cancer patients (Tang et al., 2021). As cancer progresses, managing symptoms such as pain and anxiety become the center focus of treatment because failure to attend to patient's needs can lead to worsening of the disease, both physiologically and psychologically.

Among the various cancer treatment options, chemotherapy is one of the most widely used treatments to eliminate cancerous cells from the body (Tang et al., 2021). However, with treatment comes consequences such as pain, nausea, vomiting, fatigue, lack of appetite, anxiety, and depression (Bilgiç & Acaroğlu, 2017). About 60% to 70% of patients receiving chemotherapy are at risk for chemotherapy induced physiological and psychological symptoms. Therefore, symptom management is of vital importance in improving not only compliance with chemotherapy but also their quality of life.

In comparison to pharmacological treatments, non-pharmacological interventions like music therapy are cost effective and linked to fewer side effects (Tang et al., 2021). Music interventions have been found to manage the symptoms of patients receiving chemotherapy (Tang et al., 2021). According to Bilgiç and Acaroğlu (2017), research has shown that the use of music interventions can lessen pain levels and prevent nausea and vomiting that result from chemotherapy and can promote better sleep and relaxation (Bilgiç & Acaroğlu, 2017). Therefore, with understanding the side effects of chemotherapy and the positive outcomes of music interventions, music therapy as an adjunct treatment to chemotherapy can pose a significant impact in oncology settings to optimize a cancer patient's overall well-being.

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Research Question

The purpose for this literature review and proposed study is to examine the effects that music interventions have on managing physiological and psychological symptoms among cancer patients receiving chemotherapy. Therefore, the research question for this study is: Among cancer patients undergoing chemotherapy, does implementing music therapy help aid in the management of chemotherapy induced physical and psychological symptoms?

Literature Review

This literature review aims to explore recent studies that provide relevant research about the impact music therapy has on individuals undergoing chemotherapy and how music therapy can be an additional non-pharmacological approach to managing physical and psychological symptoms induced by chemotherapy.

The articles for this literature review were collected from the following databases: Google Scholar, PubMed, and CINAHL. The following search terms were used to find relevant articles: *music intervention/music therapy, cancer pain and anxiety, nausea/vomiting, cancer patients, and chemotherapy*. There were several articles that discussed the effects of MT on chemotherapy induced physical and psychological symptoms. There were also several articles related to patient perspectives on MT as an adjunct to cancer treatments which would allow for an exploration of the impacts MT has on chemotherapy. The criteria for utilizing articles included primary articles and evidence that demonstrates the impact MT has on managing chemotherapy induced physical and psychological symptoms. For this literature review, a total of six primary studies were chosen and are categorized under the following subheadings: Cancer Patient Perspectives on Music Therapy, Music Therapy Effects on Physical Symptoms, and

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Music Therapy Effects on Psychological Symptoms. Appendix A provides a Literature Review Table where a summary of the six articles can be found.

Cancer Patient Perspectives on Music Therapy

With chemotherapy comes unwanted consequences that have profound impacts on both a person's physical and psychological well-being. Managing these symptoms with medical treatments can sometimes fail to meet the needs of patients and can further create unpleasant side effects for the patient. Therefore, a strong need to incorporate non-pharmacological interventions, like MT, that can manage both physical and psychological symptoms associated with chemotherapy is needed. Music therapy can positively influence and create a unique experience for patients who receive chemotherapy. It's important to understand how patients feel and perceive MT to see both the advantages and disadvantages of having MT as part of one's cancer treatment plan.

The article, *The Impact of Music Therapy versus Music Medicine on Psychological outcomes and pain in Cancer Patients: A Mixed methods Study* by Bradt and her research team conducted a mixed-methods study that gathered qualitative data and used a randomized control trial on adult cancer patients receiving inpatient or outpatient cancer treatment. The purpose of the study was to explore the impact of music interventions on pain and psychological outcomes among cancer patients and better understand their experiences with music interventions. All thirty participants were randomly assigned to participate in two, 30-to-45-minute sessions of MT or music medicine within a two-week period. Each participant reported their mood, anxiety, and relaxation levels using the Visual Analogue Scale (VAS) and pain using a 11-point numeric rating scale. Following the study, participants engaged in an interview to share their experiences

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of the music sessions and if they would like to receive either music intervention for their following cancer treatment sessions (Bradt et al., 2015).

The main result found was that music interventions enhanced mood, decreased anxiety, increased relaxation, and decreased pain (Bradt et al., 2015). Roughly, 77.4% of participants expressed a strong interest in MT for the rest of their cancer treatment because it allowed them to express their emotions as they made their own music (Bradt et al., 2015). The results from the interview found that overall, music interventions allowed patients to escape from stress related to their cancer diagnosis and treatment, encouraged an opportunity to connect with their “pre-illness self,” and offered “hope for the future and inspiration to move forward” (Bradt et al., 2015). Although many participants found MT to have a positive effect, some recollected memories of loss and trauma.

The use of conducting an interview provides a deeper understanding of the benefits music interventions offer to patients undergoing chemotherapy. Results of this study showed strong evidence that having pre-recorded music can provide both symptom management, a connection between the “pre-illness self” to the present self, and a sense of hope. On the other hand, interactive music making allowed patients to express their emotions. Limitations in this study can be adhered to the small sample size in which most of the participants were female and African Americans. This limits the ability for the findings to be generalized to other groups and decreases the validity of the study. The use of limiting MT to two sessions can make it challenging for participants to build trust and report their true experiences and pain levels.

Similarly, in *“A quiet still voice that just touches”*: music’s relevance for adults living with life-threatening cancer diagnosis, O’Callaghan and her research team aimed to examine the views adult cancer patients have about how music impacted them before and after receiving their

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cancer diagnosis (O’Callaghan et al., 2014). In this qualitative study, the researchers used convenience, snowball, and theoretical sampling to gather data on 52 adult patients diagnosed with life-threatening cancer. Of the participants, 38% were receiving chemotherapy and/or radiation treatment (O’Callaghan et al., 2014). Participants were recruited from an Australian metropolitan cancer and hospice setting and were asked to participate in audio-recorded, semi-structured interviews.

After analyzing the interview, researchers found that music had the potential to provide distraction from intrusive sounds, captivate, allow for expressing grief, and make one “feel alive” (O’Callaghan et al., 2014). Patients also reported that music could “empathize, reassure, distract from fear, remove sadness, and be a friend” (O’Callaghan et al., 2014). These findings show that music can help relieve psychological symptoms and even provide a sense of purpose. Another major finding showed that music helped patients “relax, sleep, enjoy, motivate, reduce pain, or quicken time” when receiving cancer treatments or undergoing diagnostics procedures (O’Callaghan et al., 2014). Although music provided symptom relief to some, one patient reported feeling overwhelmed and in distress which led to her preferring silence when undergoing stem cell transplant (O’Callaghan et al., 2014). It was concluded that many patients in this study benefited from listening to music since being diagnosed with cancer.

The overall approach of this study allowed participants to share their experiences about how music affects them. Their personal perspectives offer suggestions for including music therapy as part of one’s cancer treatment. One limitation of this study was that many patients had a music performance background. Having no music performance background can help researchers better understand the true significance of music when diagnosed with cancer. Another limitation was the lack of cultural diversity which limits generalizability. Music can

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impact individuals from different cultures in various ways; therefore, it's important to gather a sample that is culturally diverse.

With the summary of both articles, patients had the opportunity to share the impact MT had on their psychological and physical well-being. Many participants found that MT served a major role in enhancing their well-being, providing them with a sense of purpose, and offering symptom relief. Given the participants' experiences, MT should be taken into consideration to be part of the treatment plan of cancer patients.

Music Therapy Effects on Physical Symptoms

Nausea, vomiting, and fatigue are distressing side effects of chemotherapy that affect the patient physically. Inadequately managing these symptoms can lead to further complications such as anxiety and depression which can lower their quality of life. Sometimes, medications alone do not provide sufficient relief of these symptoms, and in most cases, can worsen them. The importance of implementing non-pharmacological approaches then becomes important to include in managing chemotherapy induced symptoms.

The article, *Effects of Music Therapy and Guided Visual Imagery on Chemotherapy-Induced Anxiety and Nausea-Vomiting* by Karagozoglu and her research team found that nausea and vomiting are serious symptoms produced by chemotherapy and that pharmacological treatments are inadequate to helping manage these side effects (Karagozoglu et al., 2013). Therefore, Karagozoglu and her fellow research colleagues decided to conduct a study to examine the effects of MT as a non-pharmacological approach on chemotherapy-induced anxiety and nausea/vomiting (Karagozoglu et al., 2013).

A cross-sectional and experimental design was used on 40 participants. Participants were recruited from a chemotherapy unit at a university hospital. A pre-posttest design was given to

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the single sample size where the control group and the experimental group composed the same sample group in both the second and third session of chemotherapy. The control group did not receive any music intervention while the experimental group listened to soft predetermined Turkish music 15 minutes before their chemotherapy session started.

To collect data, the Visual Analogue Scale (VAS) was used to assess the severity of nausea/vomiting pre- and post- chemotherapy sessions (Karagozoglu et al., 2013). A Nausea and Vomiting Evaluation Form was given, which consisted of 16 questions that allowed patients to assess their nausea and vomiting before and after chemotherapy sessions.

The main result from this study showed that MT significantly reduced the severity and duration of chemotherapy induced nausea/vomiting in the experimental group compared to the control group (Karagozoglu et al., 2013).

The use of a control and experimental group is an effective way of examining whether MT can decrease chemotherapy induced symptoms in patients who undergo MT compared to patients who do not. A limitation to this study, however, is the small sample group. This limits the ability for this study to be replicated. The use of a cross-sectional design and no use of randomization also limits the study because bias can occur and the finding's validity decreases.

Similarly, in *Impact of a music Intervention on Quality of Life of Breast Cancer Patients Undergoing Chemotherapy: A Randomized Clinical Trial*, Lima and her research team emphasized the idea that chemotherapy takes a toll on the patient's physical well-being which directly impacts quality of life (Lima et al, 2020). With this statement, Lima and her research team conducted a study with the purpose of examining the effects of music interventions on symptoms and adverse events in breast cancer patients undergoing chemotherapy (Lima et al, 2020).

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In this randomized clinical study, 33 female patients who were just beginning chemotherapy for breast cancer were recruited from two hospitals in Sao Lui, Maranhao (Lima et al, 2020). Participants were randomly assigned to either a music intervention group where they listened to music for 30 minutes before receiving chemotherapy or a control group where they received no intervention. The Chemotherapy Toxicity Scale measured the patient's fatigue and nausea/vomiting levels while the SIS questionnaire examined patients' perspectives about the music intervention as well as their fatigue and stress levels using a scale between 0 and 10. The evaluation was done after each session for the first three sessions of chemotherapy (Lima et al, 2020).

The results from the study showed that the incidence of vomiting was significantly decreased for patients in the music group compared to the patients in the control group. Additionally, all patients in the music group reported an improvement in tiredness or fatigue with five patients in the music intervention group reporting that they felt "relaxed" (Lima et al, 2020).

The use of the SIS questionnaire is a strong tool because patient perspectives and feelings about the music session they received can offer a better understanding about the use of music therapy as an adjunct treatment. Also, the use of randomization prevents any bias. The lack of baseline measures of symptoms pre-chemotherapy session represents a limitation because findings can't strongly validate the effectiveness of the music intervention. The lack of different cancer diagnosis can also be a limitation because the findings of this study may or may not be replicated among other patients with a different cancer diagnosis who receive chemotherapy.

With recent studies, implementing music interventions is an easy, non-invasive, and inexpensive way of improving a patient's physical well-being while receiving chemotherapy (Lima et al, 2020). Music therapy interventions that are offered for 30 to 60 minutes and are

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implemented before receiving chemotherapy have shown significant indications for positively managing the common physical chemotherapy-induced symptoms which include nausea, vomiting, and fatigue. Evidence from previous studies support the need to implement music interventions prior to receiving chemotherapy.

Music Therapy Effects on Psychological Symptoms

Emotional and psychological problems are associated with cancer treatments due to the financial burden and the idea of being seen as different (Spilioti et al., 2017). For most people, music is seen as a powerful therapeutic tool that can manage the emotions and feelings that are experienced daily. More recently, music medicine is a type of MT that is being offered more in oncology settings to improve psychological outcomes (Spilioti et al., 2017).

In the article, *The Efficacy of Music Therapy to Relieve Pain, Anxiety, and Promote Sleep Quality in Patients with Small Lung Cancer Receiving Platinum-based Chemotherapy* by Tang and his team conducted a randomized control trial on 100 patients recruited from the Hunan Cancer Hospital Department, diagnosed with lung cancer, and undergoing chemotherapy. They wanted to examine the effects of MT on chemotherapy induced anxiety, pain, and disturbed sleep patterns (Tang et al., 2021). All 100 patients were assigned randomly to either a control group where they received no music intervention or the experimental group where they received a six-step music therapy intervention based on their music preferences (Tang et al., 2021).

Anxiety, pain, and sleep quality in both groups were examined before receiving chemotherapy, one day after chemotherapy, and five days after chemotherapy (Tang et al., 2021). Anxiety was measured using the Self-Rating Anxiety Scale (SAS) while pain and sleep quality were measured using the Visual Analogue Scale (VAS) and the Pittsburgh Sleep Quality Index (PSQI) respectively (Tang et al., 2021).

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The results of the study found that patients who received the six-step MT intervention reported decreased anxiety levels one day and five days after chemotherapy compared to the control group. Similarly, patients' pain levels significantly decreased in those who received MT one day and five days after chemotherapy in comparison to patients who didn't receive MT. Lastly, those who received MT showed significantly enhanced sleep quality at one day post chemotherapy compared to those who didn't receive any MT.

One of the study's strengths is the use of a large sample size. Including 100 patients increases the validity of the study. Also, including a pre and posttest helps better examine how well MT can or cannot manage the psychological symptoms induced by chemotherapy. A limitation of this study can be adhered to patients only being recruited from a single hospital. Including patients from multiple hospitals can also increase the study's validity. Lastly, MT was directed at examining its effects on patients with lung cancer which limits the findings from generalizing to other cancer patients with a different cancer diagnosis.

Alike, The effect of music on pain and anxiety in patients receiving chemotherapy during COVID-19, by Koca and Aylaz, aimed to examine the effect music has on pain and anxiety on patients undergoing chemotherapy during COVID-19. In this randomized control trial, 92 adult patients receiving outpatient chemotherapy were recruited from a Medical Center in Turkey. The patients were randomly assigned to a control group where they received no MT and an experimental group where they listened to preselected music at home while undergoing chemotherapy. To measure pain and anxiety levels, the Visual Analogue Scale (VAS) and the State and Trait Anxiety Inventory (STAI) were used respectively in both groups before and after the chemotherapy session. Google form documents were sent the day before to patients where

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they needed to answer questions that the VAS and STAI asked. Data was collected by nurses with a music therapy certification (Koca & Aylaz, 2022).

The results showed that the experimental group had a significant decrease in pain scores after the music intervention was applied. There was also a significant decrease in anxiety levels in the experimental group compared to the control group. It was concluded that listening to music while receiving chemotherapy can significantly reduce pain and anxiety levels (Koca & Aylaz, 2022).

Randomly assigning patients to either group allows for the reduction of bias. Highlighting which participants used additional pharmacological treatments to manage pain was crucial to determine the true effect of music on pain. Results showed that more than half of the patients do not use analgesics which provides strong support that music can help manage pain levels among those undergoing chemotherapy. One limitation of the study is adhered to the location of the study. The study took place in the homes of the patients due to COVID-19 which makes it difficult to control the variables. The researchers might not know if outside factors influenced either group's outcomes. Lastly, since most patients with cancer are older adults, this can pose major technology barriers which can also alter the outcomes of this study.

With the summary of the articles, patients who engage in MT show an overall improvement in their emotional and psychological well-being in comparison to patients who don't engage in MT. Psychological symptoms of pain and anxiety that are induced by chemotherapy can lead to an overall lower quality of life. However, managing these symptoms with MT can be a unique approach to include in the oncology settings to minimize the psychological effects chemotherapy has on patients.

Overall Discussion of the Literature

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The review of the literature acknowledged the perspectives of cancer patients receiving music interventions while undergoing chemotherapy and evidence that shows a reduction of physical symptoms and improvement in psychological symptoms in individuals who received MT. The literature review suggests that implementing MT has positive impacts on managing chemotherapy induced nausea, vomiting, fatigue, anxiety, mood, and sleep quality. The use of MT before chemotherapy sessions was found to be effective in reducing the incidence and severity of chemotherapy induced nausea, vomiting, and fatigue. On the other hand, MT during chemotherapy was found to be effective in reducing pain and anxiety levels. Although MT was found to be effective in the management of physical and psychological symptoms, there are still few studies that examine the effectiveness of MT compared to simply listening to music. Therefore, more studies should be conducted to further examine how different music interventions can manage chemotherapy induced symptoms. Nevertheless, nurses should advocate for MT to be used in chemotherapy units not only because it has been shown to be effective in managing symptoms, but because it is also easy to implement and is cost effective.

Proposal for Further Study

Overall Research Question

After reviewing the articles in this literature, Karagozoglu (2013) and Tang (2021) both strongly supported the idea that MT is effective in reducing physiological symptoms such as pain and vomiting and positively improving psychological symptoms such as mood and anxiety among patients undergoing chemotherapy. Although these studies offer a perspective of how MT can be effective in reducing adverse symptoms from chemotherapy, there remains a lack of studies comparing the effectiveness of different music interventions on physical and psychological symptoms among patients who need to be admitted to the hospital to receive

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chemotherapy. Therefore, a further study will be proposed to answer the following question:

Will music therapy compared to music medicine (i.e., listening to music with headphones) be more effective in managing chemotherapy induced pain, nausea/vomiting, and anxiety among inpatients?

Rationale for Proposed Study

With medical management being administered as prophylaxis to manage chemotherapy induced physical and psychological symptoms, medications themselves can often exacerbate the adverse symptoms that patients already experience. Patients who experience serious adverse effects from medications and chemotherapy often need to be hospitalized for several days so that nurses can better manage their symptoms. Non-pharmacological interventions such as MT have promising effects on managing adverse events without being invasive or contributing to more worsening effects; however, there are few randomized controlled trials that examine the impact of different music interventions on physiological and psychological responses in patients undergoing chemotherapy who must remain in the hospital for several days to be monitored for serious chemotherapy side effects. Therefore, this proposed study will further explore the effectiveness of MT and music medicine among inpatients undergoing chemotherapy in efforts to manage their symptoms. This new study can provide further contribution to the oncology setting and the care and comfort of patients receiving chemotherapy as inpatients.

Theoretical Framework

To support this proposed study, the theoretical framework that will be used is called Kolcaba's Theory of Comfort. This theory was developed in the early 1900's with the sole focus being on patients' comfort. The concept of this theory explains how a patient's comfort should be a top priority in healthcare and that comfort is an immediate desirable outcome from the care

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nurses provide to their patients (Petiprin, 2019). According to Kolcaba, she describes comfort as being an outcome of implementing a holistic approach in the nursing practice (Petiprin, 2019). Kolcaba describes comfort existing in three forms: relief occurring after a patient's needs have been met, ease arising from a state of contentment, and transcendence transpiring when patients can overcome any challenges they're facing (Petiprin, 2019).

Based on this theory, patients utilizing MT as an adjunct to their chemotherapy session would experience comfort in the form of ease with hopes that their vomiting, pain, and anxiety would be decreased after receiving MT. Kolcaba's Theory of Comfort is essential in this study as it will help guide and support the idea of how using music interventions can bring comfort to patients receiving chemotherapy.

Primary Research Aims

The primary purpose of this present study is to compare the effects of MT and music medicine on physical symptoms (nausea/vomiting, fatigue), and psychological symptoms (pain and anxiety) for one session of chemotherapy. Research questions to be answered are:

- Is MT more effective in reducing the severity of physical symptoms (nausea/vomiting, fatigue) and psychological symptoms (anxiety and pain) compared to music medicine?
- Is there sufficient evidence that shows MT or music medicine is more effective in managing such symptoms, and should they become part of the standard treatment plan for patients receiving chemotherapy sessions as inpatients and outpatients?

Ethical Considerations

In conducting a study on patients undergoing chemotherapy, patients may or may not have a terminal cancer diagnosed. If they do, they are considered a vulnerable population in which every effort will be made to ensure voluntary and meaningful informed consent is

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provided. To obtain this information and the patient's cancer treatment plan, patients' health data must be accessed from hospital records. Prior to collecting data, patients who have agreed to participate and have been informed about the purpose of the study must provide written and verbal consent. Sufficient and clear information about the study will be given. Additionally, participants will be informed that they may withdraw from the study at any given point without any negative consequences. After this is provided, written-verbal consent will then be gathered.

Since collecting patient data from hospital records is sensitive, the researchers must inform the participants that their information and any responses provided will remain confidential. The participants' privacy and dignity will be kept by assigning code numbers so that others aren't able to link any information to them. To carry out this research, the study will need approval of an internal review board.

Research Design

To carry out this study, a mixed methods study approach will be used. For the quantitative approach, a randomized control trial will examine the effectiveness of MT versus music medicine on chemotherapy induced symptoms. Participants will be randomly assigned to either the music therapy group (MTG), the music medicine group (MMG), or the control group (CG) in which nausea/vomiting, fatigue, pain, and anxiety levels will be measured.

For the qualitative approach, data will be gathered by conducting a semi-structure, open-ended interview within 24 hours of therapy to better understand the experiences patients feel when they receive either music intervention.

Population

The population utilized for this study will include patients who need to be admitted to an adult oncology unit in a hospital located in the San Francisco Bay to receive infusion

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chemotherapy sessions as inpatients. Patients are eligible if they are to be submitted to intravenous chemotherapy, will be hospitalized to receive chemotherapy for an average of three days as predetermined by their cancer treatment plan, must have never received MT before, must be 18 years or older, and must be proficient in English. The exclusion criteria involve individuals with hearing or cognitive impairment.

Sample Size

For this study, the goal is to recruit at least 30 inpatient participants from an adult oncology unit. Ten participants will be randomly assigned to the MTG where they will create music under the guidance of a music therapist for 30 minutes, 10 participants to the MMG where they will listen to 30 minutes of soft pre-recorded music, and 10 participants to the CG where they will remain in a relaxation state for 30 minutes before their chemotherapy session.

Strategy of Recruitment

To recruit participants, the researcher will market the study by utilizing social media posts and posting flyers in hospitals' oncology units located in the San Francisco Bay who have an established music therapy program. Researchers will also meet with oncologists to inform them about the study so that the oncologists can directly market the study to their patients who currently receive inpatient chemotherapy sessions as part of their cancer treatment plan. Participants who are interested in the study will be asked to call the research team. The researcher will then ask their age, the type of chemotherapy they receive, if they are scheduled to receive inpatient chemotherapy, and if they have experienced any physical or psychological symptoms during their previous chemotherapy sessions. The researcher will inform the participant that a signed informed consent is needed and that they may withdraw from the experiment at any point. The potential participants will also be informed that they will not be

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able to choose which group they can be in. Instead, they will be told that they will randomly be assigned to either a MTG, a MMG, or a CG.

Methodology

After providing sufficient information about the planned study and obtaining informed consent, participants will be asked to fill out a patient description form that covers questions about their demographics including age, gender, ethnicity, education level, marital status, and type of cancer the day they are admitted to the hospital to receive their session of chemotherapy. Other questions will ask about the patient's recurrence of cancer and music preferences.

We will partner with Sutter Health California Pacific Medical Center (CPMC) Hospital in San Francisco since they already have a MT program that offers these services to their patients.

To maintain anonymity, the participants will be assigned a code number and will then be randomly assigned to one of the three groups using a computer randomization program: MTG, MMG, CG. All participants will remain in their individual rooms where they'll receive the music intervention, or no intervention followed by their chemotherapy.

Music Therapy Group (MTG)

A certified music therapist will guide the MT intervention. This MT session will last 30 minutes and will be offered at least 10 minutes before the start of the chemotherapy infusion. The purpose of this MT session is to help manage the patient's pain, anxiety, and fatigue, and nausea/vomiting levels. The music therapist will offer live music, will encourage the patient to play an instrument, sing, and/or create their own music.

Music Medicine Group (MMG)

Participants in the music medicine group will be provided with a list of soft pre-recorded songs based on their music preferences they noted on the demographic form. They will listen to

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music for 30 minutes at least 10 minutes before the chemotherapy session using headphones provided by the music therapist. The music therapist will make sure the CD player is working but will not remain in the room for the rest of the intervention.

Control Group (CG)

Participants in the control group will not receive either intervention. Instead, they will be taught relaxation techniques to use for 30 minutes while they wait for their chemotherapy session.

Measures and Data Collection

To obtain baseline data, the Chemotherapy Toxicity Scale will be used for the control and experimental groups prior to initiating the music intervention to assess their nausea/vomiting and fatigue levels on a grade scale of 0 to 4. The Visual Analogue Scale (VAS) which uses a 100-mm line, and the State-Trait Anxiety Inventory (STAI) will also be given to assess their pain and anxiety levels respectively to all three groups.

Immediately after the chemotherapy session, participants will be asked to rate their pain, anxiety, fatigue, and nausea/vomiting levels using the same tools used to gather their baseline measures.

To allow patients to rest, all participants will have 24 hours after therapy to participate in a semi-structured, open-ended interview where they will be asked to reflect on the music intervention. The following questions will be asked: How did music therapy or music medicine make you feel? In what ways did receiving music therapy or listening to music affect your pain, anxiety, fatigue, and/or nausea/vomiting levels, if you felt any? Would you like to receive music therapy or music medicine for future sessions of chemotherapy? If so, what makes you feel

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inclined to receive this form of therapy? Do you believe music therapy or music medicine should be implemented as part of a patient's cancer treatment plan? Why do you think so?

Statistical Methods for Quantitative Research

Data that is collected from the scale tools will be analyzed to provide results that discuss the effectiveness of MT versus music medicine on physical and psychological symptoms among patients undergoing chemotherapy. Data from the participants in the MTG who received a 30-minute session with a music therapist will be compared to the MMG who listened to 30 minutes of soft music and to the CG to investigate if there is a relationship between music interventions, reduction in pain and nausea-vomiting, and improvement in fatigue and anxiety among chemotherapy patients. To ensure that the participants in the CG are not influenced by any form of music, they will be asked to not listen to any form of music during their stay at the hospital. The data that is collected will be analyzed using a statistical analysis software called SAS/STAT which will be used to analyze the baseline and post chemotherapy scores from the single session of all three groups as utilized by Bradt (2015) and his research team. The analysis of variance (ANOVA) will be utilized to compare the results from the scales in all three groups and to determine if there lies a relationship between music interventions and management of chemotherapy induced symptoms.

Content Analysis for Qualitative Research

To ensure that the interviews are analyzed with accuracy, they will be transcribed verbatim into a script. A qualitative analysis software called MAXQD, also utilized by Bradt (2015) and his research team, will be used in the present study to analyze and gain insight from the participants' responses during the interview. A theoretical thematic analysis approach will be used to look for patterns within the responses. The following questions will be used to help guide

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the software to find themes: (1) What do the participants describe as the benefits and disadvantages of music therapy, music medicine, or relaxation? (2) What experiences do they recount from music therapy, music medicine, or relaxation? The themes will be recognized using a semantic approach to which the researchers will take the meanings of the participants' response at face value.

After thoroughly analyzing the data, researchers will better determine whether MT, music medicine, or both can help manage pain, nausea, vomiting, and anxiety induced by intravenous chemotherapy. Additionally, the researchers will gain further insight as to whether music interventions should become part of the chemotherapy treatment plan among patients who receive inpatient chemotherapy sessions.

Conclusion

In this thesis, it was acknowledged that the need for MT is necessary when providing care to patients actively receiving chemotherapy. Findings showing evidence of the effects of music interventions, either MT or listening to pre-recorded music, on chemotherapy induced symptoms along with patient experiences were examined in the literature review in efforts to find supporting information that showed whether the use of MT or listening to music can help minimize physical symptoms or improve psychological symptoms among patients who receive chemotherapy. One of the studies concluded that MT was not only preferred over listening to music, but it also offered a sense of escape from any stress related to a patient's cancer diagnosis and treatment. In subsequent studies, researchers concluded that MT resulted in a decrease in the severity and duration of chemotherapy induced nausea/vomiting, improvement in fatigue, and a reduction in pain and anxiety levels.

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The discussion of utilizing MT as evidenced based practice has supported the effectiveness that music interventions, in particular MT, has on managing chemotherapy induced pain, anxiety, nausea, vomiting, and fatigue. Oncology nurses along with oncologists can implement the use of MT as part of a patient's cancer treatment plan. In one of the studies discussed, one patient felt overwhelmed and distressed when listening to music. Therefore, rather than making MT a definitive adjunct treatment to the cancer treatment plan, oncology nurses can make MT sessions available for those who wish to engage with it to not only provide comfort while they are hospitalized but also minimize their chemotherapy induced symptoms.

Although the literature review provides an understanding about the effects of using MT for managing physical and psychological symptoms among patients undergoing chemotherapy, it was concluded that there still exists a lack of research that examines the effects of different music interventions on physical and psychological symptoms among patients undergoing chemotherapy. This research proposal will bridge that gap by examining the effectiveness of music interventions on managing symptoms induced by chemotherapy among inpatients. We, the researchers, anticipate that the results of this study will show a reduction in nausea/vomiting, fatigue, pain, and anxiety levels among patients who received either music intervention compared to the control group.

For further discussion, it is critical that more studies be performed. Music therapy was examined as a short-term treatment in the studies reviewed in the literature. However, studies that implement the use of music intervention over a longer period can present new information on how MT might affect cancer patients over their entire process of receiving chemotherapy. Perhaps, with this approach, new studies could potentially reveal how MT might minimize the effects of the dosage or strength of the chemotherapy if MT is implemented earlier in the

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treatment process. Nonetheless, having more studies that examine the impact of MT will allow different units in the hospital to see the benefits or downsides of using MT as an adjunct approach to patients undergoing any form of invasive treatment or procedure.

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Tang, H., Chen, L., Wang, Y., Zhang, Y., Yang, N., & Yang, N. (2021). The efficacy of music therapy to relieve pain, anxiety, and promote sleep quality, in patients with small cell lung cancer receiving platinum-based chemotherapy. *Supportive Care in Cancer*, 29(12), 7299–7306. <https://doi-org.dominican.idm.oclc.org/10.1007/s00520-021-06152-6>

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Appendix A - Literature Review Table

Authors/Citation	Purpose of Study	Sample/Population	Study Design	Study Methods	Major Finding(s)	Strengths	Limitations
Bradt, J., Potvin, N., Kesslick, A., Shim, M., Radl, D., Schriver, E., Gracely, E. J., & Komarnicky-Kocher, L. T. (2015). The impact of music therapy versus music medicine on psychological outcomes and pain in cancer patients: a mixed methods study. <i>Supportive Care in Cancer</i> , 23(5), 1261–1271. https://doi.org/10.1007/s00520-014-2478-7 (Bradt et al., 2015)	Compare the impact of music therapy (MT) versus music medicine (MM) interventions on psychological outcome and pain in patients with cancer and to better understand patient experiences of these types of music interventions.	Total of 31 adult cancer patients receiving inpatient or outpatient cancer treatment. All female 23 (74.2%) - Black Intervention: MT = Music therapy group; Interactive music making with a music therapist MM = Music medicine group; Listening to pre-recorded music without a music therapist	Mixed methods: qualitative & randomized crossover trial	Participants were randomly assigned to two, 30-45 min sessions for each intervention within a 2-week timeframe. Visual analogue scale (VAS) measured mood, anxiety, relaxation before & after each session. Numeric rating scale 0-10 to measure pain All participated in an audio recorded exit interview - allowed participants to express their experiences in the music sessions.	Quantitative: -MT & MM are equally effective in improving anxiety, mood, relaxation, and reducing pain. -77.4% reported preference for MT. Qualitative: -Common themes: beneficial for symptom management; memories were elicited; feeling of hope & inspiration. - MT themes: creativity; opportunity to express emotions. -MM: more comfort with hearing familial music; scared to make their own music; preference to hearing music alone	1) Randomized crossover trial allows a view and comparison of 2 types of music therapy which offers a unique message that live music is a preferred service for those receiving active cancer treatment. 2) Themes were identified using a semantic approach (were taken at face value).	1) Small sample size which makes it hard to replicate and/or generalize. 2) All female and mostly black participants which makes it difficult to generalize it across other population groups. 3) Only 2 sessions which makes it more challenging for participants to become comfortable in their elements and truly report their feelings and pain levels.

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Authors/Citation	Purpose of Study	Sample/Population	Study Design	Study Methods	Major Finding(s)	Strengths	Limitations
<p>Karagozoglu, S., Tekyasar, F., & Yilmaz, F. A. (2013). Effects of music therapy and guided visual imagery on chemotherapy-induced anxiety and nausea-vomiting. <i>Journal of Clinical Nursing</i> (John Wiley & Sons, Inc.), 22(1–2), 39–50. https://doi.org.dominican.idm.oclc.org/10.1111/jocn.12030</p> <p>(Karagozoglu et al., 2013)</p>	To understand the effects that music therapy and visual imagery has on symptoms induced by chemotherapy (i.e. anxiety and nausea-vomiting)	<p>Total of 40 patients. participants</p> <p>All received IV chemotherapy.</p> <p>Control group & experimental group were the same people.</p>	Experimental and cross sectional	<p>- State-Trait Anxiety Inventory: questionnaire (STAI) measures level of anxiety (> score means greater anxiety</p> <p>- Visual Analogue Scale (VAS): measures severity nausea and vomiting; on a scale of 0-10 (0 = absence of N/V; 10 = severe N/V)</p> <p>- Nausea & Vomiting Evaluation Form: 16 questions that allowed patients to assess their N/V before and after chemo</p> <p>Intervention of Music: soft Turkish music prepared by staff in the Music Department.</p>	<p>Anxiety: anxiety was higher before and after chemo during the control group than when in the intervention group.</p> <p>Nausea & vomiting: decreased severity significantly in the experimental group compared to the control group</p> <p>Music intervention also decreased the duration of chemo-induced N/V in the experimental group</p> <p>During 1–6 hours after chemotherapy, nausea occurred in 20% of them and vomiting in 22.5% of them when they were in the control</p>	<p>1) The control group was not informed if they were in the control group or intervention group first which is beneficial to prevent any influence on participants behavior.</p> <p>2) Use of control group and experimental group to compare the outcomes of whether the music intervention was effective or not</p>	<p>1) Not randomized</p> <p>2) Small sample size</p> <p>3) Cross sectional study makes it challenging to understand the effects of music over time.</p>

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				<p>Control Group: held during the second chemo round; received no info about music intervention</p> <p>Experimental group: held during the third chemo round; were informed about the music intervention prior to experiment. Listened to music 15 mins before the chemo session.</p> <p>30 minutes before chemo both groups filled VAS form</p> <p>Post chemo: participants filled the State Anxiety Inventory, the Trait Anxiety Inventory & VAS</p>	<p>group. However, when they were in the case group, the rates were 17.5 and 20% respectively.</p>		
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MUSIC INTERVENTION CHEMOTHERAPY INDUCED SYMPTOMS

Authors/Citation	Purpose of Study	Sample/Population	Study Design	Study Methods	Major Finding(s)	Strengths	Limitations
<p>Koca, G. Y., & Aylaz, R. (2022). The effect of music on pain and anxiety in patients receiving chemotherapy during COVID-19. <i>European Journal of Cancer Care</i>, 31(6), 1–11. https://doi-org.dominican.idm.oclc.org/10.1111/ecc.13715</p> <p>(Koca & Aylaz, 2022)</p>	To examine the effect that music has on pain and anxiety on patients undergoing chemotherapy during COVID-19.	<p>Total of 92 patients receiving outpatient chemo between March 2020 and July 2020.</p> <p>Female n = 72 Male n = 20</p> <p>Yes, using analgesic n = 36 No, using analgesic n = 56</p> <p>Control group: 47 Experimental group: 45</p>	Quantitative: Randomized control trial	<p>Both groups were determined using a randomization method.</p> <ul style="list-style-type: none"> - VAS & STAI scales used as pre & post-test. - Data collected by nurses with Music therapy certification. - Participants self-reported via a Google forms document that was sent the day before receiving chemo. - Music was listened to at the home of participants. - Participants chose the type of music from a list that was made by the researcher. 	<p>There was a significant decrease in pain scores after the music intervention was applied in the experimental group.</p> <p>Significant decrease in anxiety after music intervention was applied in the experimental group.</p>	<p>1) Use of randomization to assign control group and experimental group</p> <p>2) Sample size is relatively large enough to generalize.</p> <p>3) Indication of which participants used additional pain relief while under this experiment. More than half didn't use an analgesic which shows the strong effect that music can truly have.</p>	<p>1) The self-report method can make outcomes unreliable to a certain extent.</p> <p>2) Because the intervention was implemented at home due to covid, it makes it difficult to control the variables; researchers don't know if outside factors influenced either group's outcomes.</p> <p>3) Lack of information about the duration of listening to music.</p> <p>4) Older adults might have a difficult time using technology to fill out the forms.</p>

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Authors/Citation	Purpose of Study	Sample/Population	Study Design	Study Methods	Major Finding(s)	Strengths	Limitations
<p>Lima, T. U., Moura, E. C. R., Oliveira, C. M. B. de, Leal, R. J. D. C., Nogueira Neto, J., Pereira, E. C., Nascimento, R. V. B., Oliveira, E. J. S. G. de, & Leal, P. da C. (2020). Impact of a Music Intervention on Quality of Life in Breast Cancer Patients Undergoing Chemotherapy: A Randomized Clinical Trial. Integrative Cancer Therapies, 19, 1–9. https://doi-org.dominican.idm.oclc.org/10.1177/1534735420938430</p> <p>(Lima et al., 2020)</p>	To examine the effects of music intervention on symptoms, adverse events, and quality of life in breast cancer patients undergoing chemotherapy.	<p>Total of 33 female patients 18 years and older and beginning adjuvant chemotherapy for breast cancer.</p> <p>Recruited from 2 reference hospitals for treatment of cancer in Sao Lui, Maranhao</p> <p>Group Music (GM) group underwent 30-minute music intervention before chemotherapy. (n = 16)</p> <p>No music intervention on Group Control (GC) only instructions for self-relaxation techniques. (n = 17)</p>	Randomized Clinical Trial	<p>Evaluation was done after each session for the first three sessions of chemotherapy.</p> <p>The Chemotherapy Toxicity Scale was used to measure symptoms and adverse events related to chemotherapy including fatigue, nausea, vomiting, diarrhea, mucositis, alopecia.</p> <p>The adapted SIS verified the perception of patients about the results after the music intervention. It also verified their stress and fatigue levels using a scale between 0 and 10.</p>	<p>Incidence of vomiting was significantly decreased for the Group Music (GM) compared to the Group Control in the final experiment day.</p> <p>All Patients in the group music reported improvement in tiredness or fatigue with a mean score of 7.56 on a scale of 10 compared to the group control.</p> <p>5 patients stated feeling “relaxed”</p>	<p>1) Using the SIS questionnaire enables patients to express their feelings and perceptions about the music intervention which provides sound evidence that music interventions can be a benefit for cancer patients.</p> <p>2) Use of randomization is also a strength to prevent bias.</p>	<p>1) No baseline assessment of symptoms was taken prior to the first session of chemotherapy which represents limitation because findings will not show if symptoms were truly managed or were positively influenced by the music intervention.</p> <p>2) Study limited to sessions also represents a limitation. There needs to be multiple days of music interventions applied to determine the true effectiveness of the music interventions on chemotherapy-induced symptoms.</p>

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Authors/Citation	Purpose of Study	Sample/Population	Study Design	Study Methods	Major Finding(s)	Strengths	Limitations
<p>O'Callaghan, C.C., McDermott, F., Michael, N. et al. "A quiet still voice that just touches": music's relevance for adults living with life-threatening cancer diagnoses. Support Care Cancer 22, 1037–1047 (2014). https://doi.org/10.1007/s00520-013-2059-1</p> <p>(O'Callaghan et al., 2014)</p>	Examine adult cancer patients' views about music's role before and after diagnosis to better understand if music therapy can be a potential support intervention	<p>Total of 52 patients from Australian metropolitan cancer and hospice settings.</p> <p>Patients were over 25 years old and diagnosed with life-threatening cancer.</p>	<p>Qualitative research study informed by grounded theory.</p> <p>Sampling was convenience, snowball and theoretical</p>	<p>Interviews were conducted from June 2008 to November 2009.</p> <p>Questions inquired about: music preferences, usages, effects, spiritual associations, music therapy experiences and recommendation for music-based healthcare</p>	<p>Themes:</p> <p>1) music could empathize, reassure, distract from fear, remove sadness and be a friend"</p> <p>2) enabled peace</p> <p>3) helps elicit helpful interactions with staff, other patients and families, or separation/privacy in hospitals through headphone use</p> <p>4) could be elusive</p> <p>5) helps transform "dark" and "black" cancer experiences into relaxed and enlightened states</p> <p>6) helps find memories of significant people</p> <p>Many found that music improves mood, healing, self and spiritual awareness, energy and pain relief and their music</p>	<p>1)The study allows for patients with cancer to share their personal experiences and how they personally perceive music therapy as a non-pharmacologic approach to helping them cope with cancer.</p> <p>2)Patients came from various hospitals which can increase generalizability.</p>	<p>1) Many patients had a music performance background.</p> <p>2) patient declines to participate in research and their reasons were not included. Should have been included to better understand how music might not be helpful for cancer patients.</p> <p>3) Not culturally diverse. Music can impact different cultures in various ways.</p>

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					therapy reactions including symptoms such as symptom relief and family connection.		
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Authors/Citation	Purpose of Study	Sample/Population	Study Design	Study Methods	Major Finding(s)	Strengths	Limitations
Tang, H., Chen, L., Wang, Y., Zhang, Y., Yang, N., & Yang, N. (2021). The efficacy of music therapy to relieve pain, anxiety, and promote sleep quality, in patients with small cell lung cancer receiving platinum-based chemotherapy. <i>Supportive Care in Cancer</i> , 29(12), 7299–7306. https://doi.org.dominican.idm.oclc.org/10.1007/s00520-021-06152-6	To examine the effects of music intervention in helping relieve pain and anxiety and enhance quality of sleep among patients with lung cancer undergoing chemotherapy.	Total of 100 patients diagnosed with lung cancer undergoing chemotherapy. All patients were recruited from Hunan Cancer hospital in the Chemotherapy Department Experimental group: n = 50 Control group: n = 50	Quantitative: Randomized Control Trial Patients were randomly assigned to a control group or experiential group. Experimental group received music therapy the day before and after chemo	Music intervention was done in 6 steps: 1) A music piece was selected by the patient. Purpose was to reduce anxiety and fear. 2) Music was played 15-30 minutes before sleeping. 3) A music therapist guided patients to imagine music playing while receiving chemo. Purpose was to help distract from pain. 4) Music was played after each injection of chemo. Purpose was to relieve	Anxiety was significantly lower in the music therapy group 1 day and 5 days after compared to control group (SAS score was lower in music therapy group) Pain was significantly lower in the music therapy group 1 day and 5 days after chemo compared to control group (VAS score was lower in music therapy group) Sleep quality was significantly enhanced at 1 day post chemo (high PQSI score) in the	1) Sample size large enough for generalization 2) Pre and posttest help show the effect that music intervention has on pain, anxiety, and sleep quality among the music group compared to the control group.	1) Patients were all from the same hospital which can undermine the results of the study. 2) No examination of long-term effects of music therapy on pain, anxiety, and sleep quality. 3) Music therapy was directed at examining its effect on patients with lung cancer only and no other cancers; so, unable to generalize the results among other patients with different cancers.

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(Tang et al., 2021)				<p>vomiting and anorexia.</p> <p>5) Patients played musical instruments while receiving chemo.</p> <p>6) Music was played to promote positive emotions.</p> <p>Control group received no intervention.</p> <p>Anxiety, pain, & quality of sleep measured before chemo, 1 day after chemo, & 5 days after chemo for both groups.</p> <p>-Self-rating anxiety scale (SAS): assessed anxiety</p> <p>-Visual Analogue Score (VAS): assessed pain</p> <p>-Pittsburgh Sleep Quality Index (PSQI): assessed sleep quality</p>	music therapy group.		
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