Music Therapy in the PICU: An Integrated Synthesis of the Literature and Recommendations

by

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MUSIC THERAPY IN THE PICU: AN INTEGRATED SYNTHESIS OF THE LITERATURE AND RECOMMENDATIONS

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Abstract

There is an expansive amount of music therapy literature that discusses how music therapy may alleviate adult pain, but there is limited research dedicated to pediatric pain management and music therapy. Even more scarce is how, why or when music therapy is provided for patients in the Pediatric Intensive Care Unit (PICU) suffering with chronic or acute pain. An integrative review was conducted to create a synthesis of the literature on music therapy being conducted for pediatric pain in the PICU. A total of 7 research articles and 3 book chapters met the authors' search criteria for final analysis. These articles discussed specific circumstances where music therapy was utilized, with some examples being biopsies, ultrasounds, dressing changes, cardiac care, and utilization of mechanical ventilation. This integrative review demonstrated that music therapy may be helpful in regulating and managing pediatric pain for patients in the PICU. Music therapists and medical professionals must continue researching how music therapy can be utilized for PICU patients experiencing pain in order for these patients to receive the highest quality of evidence-based care.

Keywords: music therapy, pain, and Pediatric Intensive Care.

Contents

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The Pediatric Intensive Care Unit (PICU) is a multidisciplinary unit that provides care for infants, children & adolescents who become critically ill or injured. PICU patients often require specialized equipment such as heart monitors, oxygen, or mechanical ventilation and medications that must be closely monitored by medical professionals (Torres Jr., 2021). A PICU patient's length of stay on average is five days (Pollack et al., 2018), and long-stay patients may remain in the PICU between 14-28 days (García Mancebo et al., 2021).

The PICU is staffed with specially trained medical personnel including pediatric pharmacists, rehabilitation specialists, social workers, nutritionists, respiratory therapists, and child-life specialists (Mount Sinai, n.d.). Pediatric Intensivists are doctors who have specialized training in treating seriously injured or ill children, and they coordinate how the child will be treated and who will also care for them (National Cancer Institute, n.d.). The goal of the PICU team is to do "everything medically possible to cure a child's illness or prolong life," (Doorenbos et al., 2013, p. 2). Music therapists may also serve on the interdisciplinary team. Some PICUs may also provide end of life care (EOL) care. When a patient's traditional medical care is deemed ineffective, EOL care is introduced in order to provide medical, psychological, and spiritual comfort to the dying patient (Friebert & Williams, 2015, p. 2).

The Internal Association for the Study of Pain's (IASP) definition of pain is "an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage," (IASP, 2020, para. 3). Children who are hospitalized in the PICU may experience pain on an acute or chronic basis, depending on their diagnosis and their history of hospitalization. Acute pain, including procedural pain, is sudden, intense, and serves

as a warning sign to the body (IASP, n.d.). It is caused by injury, illness, trauma, or painful medical procedures, and can last up to six months. It can be treated with rest, heat or ice, anti-inflammatory medications, exercise, muscle relaxants, stress reduction, or narcotics (IASP, n.d.). Chronic pain lasts longer than twelve weeks despite medication or treatment and may leave and reappear (Cleveland Clinic, 2022). Common types of chronic pain include back and neck pain, cancer pains, headaches and migraines, lasting pain in scar tissue, and muscular pain. Creating a treatment plan for chronic pain is dependent on the cause and type of pain, but some treatments include anticonvulsants, antidepressants, corticosteroids, muscle relaxers, non-steroidal anti-inflammatory drugs, topical products, narcotics, sedatives, and medical marijuana (Cleveland Clinic, 2022).

Music therapy services in the PICU may address several clinical goals, including pain management and issues related to quality of life for the patients. A Board-Certified music therapist will create a treatment plan that is unique to each individual with specific clinical goals and recommendations for evidence-based music interventions. Ghetti and Hannan (2008) reported that research studies have demonstrated the efficacy of music interventions in treating pain and addressing quality of life issues. However, they also reported that a distinction between clinical music therapy and music given to patients by medical staff is not often made. It is important to make a distinction between music medicine and music therapy. Music medicine is "typically used by medical personnel as an adjunct to various medical treatments." (Dileo, 1999, p. 4). It is used as a nonpharmacological intervention for stress, anxiety or pain (Dileo, 1999). Examples of music medicine include background music in various areas of the hospital and musical programs offered to the patient before or after their treatment or surgery (Dileo, 1999; Gold, 2009). The American Music Therapy Association (AMTA) defines music therapy as "the

clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program" (AMTA, 2005). Music therapy can address specified goals such as promoting wellness, alleviating pain, enhancing memory, improve communication, and promote physical rehabilitation (AMTA, 2005).

There is a robust body of literature that reports on the efficacy of music medicine and music therapy interventions for pain management. It is notable that most of these studies examined the effect of music interventions on pain in adults. This disparity was noted by Bradt (2001) who suggested that research on nonpharmacologic research on pediatric pain has been "neglected" (p. 89). A review of the research since that time supports Bradt's contention. Lee (2016) conducted a meta-analysis in order to examine the efficacy of music interventions to decrease pain perception. Ninety-seven research reports published between 1995 and 2014 were included in his review. Only two of the 97 studies investigated the effect of music on pediatric pain (Bradt, 2001, & Yinger, 2012).

Bradt (2001) suggested that music therapists can engage pediatric patients in music experiences that will offer distraction from their procedure, an alternative form of stimulation, and a method of relaxation. Bradt worked with 32 recovering orthopedic patients in a pediatric setting to examine how music entrainment affected their postoperative pain. The purpose of this study was to examine the effects of music entrainment, an improvisational music therapy intervention, on postoperative pain perception in pediatric patients. This was important to study because Joke described nonpharmacologic research on pediatric pain as "neglected". Bradt played live music that was intended to match the child's pain, and then the music transitioned into a song that the child deemed "healing". Those that were in the control group did not partake

in music entrainment, but participated in any previously scheduled activities. Musical entrainment was deemed notably successful in regulating post-procedural pain. It provided alternative engagement, alternative stimulation, and relaxation to the patients. Bradt noted that the children who noted higher pretest pain intensity and a more negative emotional state experienced greater pain relief and positive mood effects.

Yinger's (2012) randomized controlled study (RCT) examined how live cognitive behavioral music therapy, rather than music played by a medical provider, affected the behaviors of young children who received immunizations, as well as their parents' and nurses' reactions. A total of 58 children, 62 parents, and 19 nurses were studied. The child/parent dyads were randomly assigned to a music therapy or control group without music therapy. The music was chosen by the clinician-researchers and reflected the patients' needs, musical preferences, and developmental levels. During the procedure, the music therapist encouraged the child and parent to partake in active music making. After the appointment, each parent rated their child's levels of pain and distress in comparison to their past medical experiences. All appointments were videotaped, and the participant's recorded behaviors were observed under the Child-Adult Medical Procedure Intervention Scale-Revised (CAMPIS-R). Non-parametric tests and a series of Mann-Whitney U tests were used to analyze the data. The clinician-researchers found that the parents in the music therapy group reported that their children experienced lower levels of distress compared to their previous medical appointments. They showed significantly lower rates of distress-promoting behaviors and significantly different rates of coping-promoting behaviors during their appointment. The children in the control group experienced even greater distress than their previous medical appointments. Neither group displayed significant differences in pain ratings or in rates of nurse behavior. Some limitations of this study included

a lack of allocation concealment, selection bias, attrition bias, and having two different music therapists perform the intervention.

The aim of Birnie et al.'s (2015) systematic review and meta-analysis was to review the research related to psychological interventions (including music) on the perception of pain during pediatric patients' medical procedures. The authors used GRADE (Grading of Recommendations, Assessment, Development and Evaluation) 10 (Schünemann et al., 2013) and the guidelines published by the Cochrane Collaborative for Systematic Reviews (Higgins et al., 2022) to evaluate each study that was included in the review. Study participants were between the ages of 3 and 17. Pain and fear were prioritized as outcomes, and distress was accepted for those under 7 years old. A total of 114,389 studies were identified through databases and manual searches. Of those, only 22 met inclusion criteria. Twenty of the studies included children, one study included adolescents, and one study combined the populations. Results of this review suggested the only psychological intervention with consistent evidence supporting its use for pain was music distraction for children under 12 years old who were receiving injections (p. S85). These interventions involved listening to a live music therapist or listening to age-appropriate music through headphones (Fowler-Kerry, Lander, 1987; Megel, Houser & Gleaves, 1998; Noguchi, 2006; Yinger, 2012). All trials used in the systematic review had a high overall risk of bias due to lack of blinding of participants, clinicians providing services, and those who gave ratings of pain, fear and distress on behalf of the patient.

Fowler-Kerry and Lander (1987) sought to investigate how music associated with and without positive suggestion affected pediatric pain relief. The researchers hypothesized that the patients who received music during their injection would experience less pain. A total of 200 children between the ages of 4.5-7 years old were randomly assigned to their experimental and

control groups. A total of five groups of 20 boys and 20 girls were created. Three of the groups received positive suggestions with musical distraction. The children listened to music through headphones immediately before and during their injection. The group receiving suggestions were told that the experimenter was going to help them and had headphones placed on their heads that did not play music. The researchers found that the level of pain experienced by the child depended on their age, as the younger children experienced more pain. The suggestion and music distraction group experienced significantly less pain than the group without distraction. This study noted that music distraction, specifically music sung by other children, should be recommended as a treatment for short-term painful stimuli.

Megel, Houser and Gleaves (1998) conducted a study to determine if lullabies could be used as an effective distraction technique during immunization injections to influence the patients' pain and distress. A total of 99 children between the ages of 3 and 6 took part in the study. The children in the experimental group chose a lullaby from *A Child's Gift of Lullabies* and listened to it during their immunization via headphones attached to an audiocassette player. The data was collected and separated into five phases- the children being escorted to the room and being introduced to the Oucher scale (a pediatric pain scale), the injection site being cleaned, the time of injection, the time of Band-Aid Application and vital sign collection, and the children leaving the room. Data was collected with the FACES scale on the Oucher, the Triangle serration task, Observational Scale of Behavioral Distress (OSBD), Dinemap™ 8100 blood pressure and heart rate monitor, and a demographic questionnaire written by the authors for the parents. The data was analyzed by Statistical Analysis System (SAS) and repeated measures of analysis of variance (ANOVA) was used to determine differences between the children's vital signs. The Kruskal-Wallis nonparametric text was also used to measure the accuracy of the Oucher. All

three hypotheses tested by the researchers did not reach statistical significance, meaning that no differences were found between the experimental and control groups for heart rate, blood pressure, or Oucher scores. Future research should continue in order to learn how pharmacological and nonpharmacological interventions could improve the immunization experience.

Noguchi (2006) attempted to determine the effectiveness of a focused listening task as a distraction for children receiving injections. The children were between 4 and 6 ½ years old and understood English. They each received an average of about three injections. A total of 62 participants were included in the final analysis, with 21 in the music condition, 21 in the spoken word (nonmusic) condition, and 20 in the control condition. The participants were assigned to two experimental groups and one control group based on the results of a randomly generated sequence of numbers. The experimental group listened to the story told through music or nonmusic on a CD player with headphones. The children listened to a story titled "Little Squirrel", and the experiment included visual aids of the characters on a Velcro board. Each session was videotaped. The children's responses were measured through the Observational Scale of Behavioral Distress (OSBD). These trained and blinded observers measured the children's responses 15 seconds before, during, and after the injection. The children's responses were also measured with FACES Pain Scale. The examiners found that children in the music group exhibited more distress than the children in the nonmusic group, but less than the children in the control group. During the injections, the children in the music group achieved an OSBD score of 3.11. The children in the nonmusic group achieved a score of 3.52. The children in the control group achieved a score of 3.92. The music group participants demonstrated less stress after their injection than the nonmusic and control group. However, these differences were not

statistically significant. The children in the music group reported less pain than the children in the nonmusic and control group, but these results were not statistically significant either. These statistically insignificant results may be due to small sample size and various formatting weaknesses in the OSDB measurement.

Purpose

Music therapy is an evidence-based practice (EBP) meaning the music therapist integrates the best evidence available, their expertise, and the needs, values, and preferences of the pediatric patient and their family (AMTA, 2010). There is a lack of scholarly literature regarding how clinical music therapy may aid pediatric pain management in the PICU, whether it serves as a cotreatment or a stand-alone intervention making it difficult to use research to guide music therapy practice. Therefore, the purpose of this integrative literature review is to document the few sources from music therapy, nursing, and medical literature that have examined pain management as a separate variable in relation to music therapy interventions, and how these studies can be expanded upon for future research.

Method

Design

An integrative literature review defines a concept, reviews theories and evidence regarding a concept, and analyzes any methodological problems within that concept (de Souza, 2010). The data used for final analysis combines theoretical and empirical sources. For the purposes of this review, the author examined how music therapy has historically been utilized for PICU patients experiencing physical pain. This review will also summarize the importance of utilizing music therapy specifically in the PICU based on the analyzed data.

Evidence Search

Multiple databases were utilized for research, including *APA Psychinfo, CINAHL, Medline,* and *ScienceDirect.* These databases were searched using the search terms "Music Therapy", "Pain", and "Pediatric Intensive Care". Reference lists of all identified journal articles were reviewed to ensure all relevant literature was included in this review. Finally, music therapy textbooks related to medical music therapy were manually searched by the author and thesis advisor.

Evidence Selection

All articles and book chapters that were found by the search terms were reviewed to determine if they met inclusion criteria using the Preferred Reporting Items for Reviews and Meta-Analysis (PRISMA) flow chart (Moher et al. 2009). Duplicates and titles that did not meet the inclusion were removed. The abstracts of the research articles were screened to determine if they met eligibility criteria. Articles were excluded if they were not written in English, if they were published before the year 2000, if the music therapy intervention described was not used to treat physical pain as a separate variable from anxiety, if the intervention was not delivered by a music therapist, and if these patients were not in a PICU setting. All disagreements were discussed between the author and thesis advisor. A total of seven articles were identified and three book chapters were identified (See Figures 1 and 2).

Figure 1

Identified Articles

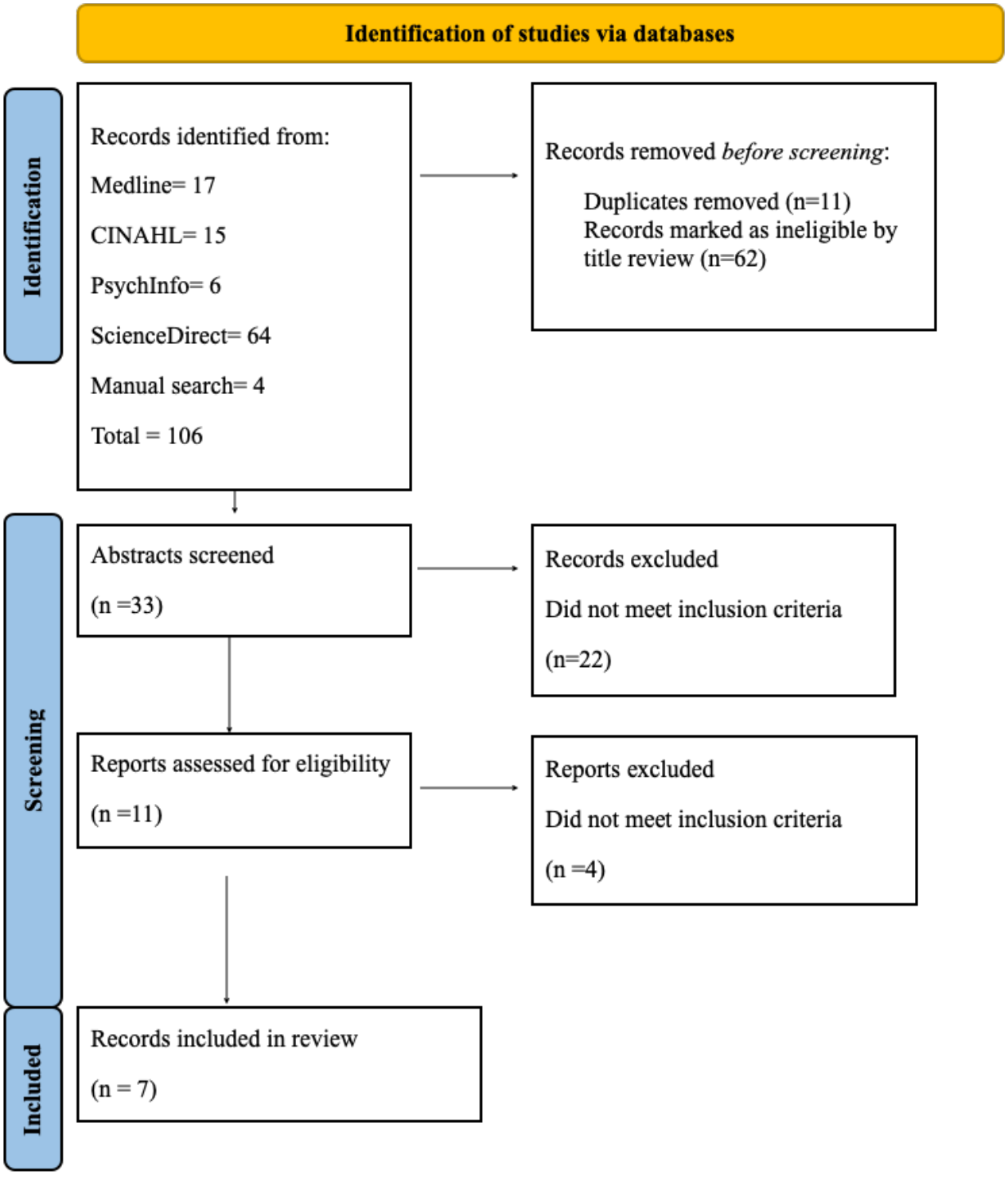
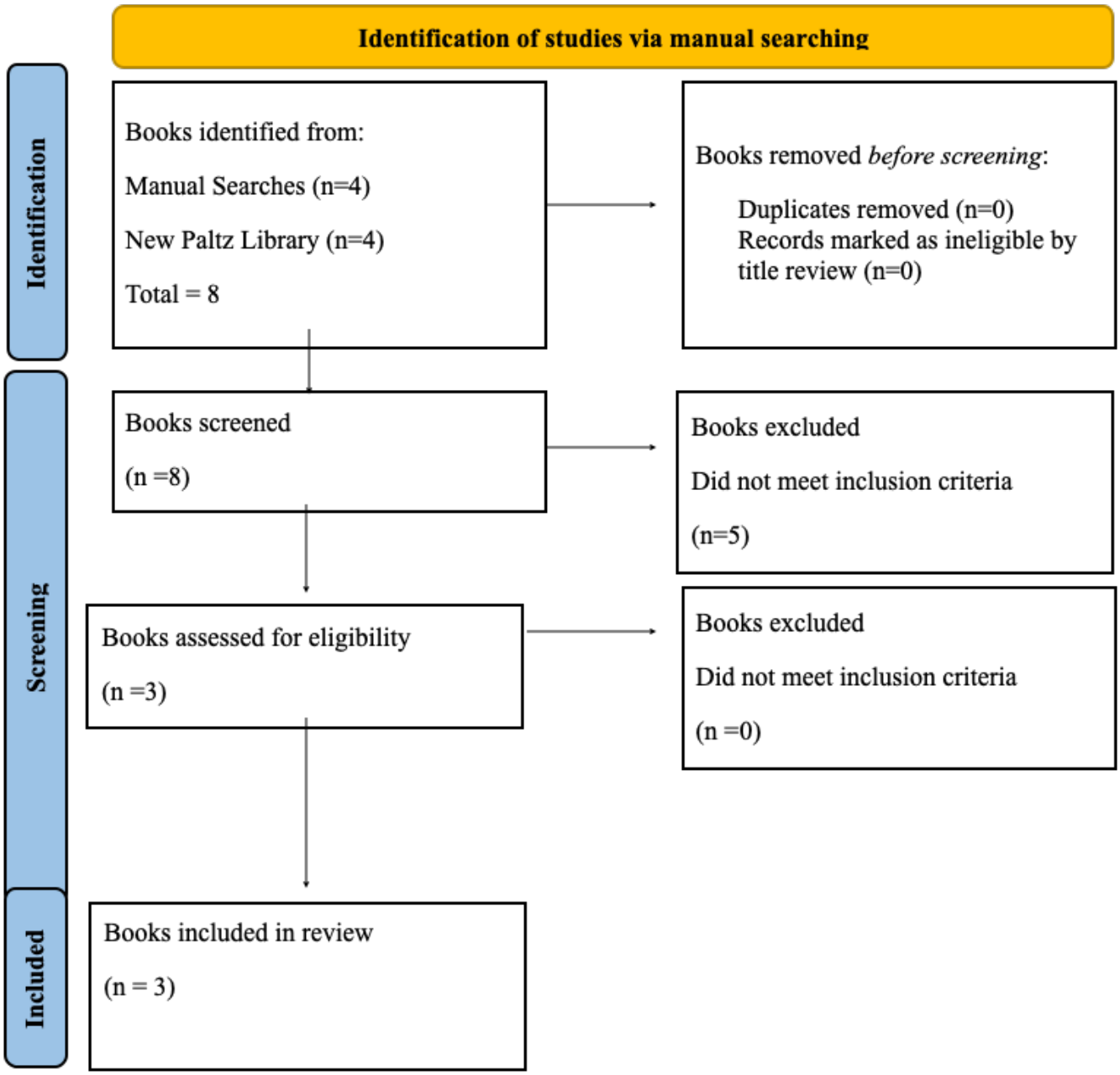


Figure 2

Identified Books



Results

Findings

A total of 106 articles and 8 book chapters were retrieved based on database identification and hand search. Of those, 7 research articles and 3 book chapters met inclusion criteria (see tables 1 and 2). These 10 studies included 7 quantitative research papers, which utilized 2 non-experimental designs, 2 experimental designs, 3 quasi-experimental designs, and 3 brief case studies that were classified as non-research. These studies took place in the United States (n=6), Iraq, (n=1) Spain (n=1), Brazil (n=1), and China (n=1). They were published between the years 2006-2022, with the majority of qualitative studies published in medical publications and qualitative studies published in music therapy publications.

Research Design and Materials

Four of the articles reported statistically significant changes in vital signs, including heart rate (HR), respiratory rate (RR), mean arterial pressure (MAP), systolic pressure, and oxygen saturation among patients. A total of three articles included the Comfort-Behavioral Scale (CBS), or a modified version of this scale, or another previously established facial pain scale (Bieri et al., 1990), to record the patient's pain scores. One study utilized the Penn State Level of Sedation (Popernack et al., 2004), which measures sedation levels of children utilizing mechanical ventilation. The qualitative studies described how music therapy affected the perceived pain level of pediatric patients undergoing invasive procedures, such as a biopsy, dressing change, or ultrasound via clinical observation and patient feedback.

Table One

Qualitative and Quantitative Article Evidence Search

Publication	Design	Target population or participants	Total participants	Country	Level of Evidence
Benkovitz et al. (2012)	Non-research (case study)	Graft vs. Host disease, mechanical ventilation	1	United States	VI
Bohr et al. (2022)	Non-experimental	PICU patients from 15 participating hospitals	97	United States	IV
Bush et al. (2021)	Experimental	0-2 y.o. Patients receiving music therapy between 24-71 hours after intubation, intubated average of 3.27 days	33	United States	II
Buzzi et al. (2022)	Quasi-experimental	Patients of varying diagnoses	59	Iraq	III
Jesús del Olmo et al. (2006)	Quasi-experimental	Infants	87	Spain	III
Hatem, T.P., Lira, P.I.C., & Mattos, S.S. (2006)	Experimental	Acyanotic congenital heart disease with left-right shunt.	79	Brazil	II
Liu, M.H. (2020)	Quasi-experimental	Mechanically ventilated	50	China	III

Table Two

Qualitative and Quantitative Textbook Evidence Results

Publication	Design	Target population or participants	Total of participants	Country	Level of Evidence
Stouffer, J.W., Shirk, B. (2003)	Quasi-experimental	3 m.o.-8 y.o. on mechanical ventilation	N/A	United States	III
Ghetti, C., Hannan, A. (2008)	Non-research (case study)	Female, semi-anxious teenage patient undergoing renal biopsy	1	N/A	VII
Heiderscheit, A. (2018)	Non-research (case study)	Female 2 y.o. undergoing renal ultrasound	1	United States	VI

Demographics

The ages of the children studied range from 1 day old to 20 years old. The race of the children ranged from white, black, Latino, Hispanic, Brazilian, Chinese, and Iraqui. The sex of the participants was not consistently specified throughout the studies, but of the studies that disclosed sex, there were 107 girls and 85 boys. The most noted medical interventions were mechanical ventilation or maintenance of surgical interventions. The most common diagnoses were a variety of respiratory illnesses. Other notable illnesses included neurologic or cardiovascular conditions.

Research Results

The concept of "pain" for this review was an objective value of physical or biological anguish, without nods towards anxiety or stress as a cause. In general, music therapy may objectively and subjectively alleviate pain in pediatric patients undergoing a variety of procedures or mechanical ventilation in the PICU.

There are few articles in the literature that discuss pediatric pain levels separately from pediatric anxiety levels. It is important to distinguish these facets in order to find the source of the pain and properly treat it. Multiple articles that met inclusion criteria utilized the COMFORT scale in order to measure pain. None of the articles that met inclusion criteria discussed the Wong-Baker FACES Pain Rating Scale. This pain scale is globally used by children that are at least 3 years old in order to facilitate communication and improve pain assessments (Wong-Baker FACES Foundation). Music therapy literature may develop an enhanced understanding of pediatric pain by utilizing these scales as a continuous assessment tool during research efforts.

Discussion

This integrative review served to explore how physical pain experienced by pediatric patients in the PICU has been historically managed through evidence-based, clinical music therapy sessions. The results of this integrated synthesis of the literature demonstrate that music therapy is a feasible non-pharmacological intervention that may alleviate pain experienced by children in the PICU.

It is apparent that there is not enough research that focuses on pediatric pain in the PICU. There are a variety of reasons why this may be true. Firstly, many PICU's across America may be struggling with the number of patients that are admitted versus their bed availability. This means that the number of PICU's able to host research efforts may be decreasing. Horak et al. (2016) found that the pediatric population grew by 1.9%, but the amount of PICU hospitals decreased by 0.9%. The units that have remained open have increased their bed numbers by 43%, with the most growth seen in PICU's with more than 15 pre-established beds. Secondly, there may not be enough music therapists at a facility to regularly tend to the PICU. Knott et al. (2020) conducted a survey of music therapists working in medical settings. A total of 83 out of

115 respondents claimed to work in the PICU, which appeared promising, until the researcher found that one music therapist was commonly assigned to about 100 beds throughout the entire pediatric facility. It was then reported that the music therapists could only see between six and nine patients in a day. Thirdly, medical directors may be unaware of the benefits and even the existence of clinical music therapy. Mathur et al. (2008) created a survey to learn how pediatric practitioners in Michigan viewed music therapy as a medical treatment. Only 23.4% of the practitioners' hospitals provided music therapy. Almost half of the responding practitioners did not know that a music therapist could provide music services. Almost 90% of the respondents who completed the survey reported never making a referral to a music therapist. Out of the 27 practitioners who had made referrals to music therapy, 18.8% of the respondents had referred their PICU patients to music therapy.

Implications for Research

Many of the articles discussing “music therapy” that did not make the criteria did not include a board-certified music therapist. Many authors appeared to believe that music therapy entails someone playing recorded music in a room before, during, or after a procedure. Although the patient may experience benefits such as relaxation or a sense of normalization within the environment, it is not music therapy. Future research endeavors may seek to utilize the pain scales noted in the review, such as the Wong-Baker FACES scale or Penn State Level of Sedation. One that Measuring vital signs may indicate levels of pain, but these results may be influenced by situational anxiety or medications unrelated to pain management.

Some implications for research stated by the authors of the quantitative research articles included continuing to research the relationship between music therapy and pain management, including larger sample sizes in studies, observing how nonpharmacologic interventions are

notated in electronic health records, learning how music therapy may amplify known pain management protocols, researching how elements of music fundamentally organizes younger patients, and learning how music therapy can be personalized for each patient (Bohr et al., 2022; Bush et al., 2021; Hatem, Lira, & Mattos, 2006; Jesús del Olmo, Tarrío, Garrido, et al., 2006; Liu, 2020).

Conclusion

Many research efforts have been made to observe how music therapy affects pain in adult patients, but little research has been completed on pediatric patients. Music therapy interventions may facilitate healing, ameliorate pain, and improve quality of life for PICU patients. This integrated synthesis of literature examined the limited amount of evidence discussing how clinical music therapy may aid pediatric pain in PICU's in a variety of countries. Further research will help us collect evidence on the effectiveness of music therapy for a PICU patient experiencing pain and how we can enhance our music therapy techniques.

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