

THESIS

THE EFFECT OF LIVE MUSIC THERAPY INTERVENTIONS ON PEDIATRIC PATIENTS WHO ARE MECHANICALLY VENTILATED AND SEDATED AND THEIR CAREGIVERS

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ABSTRACT

THE EFFECT OF LIVE MUSIC THERAPY INTERVENTIONS ON PEDIATRIC PATIENTS WHO ARE MECHANICALLY VENTILATED AND SEDATED AND THEIR CAREGIVERS

The purpose of this study was to assess the effects of live music therapy interventions on pain and anxiety in critically ill pediatric patients ages birth to two years who are mechanically ventilated and sedated as a result of a respiratory tract infection. The research aims were to: 1) Determine the effect of live music therapy interventions on heart rate, blood pressure, and respiratory rate in patients who are mechanically ventilated and sedated and 2) Explore and describe the effect of live music therapy interventions on parental engagement and behavior with their hospitalized child on life support.

Heart rate, respiratory rate, and blood pressure were calculated at six time points surrounding a 15 minute live music therapy intervention and were compared to vital signs measured at the same time points in response to a 15 minute recorded music intervention. Caregivers of both groups were surveyed prior to and following the intervention to assess their beliefs in their role as caregivers in the hospital and provided with a follow up survey to further explore their responses to the intervention provided.

Results indicated a significant effect for time and interaction for the live intervention group by positively lowering heart rate. Post-hoc analysis identified the difference occurred immediately following the intervention, 15 minutes following the intervention, and 45 following the intervention. Further, caregivers described the music intervention allowed them to positively interact with their hospitalized child while providing happy memories and feelings of comfort.

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CHAPTER ONE: INTRODUCTION

The purpose of this study was to assess the effects of live music therapy interventions on pain and anxiety in critically ill pediatric patients ages birth to two years who were mechanically ventilated and sedated as a result of a respiratory tract infection. Admission to an intensive care unit has been shown to increase stress in pediatric patients, especially patients who are mechanically ventilated due to the discomfort of the endotracheal tube. Physiological signs of pain and anxiety in neonates and young children are often defined by an increase in heart rate, respiratory rate, and blood pressure as well as a decrease in oxygen saturation (Sweat & McGrath, 1998). Playing recorded music may be an effective way of decreasing physiological signs of pain and anxiety in adult patients on life support by lowering heart rate, respiratory rate, and blood pressure (Almerud & Petersson, 2003; Chlan, 1998; Korhan, Khorshid, & Uyar, 2011; and Wong et al, 2001). Only two studies to date, with varying results, focused on the critically ill pediatric patient (Austin, 2010; Stouffer & Shirk, 2003). There are no studies exploring the effect of the parent-child dyad with this population. Parental stress can negatively impact the child during this critical time and prior studies called for an increase in parental engagement with their child to improve parent stress (Diaz-Caneja, Gledhill, Weaver, Nadel, & Garralda, 2005; Kazak, Kassam-Adams, Schneider, Zelikovsky, Alderfer, & Rourke, 2006).

A pilot study conducted by the author found a live music therapy intervention lowered heart rate in eight pediatric patients ages birth to two years who were mechanically ventilated and sedated. The current study measured the effect of live music therapy interventions on heart rate, blood pressure, and respiratory rate in critically ill pediatric patients who are mechanically ventilated and sedated ages birth to two years of age. Given the paucity of randomized controlled

trials in children demonstrating the efficacy of live music, randomizing the caregiver-child dyad to the test group was proposed, which received live, preferred music compared to the control group which received recorded, preferred music. Variables measured during the intervention included heart rate, blood pressure, and respiratory rate and were collected from the patient's electronic medical record every fifteen minutes across a timespan of an hour and a half. The first two time intervals occurred prior to the intervention in order to assure the patient's vital signs were stable before proceeding with the intervention. Caregivers in both groups completed a standardized survey regarding parental self-efficacy prior to and following the intervention as well as a survey following the intervention to further explore caregiver perceptions regarding the intervention.

Aim 1: Determine the effect of live music therapy interventions on heart rate, blood pressure, and respiratory rate in patients who are mechanically ventilated and sedated. Study participants in the intervention group received fifteen minutes of live music delivered by a board-certified music therapist. Heart rate, blood pressure, and respiratory rate were evaluated 15 minutes prior to intervention, immediately prior to the intervention, directly following the intervention, and 15 minutes, 30 minutes, 45 minutes, and 60 minutes following intervention. Control participants received 15 minutes of the same music, previously recorded, with the same measures taken for vitals.

Aim 2: To explore and describe the effect of live music therapy interventions on parental engagement and behavior with their hospitalized child on life support.

The caregivers of study participants took the Parental Beliefs Scale for Hospitalized Children (Appendix A) prior to and 60 minutes following the intervention to assess parental self- efficacy during hospitalization. Caregivers also completed a survey (Appendix B) developed by the researcher and reviewed by music therapists who worked in pediatric medical settings.

CHAPTER TWO: REVIEW OF LITERATURE

Mechanical Ventilation and Sedation

Respiratory tract infections are the leading cause of hospital admissions in pediatric patients (Ralston et al., 2014; Yu, Wier, & Elixhauser, 2009). Over 57,000 pediatric patients under the age of five were hospitalized in the United States in 2017 as a result of one type of upper respiratory infection alone, respiratory syncytial virus (Rose, Wheatley, Langley, Gerber, & Haynes, 2018). Respiratory syncytial virus is only one of multiple respiratory tract infections, including human metapneumovirus, rhinovirus, influenza, adenovirus, and coronavirus, that can lead to pneumonia, the leading infectious cause of death in pediatric patients under five (Centers for Disease Control and Prevention, 2017). Outbreaks in respiratory tract infections are seen in the northern hemisphere from October to April, with the peak of the season occurring in January and February (Ralston et al., 2014).

In children ages two and under, respiratory tract infections may lead to bronchiolitis, an inflammation of the bronchioles, in which the flow of oxygen to the lungs may be partially or completely blocked. Approximately three percent of the children who develop bronchiolitis will require hospitalization for monitoring of vital signs, including oxygen flow, and will most likely be placed on supplemental oxygen. Children who are born prematurely, have a genetic abnormality, and those who contract respiratory tract infections within a few weeks of birth are more likely to be hospitalized and require supplemental oxygen (Ralston et al., 2014).

In the most severe cases of respiratory tract infections, supplemental oxygen is not enough to support adequate airflow into the lungs leading to the need for endotracheal intubation (Ralston et al., 2014). Endotracheal intubation is a type of mechanical ventilation, a form of life

support utilized to help patients breathe while recovering from critical illnesses, giving patients more time to heal from severe illnesses (American Thoracic Society, 2014). In this type of short-term mechanical ventilation, an endotracheal tube is placed through a patient's mouth into their trachea to keep their airway open, allowing oxygen to flow into their lungs.

Although ventilators do not cause pain, the endotracheal tubes utilized to connect patients to the ventilators may be uncomfortable. Patients receiving mechanical ventilation also undergo frequent suctioning of mucous secretions, oral care, and changes in body positioning to prevent wounds or pressure ulcers (Stouffer & Shirk, 2003). Patients are often given sedative medications to alleviate the discomfort of being connected to a ventilator (American Thoracic Society, 2014). Sedatives are more commonly given to younger pediatric patients who cannot understand the need for mechanical ventilation and experience pain as perceived by their caregivers or medical staff in response to mechanical ventilation. Sedative medications assist with patient safety so patients do not self-extubate due to their agitation of being mechanically ventilated (Curley et al., 2015).

While sedative medications increase patient compliance with the ventilator, they may cause adverse reactions including agitation, increased heart rate, increased blood pressure, weakness, delirium, immobility, increased work of breathing, nausea, and fear in pediatric patients (Chlan et al., 2013; Stouffer & Shirk, 2003). Achieving the right amount of sedative medication is often challenging for physicians to achieve. Oversedation necessitates patients be on a ventilator for longer periods of time and is associated with longer hospital stays, increasing patient risk for infection and withdrawal symptoms. Undersedation leads to excessive agitation and increased risk for self-extubation before patients have an opportunity to heal (Dreyfus, Javouhey, Denis, Touzet, & Bordet, 2017).

Sedatives and discomfort from endotracheal tubing are not the only causes for increases in heart rate, blood pressure, and respiratory rate in pediatric patients who are mechanically ventilated. Admission to an intensive care unit can also be stressful for patients due to the noise from patient alarms and equipment, absence of natural light, and unfamiliar surroundings (Minton & Batten, 2015). Negative emotions states such as stress, fear, and anxiety can intensify pain intensity. Pain notably elevates the sympathetic nervous system, increasing heart rate, respiratory rate, and blood pressure (Garland, 2012).

Entrainment

Heart rate, respiratory rate, and blood pressure can be considered a type of biological oscillator as they have a rhythmic pulse rate. Biological oscillators have the ability to synchronize to an external input, changing the initially rate of the physiological measure (Larsen & Galletly, 2006). When two oscillators synchronize, entrainment of the stimuli occurs. As music offers a beat, or rhythmic pulse, the theory of entrainment could provide a therapeutic mechanism for changing physiological measures of patients who are mechanically ventilated and sedated.

Music to Decrease Pain and Anxiety in the Mechanically Ventilated Patient

Efforts to decrease pain and anxiety utilizing a passive music listening intervention is documented with adults who were mechanically ventilated across multiple studies. Chlan (1998), an intensive care nurse, published one of the first papers using music listening to reduce the physiological signs of stress in adult patients in the intensive care unit (ICU) who were mechanically ventilated. When compared to a rest period, Chlan found listening to classical music lowered heart rate and respiratory rate in 54 adult patients with an average age of 57 years (1998).

Almerud and Petersson (2003) did not find heart rate to change significantly when listening to classical music in 20 adult patients ages 54-81 years who were mechanically ventilated and sedated but did find heart rate to increase significantly following the completion of the intervention. However, Almerud and Petersson found listening to classical music lowered both systolic and diastolic blood pressure followed by a corresponding rise in systolic and diastolic blood pressure after the intervention was completed. Sixty minutes after treatment was completed, the rise in blood pressure was statistically significant.

Lee, Chung, Chan, and Chan (2005) demonstrated a significant reduction in heart rate, respiratory rate, systolic blood pressure, and diastolic blood pressure across 64 participants, ages 19 to 90 with a mean age of 69.4 years. Participants in the intervention group were allowed to select their preferred music from a collection of Chinese classical, religious, Western classical, and natural sounds.

Han and colleagues (2010) also found music listening to significant decrease heart rate, respiratory rate, systolic blood pressure, and diastolic blood pressure across 137 subjects, ages 18 to 84 years, who were mechanically ventilated but not sedated. Han and colleagues also allowed participants to select music of their preference (Chinese traditional, Chinese folk, or Western classical) if assigned to the intervention group.

A study conducted by Korhan, Khorshid, and Uyar (2011) examined the effects of a music listening intervention over time in a randomized controlled trial of 60 patients ages 18 to 70 years. The researchers found listening to Bach's 19 trio sonatas to significantly decrease systolic blood pressure, diastolic blood pressure and respiratory rate across 90 minutes when compared to a control group. These results could indicate a relaxation effect as a result of a passive music listening intervention. Collectively, the aforementioned research demonstrates a

reduction in physiological signs of anxiety in adult patients who are mechanically ventilated and sedated. While the first study demonstrated a reduction in heart rate and respiratory rate following listening to classical music (Chlan, 1998), the later studies demonstrated reductions in blood pressure as well (Almerud & Petersson, 2003; Han et al., 2010; Korhan, Khorshid, & Uyar, 2011; Lee, Chung, Chan, & Chan, 2005).

Researchers have demonstrated listening to music can help reduce pain perception and anxiety in the ICU. Chlan and colleagues identified a lack of research utilizing music listening to reduce sedative medication exposure in intensive care units. A reduction in the amount of sedatives given can lessen the side effects of delirium, agitation, and anxiety often experienced while on sedatives. Chlan et al. (2013) found mechanically ventilated adult patients (mean age of 59) who listened to preferred music received sedatives at a lower frequency when compared to those who utilized noise reducing headphones without music to combat the environmental sounds of the intensive care unit as well as participants who received standard care. Patients randomized to the music listening group were encouraged to listen to their music as often as they wanted while they were on the ventilator. This may suggest listening to preferred music has a potential to serve as a non-pharmacological pain management strategy, reducing the sedative exposure and side effects of sedatives in an intensive care unit. Reducing the side effects of sedatives such as delirium can help allow patients to be extubated off the ventilator sooner than patients with heavier amounts of sedatives.

Critical care nurses and physicians in the studies mentioned above have established that music listening can decrease signs of stress with mechanically ventilated adults; however, the literature is focused on adult populations. Only three studies were identified that examined the effects of music on children who are mechanically ventilated and sedated.

Austin (2010) summarized a study conducted in a Portuguese intensive care unit that utilized listening to music through headphones to decrease heart and respiratory rates compared to no music in 84 children ages one to 16 years who were mechanically ventilated and sedated. The participants assigned to the intervention group listened to classical music through headphones for 30 minutes during the first 24 hours following cardiac surgery while participants assigned to the control group listened to no music.

Stouffer and Shirk (2003) also examined the effects of listening to music to decrease signs of anxiety in 34 critically ill pediatric patients ages three months to eight years who were mechanically ventilated and sedated. Stouffer and Shirk found listening to patient preferred music to decrease systolic blood pressure when compared to blank audiotapes but did not demonstrate significant effects in decreasing heart rate or respiratory rate as described by Austin (2011). However, Stouffer and Shirk stressed the importance of the caregiver-child dyad through incorporating mothers' voices and compared listening to recordings of patients' mothers singing compared to recorded music alone in addition to blank audiotapes. While they found no significant effects when patients listened to their mother's voices compared to recorded music without their mother's voices, their study demonstrated that caregivers may be able to reduce signs of anxiety in their children by utilizing a familiar voice in the music recordings.

The results of the Austin (2011) and Stouffer and Shirk (2003) studies utilizing a passive music listening intervention to reduce physiological signs of anxiety were inconsistent and expose a need to increase music therapy research with intubated and sedated pediatric patients. The only other published study examining the effects of music with pediatric patients who were mechanically ventilated and sedated looked at different criteria to evaluate stress responses in two participants, ages five and seven (Kennelly & Edwards, 1997). While Kennelly and Edwards

utilized their skills as board-certified music therapists to deliver the only live intervention published with patients who are mechanically ventilated and sedated, the observational data included increased movement and eye twitching to music instead of the physiological signs of anxiety most often utilized in hospital settings as defined by Sweat and McGrath (1998).

Support for the use of Live, Patient-Preferred Music

The above literature demonstrates a widespread interest in the use of music listening for decreasing physiological signs of anxiety; however, all of these studies utilized a passive recorded music listening intervention. The exclusive use of recorded music listening in research studies conducted with this patient population could be because they were conducted by nurses and physicians. Live music should be considered because it allows for the alteration of musical elements in the moment based on patient responses (Bradt & Dileo, 2014). Music therapists are uniquely qualified to apply live music therapy with the patient population due to their extensive training with the iso-principle, a technique “by which music is matched with the mood of a client, then gradually altered to affect the desired mood state” (Davis, Gfeller, & Thaut, 2008, p. 547).

While the majority of music therapy studies with infants in neonatal intensive care units have utilized recorded music (Cassidy, 2009; Keith, Russell, & Weaver, 2009; Standley, 2002) Garunkstein, Buinauskiene, Uloziene, & Markuniene examined the effects of live versus recorded lullaby music in 35 premature but stable infants admitted to general medical units of a hospital. While both live and recorded music significantly reduced heart rate, the live music also resulted in a significantly deeper sleep state (2014).

Yurkovich, Burns, and Harrison (2018) examined the effects of live music entrainment on physiologic measures in infants admitted to a cardiac intensive care unit. The primary

investigator matched the heart rate of the infants with guitar for two minutes and gradually reduced the rate by 5 beats per minute (bpm) for one minute until the infant's heart rate was at 100 micro-bpm or 50 bpm. The researchers found heart and respiratory rates to lower in four of the five infants studied during the intervention but did not find their vital signs to remain lowered. While the group lacked a control group due to the small sample size, combined with other studies it begins to build a foundation to support the use of live music with infants in critical care settings.

Although research with the adult population differs in what type of music is most beneficial to support a relaxation effect (Chlan 1998; Davis & Thaut, 1989; Han et al., 2010), research with the general pediatric population more favorably supports music of the patient's preference in both hospital and non-hospital settings (Gfeller & Davis, 2008; Stouffer & Shirk, 2003). Music therapy studies with infants most frequently utilize live or recorded lullabies as patient-preferred music (Standley, 2012). Lullaby music across cultures is simple and soft with repetitive melodies and rhythms (Keith, Russell, & Weaver, 2009). The repetitive nature of lullabies might allow for a calming effect as their repetition allows for predictability. Cassidy (2009) studied the effects of listening to lullaby music versus classical music in 63 premature infants admitted to a NICU on head circumference and oxygen saturation but found no significant differences between either type of music.

Pilot Study

The primary investigator conducted a pilot study looking at the effects of a live music therapy intervention utilizing patient preferred music on heart rate in eight pediatric patients birth to two years of age ($M=13.44$ months) who were mechanically ventilated and sedated. Live music was played on guitar for 30 minutes as the researcher sang patient's preferred music in

English or Spanish, according to their primary language. If caregivers were present, they were instructed as to how they could participate in the intervention including singing along, holding their child's hand, and/or providing gentle massage. Participants received between one and four music therapy sessions while they were mechanically ventilated and sedated ($M = 2.13$). Vital signs were collected from the patient's monitor at the beginning of the session before the live music intervention began and at the end of approximately 30 minutes of live, preferred music played by the music therapist with guitar and voice. A Wilcoxon Signed Ranks Test was performed in SPSS utilizing the pre and post heart rate data of the participants. While heart rate reduced significantly from pre to post, the absence of a control group and the small sample size warrant further research in this area.

Due to the lack of research in this area, the effects of live music therapy with mechanically ventilated and sedated pediatric patients are largely unknown. The purpose of this study was to determine the effect of live music therapy compared to recorded music on 24 pediatric patients ages birth to two years who are mechanically ventilated and sedated. Music therapy will be defined as a live intervention provided by a board-certified music therapist.

Parental Beliefs

The secondary aim of the study was to explore the effect of the music intervention on parental beliefs during their child's hospitalization. A study conducted at Children's Hospital of Philadelphia in 2004 found up to 32% of caregivers meet the criteria for acute stress disorder and 21% for post-traumatic stress disorder following their child's admission to the ICU (Balluffi, Kassam-Adams, Kazak, Tucker, Dominguez, & Helfaer, 2004). Parent stress is considered to affect patient stress (Colville & Pierce, 2012). Efforts to reduce parental stress often focus on increasing parental self-efficacy as parents identify participating in their child's care as helpful in

reducing their anxiety (Diaz-Caneja, Gledhill, Weaver, Nadel, & Garralda, 2005; Kazak, Kassam-Adams, Schneider, Zelikovsky, Alderfer, & Rourke, 2006).

Due to the critical nature of the mechanically ventilated and sedated pediatric patient, caregivers are often unable to hold their child or the time they are able to hold is significantly reduced. This is to prevent accidental removal of the endotracheal and ventilator tubing, as well as other medical lines and equipment performing life-saving support for the patient. Holding a child when they are scared or in pain, especially young infants and toddlers, is one of the most common soothing mechanisms caregivers can provide to their child. Taking this form of comfort away from the parent-child dyad can negatively impact the caregiver and make it challenging for caregivers to engage with their child. Caregivers are often unsure of how to interact with their child when they are attached to medical equipment and lying in metal hospital cribs (Obeidat, Bond, & Callister, 2009). Nurses and child life specialists may provide education and prompt caregivers on alternate ways to engage with their child and attempt to provide comfort.

While music is shown to foster positive parent-child relationships outside of the hospital (Abad & Edwards, 2004; Jacobsen, McKinney, & Holck, 2014), there is limited research with music to support the parent-child interactions in the hospital. Whipple (2000) found instructing caregivers of 20 premature infants admitted to a neonatal intensive care unit on the appropriate use of music, multimodal stimulation, and signs of overstimulation caused a decrease in signs of neonatal stress behaviors. The study found caregivers in the experimental group receiving music instruction demonstrated more appropriate interactions with their infant as observed by hospital staff and spent more time visiting their child in the neonatal intensive care unit than control participants (Whipple, 2000). The aforementioned studies demonstrate a benefit to hospital staff instructing and demonstrating caregivers in ways they can interact with their hospitalized child.

During times of stress and unforeseen events such as the hospitalization of a child, caregivers may need thoughtful instruction in how they can interact with their child who may be connected to monitors or behaving differently as a result of their hospitalization.

Although some researchers have shown an increase in positive interactions between caregivers and their children following instruction and demonstration, Robb and Henley (2016) found instructing caregivers to independently deliver music-based play interventions at times increased parental distress. This could be due to the active nature of the intervention utilized in the study and the age range of the children hospitalized. Even though caregivers expressed an increase in distress for themselves, caregivers recognized the benefits of participating in the music intervention for their children (Robb & Henley, 2016).

While both studies demonstrated a potential for increased parent-child interaction with benefits for the child, the Robb and Henley study points to the possibility that instruction on delivering music interventions might negatively impact the caregivers. Since hospitalizations are already challenging for caregivers as demonstrated in previous studies (Diaz-Caneja, Gledhill, Weaver, Nadel, & Garralda, 2005; Kazak, Kassam-Adams, Schneider, Zelikovsky, Alderfer, & Rourke, 2006), instructing caregivers to deliver music interventions with their hospitalized child should be further explored.

Research suggests providing opportunities for caregivers to interact with their hospitalized child may decrease caregiver stress and anxiety during their child's hospitalization. This brings a feeling of self-empowerment by returning the parental role to the caregiver during times in which they may feel a loss of control in response to their child's ill health and potential pain and fear of being hospitalized. However, there is a lack of research supporting music to assist caregivers during their child's hospital stay. The literature that exists does not define the

underlying mechanisms of how music may bring change to parental empowerment. Due to the limited studies assessing parental beliefs following music-based instruction, both quantitative and qualitative measures will be utilized to assess caregiver emotions and coping following the experimental and control conditions.

CHAPTER THREE: METHODS

Research Design

This study utilized an embedded mixed methods research design with a qualitative analysis serving in a secondary role. While child measures were strictly quantitative as vital signs were measured and compared across six time points, parent measures were assessed through a mix of quantitative and qualitative surveys. Although the quantitative measure utilized for caregivers was validated and reliable, the author knew it would not provide in depth insight of the thoughts and feelings caregivers were experiencing in response to the intervention. As the second aim of the study was to explore and describe the effect of live music therapy interventions on parental engagement and behavior with their hospitalized child on life support, the addition of an open-ended questionnaire gave the researcher additional information to better illustrate caregivers perceived feelings and responses to best answer the study question.

Participants

Ten caregiver/child dyads were recruited for the study. Six participants were randomized to the live music therapy intervention and four participants were randomized to the control intervention utilizing recorded music. Participants were included in the study if they were in the age range, birth to two years of age, had a caregiver present for consent, and were currently mechanically ventilated and sedated as a result of a respiratory illness. Participants were also included if they meet the inclusion criteria and had an additional comorbid diagnosis such as asthma, prematurity, and/or a genetic abnormality. Participants were excluded from the study if they were oscillating, currently on paralytics, had a prior diagnosis of being profoundly hearing impaired, had a suspicion of child abuse or neglect, were in custody of the state without

identified caregivers, were currently undergoing video EEG monitoring, or were admitted for a traumatic brain injury.

In order to determine eligibility for inclusion in the research study, two board-certified music therapists working on intensive care units at a pediatric hospital in the southeastern United States attended interdisciplinary rounds with a charge nurse who gave daily reports on all patients admitted. The primary investigator then conducted a chart review for further assessment and requested approval from the patient's attending intensivist and nurse to approach the patient's caregiver for consent. The author discussed the study with the patient's consenting caregiver, including risks and benefits, then answered caregiver questions about the study design. After receiving consent from the caregiver a time to begin the intervention was discussed. During both experimental and control interventions, the music therapists discussed ways parents could interact with their child through the music (ex. singing, providing massage, holding their child's hand). The protocol and consent form were reviewed and approved by the Institutional Review Boards at the hospital and Colorado State University. Participants were randomized utilizing a block randomization procedure developed through an online generator reviewed by the study's statistician.

Intervention

Recorded Intervention

The recorded music utilized for the control group was a recording of popular American children's music chosen, arranged, and performed by the researcher on guitar and voice, recorded in a music studio. The researcher began the recording with two minutes of guitar only in order to introduce one stimulus at a time to the patient as recommended in previous research with critical care populations (Standley, 2002). The researcher then added voice and sang

through lullabies while continuing guitar as accompaniment with simple rhythmic patterns as suggested in previous research (Standley, 2002). The songs performed were the same ten songs the researcher would utilize in the live group and are included in Table 1. The songs were chosen based on previous research supporting songs utilizing major keys, simple harmonic progressions, and repetitive melodies (Standley, 2002). The control group intervention music played at bedside on a Dream of Superior Sound touch wireless bluetooth portable speaker. Caregivers were informed they were not required to participate but could to their comfort level. The music therapist gave specific recommendations on how they could interact with their child including singing, providing gentle massage, gently tapping the rhythm of the music, and/or holding their child's hand.

Live Intervention

The live intervention was performed by a board-certified music therapist on guitar and voice. The music therapist began with a simple guitar medley as recommended in previous research studies (Standley, 2002) and to mimic the intervention provided in the control intervention as closely as possible. The same ten songs provided in the control intervention listed in Table 1 were provided in the live music intervention. Caregivers were informed they were not required to participate but could to their comfort level. The music therapist gave the same recommendations on interacting with their child during the intervention as given to caregivers in the control group.

Table 1

Intervention Song Selection

Guitar Medley	The Wheels on the Bus
Twinkle, Twinkle Little Star	The Alphabet Song
If all the Raindrops	Old MacDonald had a Farm
The Lion Sleeps Tonight	This Little Light of Mine
The Itsy Bitsy Spider	Skinamarink

Study Measures

Physiological Measures. Heart rate, respiratory rate, and blood pressure have long been utilized as a tool for measuring psychological signs of pain and anxiety in both neonates and young children as well as critically ill patients in varying states of consciousness (Sweat & McGrath, 1998). Heart rate and respiratory rate are continuously monitored per hospital policy regulation on the intensive care units. Blood pressure is recorded at a minimum of every two hours. These measures are recorded into the patient's electronic chart (EPIC) and can be accessed by nursing personnel. To assure patient's vitals are stable prior to beginning the intervention, vital signs were taken 15 minutes prior and immediately prior to beginning the intervention. Measures were then taken immediately following and every 15 minutes following the intervention for 60 minutes. The patient's primary nurse reset the parameters for blood pressure recording to allow for the additional blood pressure readings to be documented in the patient's electronic medical record.

Parent Scale. The Parental Beliefs Scale for Hospitalized Children by Melynck (Appendix A) in 1991 is a 20 item questionnaire utilizing a 5-point Likert Scale measuring parental beliefs about their role during hospitalization (12 items) as well as their confidence in anticipating potential changes in their child's behavior (eight items). Parents select their confidence of each item on a five point Likert scale ranging from "strongly agree" to "strongly

disagree.” Scores range from 20 to 100 with higher scores indicating higher confidence and beliefs. Eight pediatric clinical nurse specialists verified the scale measured the identified content to establish content validity. Caregivers were asked to take the assessment prior to and 60 minutes following the intervention for both groups.

Questionnaire. A qualitative questionnaire containing four questions was written by the researcher to further explore the effect of the music intervention on caregivers (Appendix B). The questionnaire was reviewed by five music therapists with experience in pediatric medical settings in order to determine validity.

Data Analysis Procedures

Patient. Patients’ physiological data were measured at six time points: 15 minutes prior to intervention, immediately prior to intervention, immediately post intervention, and 15, 30, 45, and 60 minutes post intervention. Because each subject was measured multiple times, the data was analyzed using a two-way Repeated Measures Analysis of Variance (RMANOVA) model where the music condition is the independent variable and the patient’s vital signs are the dependent variable. The analysis utilized the data collected immediately prior to the intervention as baseline data as there were no significant differences between the 15 minutes prior and immediate prior to intervention time points. The 15 minute prior data collection had been proposed to assure patients’ vitals were stable prior to beginning in an effort to demonstrate any results taken post intervention were likely a result of the intervention provided. The model was fit using an unstructured covariance matrix and the degrees of freedom were estimated using the Kenward-Roger degrees of freedom approximation. Values were considered significant at $p < .05$.

Due to the small sample size, significant data were checked using a Levene's for homogeneity of variances and skew/kurtosis for normality. Data that were found to be non-normal or to lack homogeneity were analyzed using non-parametric statistics.

Caregiver. The parental belief scale for hospitalized children were scored by adding total values of answers recorded by caregivers on the instrument. Mean scores were calculated for pre tests and compared to mean scores of post tests. A music therapist not participating as an intervener in the study performed an analysis of the qualitative questionnaire, coding three themes for each question and pulling out quotes to support each theme.

CHAPTER FOUR: RESULTS

Quantitative Results

Patient. 10 patients were recruited to the study (see Table 2). The patients were between the ages of twenty-four days and eight months twenty-six days old with an average age of 3.83 months. 40% of the patients had comorbidities in addition to their upper respiratory diagnosis including prematurity ($n=3$), Trisomy 13 ($n=1$), and an atrial septal defect ($n=1$). Patients had a variety of ethnic backgrounds including African-American ($n=3$), Asian ($n=1$), Caucasian ($n=5$), and Multi-racial ($n=1$). All patients spoke English as a primary language.

Patients were mechanically ventilated and sedated for a variety of upper respiratory infections with 40% of patients positive for more than one infection. Although respiratory syncytial virus was present in 60% of the patients, patients also presented with various strains of adenovirus, bronchiolitis, coronavirus, croup, influenza, pneumonia, and rhinovirus. Patients had been intubated for an average of three days when the intervention was provided with 40% of the patients receiving the intervention within 24-48 hours of being intubated and an additional 20% being provided with the intervention within 36-48 hours of being intubated.

Table 2

Patient Demographics

Patient	Gender	Age (Days)	Ethnicity	Respiratory Diagnosis(es)	Comorbidity	Sedatives	Length of Intubation (days)
1	Female	61	African-American	respiratory syncytial virus	prematurity	fentanyl, precedex	12
2	Male	39	Caucasian	influenzaA, coronavirus	n/a	fentanyl, precedex	2
3	Female	229	African-American	respiratory syncytial virus, croup, bronchiolitis	n/a	fentanyl, precedex, ketamine	2
4	Male	48	African-American	respiratory syncytial virus	prematurity	precedex	1
5	Male	212	Caucasian	respiratory syncytial virus	n/a	fentanyl, versed	1
6	Female	152	Caucasian	respiratory syncytial virus, coronavirus	n/a	fentanyl, precedex	1
7	Female	59	Asian	haemophilus influenzae	prematurity	fentanyl, precedex	3
8	Male	24	Caucasian	respiratory syncytial virus	n/a	fentanyl, precedex	4
9	Female	91	Caucasian	pneumonia	Trisomy 13, Artrial septal defect	fentanyl, precedex, ketamine	1
10	Female	271	Multi-Racial	rhinovirus, coronavirus, adenovirus	n/a	morphine, precedex	3

A two-way RMANOVA was conducted to compare the main effects of live and recorded music and interaction effects of intervention group (live or recorded music) and time on heart rate, respiratory rate, and blood pressure. Results of the two-way RMANOVA are listed in Table 3. Effects were considered statistically significant at the $p < .05$ level. The main effects for intervention groups were not statistically significant for heart rate, blood pressure (MAP), or respiratory rate as $p > .05$. The main effect for time for heart rate yielded an F ratio of $F(5,6) = 5.12$, $p = 0.036$ indicating a significant effect for time from pre to post measures. The interaction effect for heart rate was also significant, $F(5,6) = 11.71$, $p = 0.005$ indicating a significant effect for time and intervention. There were no significant effects of time or interaction effects for blood pressure or respiratory rate.

Table 3

Summary Values from Two-Way Repeated Measures Analysis of Variance

Outcome	Effect	F-Statistic¹	P-value
Heart Rate	<i>Intervention Group</i>	$F_{(1, 10)} = 2.13$	0.175
	<i>Time Interval</i>	$F_{(5, 6)} = 5.12$	0.036
	<i>Time x Intervention (interaction)</i>	$F_{(5, 6)} = 11.71$	0.005
MAP	<i>Intervention Group</i>	$F_{(1, 10)} = 1.93$	0.195
	<i>Time Interval</i>	$F_{(5, 6)} = 2.07$	0.201
	<i>Time x Intervention (interaction)</i>	$F_{(5, 6)} = 2.13$	0.192
Respiratory Rate	<i>Intervention Group</i>	$F_{(1, 10)} = 0.70$	0.424
	<i>Time Interval</i>	$F_{(5, 6)} = 1.92$	0.116
	<i>Time x Intervention (interaction)</i>	$F_{(5, 6)} = 1.22$	0.241

1 – Models were fit using two-way repeated measures analysis of variance model using an unstructured covariance matrix and the Kenward-Roger degrees of freedom approximation.

The posthoc analysis displayed in Table 4 further defines significant changes with means and standard deviations displayed in Table 5. A positive decrease in heart rate was significant at $p < .05$ at the immediate post ($d = -1.07$), post 15 ($d = -1.28$), and post 45 ($d = -.69$) measures (see Figure 1). Effect sizes were calculated utilizing cohen's d. Data at the post 30 and post 60 measures were still trending below baseline measures but were not significant. Out of the six patients randomized to the live intervention, five of the patients never returned to their baseline heart rate during the 60 minutes their vitals were tracked. The sixth patient's heart rate returned and exceeded baseline heart rate 30 minutes following the intervention.

Table 4

Summary of changes in outcome measures from baseline

Heart Rate						
Pre	Δ Post	Δ Post 15	Δ Post 30	Δ Post 45	Δ Post 60	p-value ²
<i>Mean (SE)¹</i>	<i>Mean (SE)¹</i>	<i>Mean (SE)¹</i>	<i>Mean (SE)¹</i>	<i>Mean (SE)¹</i>	<i>Mean (SE)¹</i>	<i>Mean (SE)¹</i>
139.0 (7.0)	-12.8* (2.0)	-9.5* (3.7)	-7.1 (4.3)	-10.3* (4.3)	-8.8 (5.1)	0.001

Δ Indicates Change from Baseline (Pre-Music)

* Indicates a significant change from baseline

1- Least square mean estimates and standard errors from the two-way repeated measures analysis of variance model. Model was fit using a unstructured covariance matrix and the degrees of freedom were estimated using the Kenward-Roger degrees of freedom approximation.

2- P-value represents the overall omnibus effect of interval (i.e., time) in the live music group from the two-factor repeated measures ANOVA

Table 5

Summary of Outcomes Measures Across Time by Group

Measure	Time Interval	Live Music		Recorded Music	
		Mean	SD	Mean	SD
Heart Rate	Pre	139	21.1	143.8	15.5
	Post	126.2	20.4	145.3	14.7
	Post - 15	129.5	18.6	151.3	15.3
	Post - 30	127	19.5	145.5	17.2
	Post - 45	128.7	25.7	142.8	13
	Post - 60	130.2	24.6	144.3	15.5
MAP	Pre	59	7	58.5	7
	Post	56.3	13.4	54	3.2
	Post - 15	62	6.6	54.8	13.7
	Post - 30	71.8	12.7	55	12.4
	Post - 45	61	9.6	57.8	10.9
	Post - 60	58.3	11.7	53.8	3
Respiratory Rate	Pre	34.2	6.1	29.3	1
	Post	34	6	32.8	5.3
	Post - 15	37.8	11.6	32.5	7.6
	Post - 30	37.3	11.2	29	7.6
	Post - 45	32.7	5.3	37.3	15.6
	Post - 60	34.8	8.3	29.8	3.9

There were no significant differences in heart rate in the recorded intervention group ($n=4$). Any decreases in heart rate experienced in the control group had returned or exceeded baseline measures within 15 minutes of stopping the intervention. The live intervention group experienced a positive decrease in respiratory rate between the baseline and immediate post interventions measured (Figure 2). There was an increase in respiratory rate corresponding with the cessation of the live intervention which could indicate an increased level of arousal in

response to the intervention stopping. There were no notable trends in respiratory rates of the control group.

Mean arterial pressure (MAP) is frequently utilized for statistical analysis of blood pressure and automatically derived when systolic blood pressure and diastolic blood pressure are taken and recorded in the patient's electronic medical record. MAP is believed to be a better indicator of tissue perfusion in children and adults. Both the intervention and control groups experienced a decrease in MAP in response to the intervention provided from baseline to immediate post measures followed by a gradual increase in MAP after the interventions stopped (Figure 3).

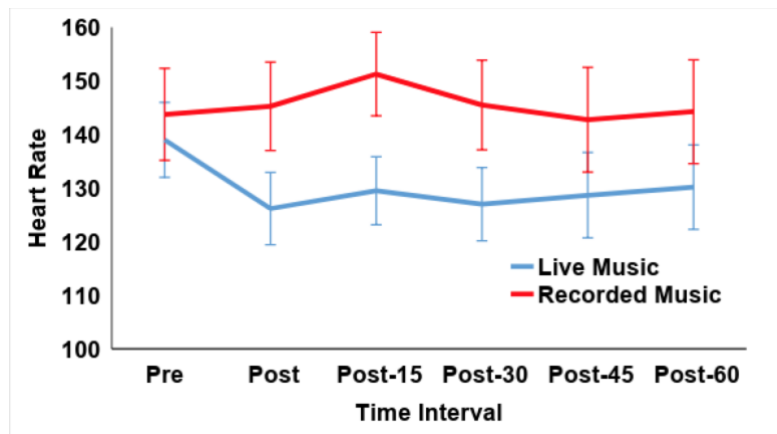


Figure 1. *Results of heart rate analysis between live and recorded conditions. Results are significant at the immediate post, post-15, and post-45 time intervals for the live music condition.*

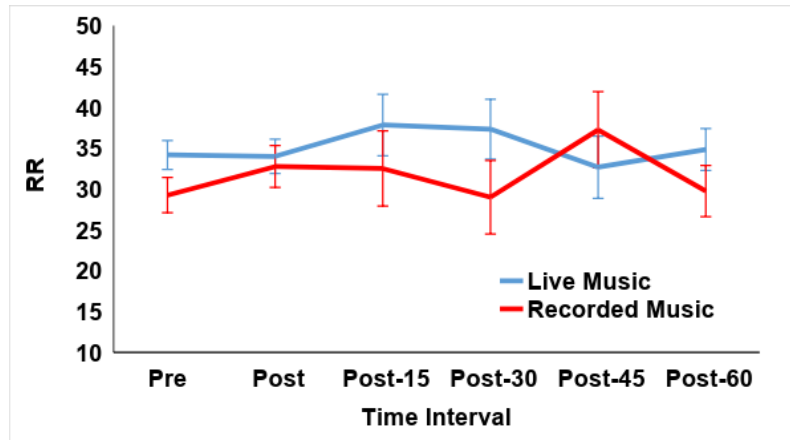


Figure 2. *Results of respiratory rate analysis between live and recorded conditions. There are no significant results for either condition.*

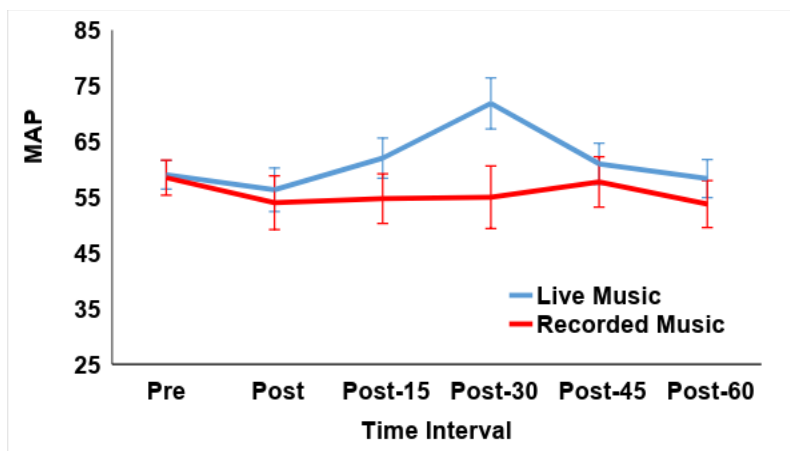


Figure 3. *Results of mean arterial pressure analysis between live and recorded conditions. There are no significant results for either condition.*

Caregivers. All participants had one caregiver who took the pre and post Parental Belief Scales for Hospitalized Children (PBS). The caregiver who consented to participation in the study was asked to take both surveys in the two cases where more than one caregiver was present. 90% of the surveys were completed by the patients' mothers and 10% were completed by their fathers. Scoring for the PBS is based on an overall score with higher scores indicating

higher levels of coping, and management of their role as a parent during their child's hospitalization. Changes in measures from pre to post were calculated so a two-sample t-test could be utilized to determine differences from pre to post between the two groups. While instruction for ways parents could participate in the intervention with their child was the same for both live and recorded groups, a positive increase was seen in the analysis of the recorded group surveys from pre and post although it was not significant. Scores from pre to post in the intervention group generally remained the same (see Figure 4).

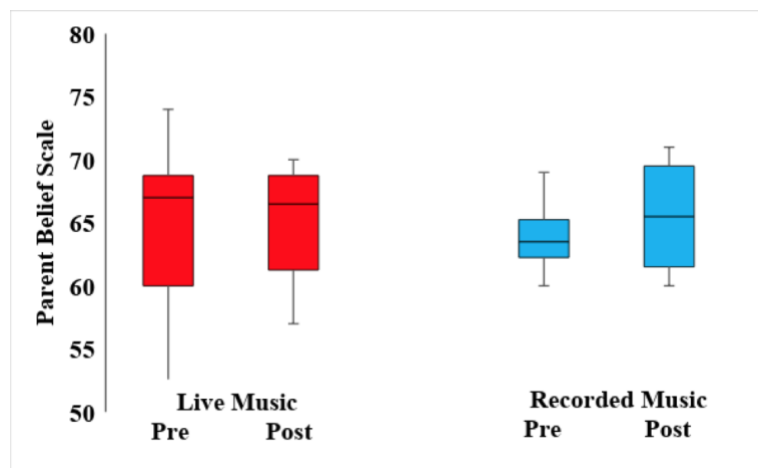


Figure 4. *Results comparing caregivers' pre and post test scores from the Parental Belief Scales for Hospitalized Children. There were no significant differences for either condition.*

Qualitative Analysis

A qualitative questionnaire was given to caregivers 60 minutes following the intervention in an effort to gain a better understanding of parental thoughts and feelings about the intervention. A music therapist who did not deliver the interventions but had completed CITI training and had been approved by the IRB to participate in the study was asked to code survey

responses for themes with corresponding quotes for qualitative analysis. All caregivers of children in the live intervention participated actively by singing along, holding their child's hand, and/or massaging their child during the intervention. Only 50% of caregivers in the recorded intervention actively attended to their child during the intervention. Despite differing levels of engagement between the two groups, the themes communicated by caregivers were consistent, regardless of randomization and are listed in Table 6.

In response to Question 1, "Did the music you received help you engage with your child?", parents reported the music interventions provided a positive opportunity for them to engage with their child, and they found the music provided soothing for themselves as well. It could be possible receiving an opportunity to interact with their child helped soothe the caregivers as well.

Parents reported a lot of memories in response to Question 2, "Please describe any thoughts, feelings, or responses you had to this intervention." Caregivers described a feeling of authority in their role as mom/dad in response to the music intervention and wishes to continue utilizing music as a way to bond with their child while on a ventilator. While most emotions associated with the memories brought by the music intervention were described as positive, one caregiver noted the memories made her feel sad. She further detailed that she would rather not focus on happy memories of her son at home while he was hospitalized.

In response to question 3, "Did this music intervention help you cope with your child's hospitalization?", parents' responses returned to the memories they experienced through the music interventions. Caregivers noted the memories brought comfort and normalcy into an environment they found sterile and unfamiliar.

Question four was intended to give caregivers a space to relay anything else they wished to communicate to the investigator. The majority of participants utilized their response to reiterate an enjoyment and appreciation of the music intervention offered. Several participants asked to receive copies of the study's results once completed.

Table 6. *Qualitative Analysis of Parent Questionnaires*

Questions	Themes	Quotes
Question 1: Did the music you received help you engage with your child?	<ul style="list-style-type: none"> •Music created a soothing environment •Music calmed both parent and child •Music provided an opportunity for the parent to bond with their child 	<p><i>"The music was a nice bonding time. I feel like she enjoyed the calming lullabies."</i></p> <p><i>"The music was a calming environment for [patient] to hear something soothing besides the beeping of machines/people talking about her health. The music was calming to us parents too and gave a soothing way for daddy and mommy to interact without overstimulating [her]."</i></p>
Question 2: Please describe any thoughts, feelings, or responses you had to this intervention.	<ul style="list-style-type: none"> •Reminiscing of home life prior to hospitalization •Empowered parents to utilize music while their child is in the hospital •Various emotions (both negative and positive) were brought up during intervention 	<p><i>"Just thoughts of him in his bed at home napping while I clean, listening to his music, and also feelings of happiness."</i></p> <p><i>"This intervention made my heart happy! It made me have excitement to do more!"</i></p>
Question 3: Did this music intervention help you cope with your child's hospitalization?	<ul style="list-style-type: none"> •Parents reported that this intervention made the hospital feel a little more normal •Parents reported feeling comforted that their child still got to engage in some type of activity, given their clinical status. •Parents were reminded of the activities that they engaged in with their child before their hospitalization. 	<p><i>"Yes, the selection of songs was so familiar that I was able to go into a 'happy place' outside of our hospital room for a period of time. I became calm and think about more happy thoughts. All of which gave me some positive energy to deal with her hospitalization."</i></p> <p><i>"Yes, because we were just in that moment, just the two of us in a room, connecting."</i></p>
Question 4: Is there anything else you would like us to know about the intervention?	<ul style="list-style-type: none"> •Further reports of loving the intervention •Reports [parents] would like to see the outcome of the study 	

CHAPTER FIVE: DISCUSSION

The purpose of the study was to (a) determine the effect of live music therapy interventions on heart rate, blood pressure, and respiratory rate in patients who are mechanically ventilated and sedated and (b) to explore and describe the effect of live music therapy interventions on parental engagement and behavior with their hospitalized child on life support. The study demonstrated live music therapy interventions reduced heart rate, respiratory rate, and mean arterial pressure in pediatric patients who are mechanically ventilated and sedated as a result of an upper respiratory infection. While results were only significant for heart rate reduction, the downwards trend during the intervention across all vital signs assessed could be interpreted as a decrease in anxiety and/or pain in patients who are unable to communicate their distress.

Further, as the heart rates of the intervention group continued to trend below baseline for 60 minutes following the intervention, the live music therapy intervention may have created a relaxation effect lasting longer than the duration of the actual intervention, which is promising as a form of non-pharmacological pain management in treating patients who are mechanically ventilated and sedated.

The reduction in mean arterial pressure in the control group did not approach significance contrasting previous studies utilizing recorded music listening with adults (Almerud & Petersson, 2003; Han et al., 2010; Korhan, Khorshid, & Uyar, 2011; Lee, Chung, Chan, & Chan, 2005) and pediatrics (Austin, 2010). However this result is consistent with a downwards trend seen in pediatric patients in Stouffer and Shirk (2003). The study provides inconsistent results when comparing the control group's heart rate and respiratory rate data to previous studies in adults

(Chlan, 1998; Han et al., 2010; Korhan, Khorshid, & Uyar, 2011; Lee, Chung, Chan, & Chan, 2005) and pediatrics (Austin, 2010) because the recorded music group did not reach significant results in either area of assessment. A slight increase in both heart rate and respiratory rate in response to the recorded music intervention was demonstrated but a much larger sample size is needed to fully determine the effect of recorded music on vital signs.

It can be interpreted from the statistical analysis, despite the small sample size, that live music therapy interventions utilizing preferred music better decrease vital signs in pediatric patients who are mechanically ventilated and sedated than recorded music of the patient's preference. As live music decreased heart rate significantly and had positive trends downwards in both respiratory rate and mean arterial pressure, patients could benefit therapeutically from live music therapy interventions provided by a music therapist. The theory of entrainment provides an explanation for the change in physiological parameters observed. The iso-principle further explains the increased benefit of providing live music as the interveners were able to manipulate tempo and timbre in response to patient's reactions and physiologic states.

The results of the Parental Belief Scale for Hospitalized Children (PBS) did not bring significant results in either the intervention or recorded groups. This is most likely due to the instrument not being a good measure for the intensive care unit as it is typically given on general medical and oncology units. Despite literature often recommending parental empowerment in their role as a caregiver in a critical care environment, it was not seen in the responses of the PBS (Diaz-Caneja, Gledhill, Weaver, Nadel, & Garralda, 2005; Melynk et al., 2004).

The responses of the qualitative survey provide insightful information into caregivers' feelings and interactions for music therapists and medical professionals working with this population; despite the PBS results not demonstrating changes in parents' beliefs about their role

as a caregiver during their child's hospitalization. The responses were positive and described feelings of relaxation and comfort in response to participating in the music intervention including happy and uplifting memories of their children. Several caregivers discussed participating in something familiar helped normalize the hospital environment. Feelings of normalization, relaxation, and comfort could help decrease stress and anxiety from their child's hospitalization. Focusing on memories of their children could further decrease their stress while providing an element of distraction from the chaos of the intensive care unit. Being provided with positive opportunities to participate in their child's physical and emotional care in the intensive care units has been shown to significantly decrease symptoms of post-traumatic stress disorder in parents following their child's intensive care unit admission (Melnik et al., 2004).

Limitations

A significant limitation of the study is the small sample size. With only ten patients, drawing conclusions from the statistical analysis is challenging. The results should be interpreted with caution.

While standard nursing care was not changed during the time frame of the study, it was also not accounted for and documented during the tracking period of each patient. Patients could have undergone procedures, physical or occupational therapy sessions, neuro exams, and other standard medical procedures during the time frame their vital signs were followed. These types of interventions increase heart rate, respiratory rate, and blood pressure. Because they were not accounted for. It is unknown if any of the spikes in data are as a result of medical care, the patient's pain, and/or the intervention's effect wearing off. Correlating vital sign increases to a specific intervention or procedure would be helpful in further clarifying the intervention's duration.

Another consideration is the recorded intervention was utilized as a control group instead of no intervention. The study's results for both live and recorded music could change when compared to silence or standard care as a baseline. The results for the Parental Belief Scale could differ as well when compared to silence or standard care.

The Parental Belief Scale for Hospitalized Children, while shown reliable and valid, was not an accurate assessment for caregivers of patients who are mechanically ventilated and sedated. A more appropriate standardized survey would be geared towards the intensive care unit while maintaining a similar number of question as the Parental Belief Scale for Hospitalized Children. Although the qualitative survey provided more specific feedback regarding the intervention, the instrument has not been proven reliable as a measure of music therapy, as it was only reviewed by five other music therapists with experience in medical settings. It did also not account for the how the caregivers who did not actively engage in the intervention described the same positive feeling of comfort and relaxation as the caregivers who did actively engage with their hospitalized child.

Recommendations for Future Research

Future research with pediatric patients who are mechanically ventilated and sedated should track any decreases or increases in sedative medication levels following the intervention. All patients in the study received continuous levels of sedation during the intervention period and throughout the tracking period for vital signs. However, the current study did not look at medication trends following the end of the post 60 minute measures. The relaxation effect experienced could bring a reduction in sedative medication administered later. Timing the intervention around medication administration could lower sedative doses like it has with conscious adults who are mechanically ventilated (Chlan et al., 2013). This would bring a

reduction to sedative exposure and potentially shorten the length of time patients are connected to a ventilator.

Further assessment is needed to better determine the duration of the live music therapy intervention. A deeper understanding of any lasting relaxation effects provided by the live music stimulus could provide valuable insight into dosing for the music therapy intervention. This could also lead to a reduction in sedative exposure and shorten intubation periods for pediatric patients.

Results of the current study point to a potential for stress reduction in caregivers who are participating in the session which should be considered as a focus of a future study. Reducing caregiver anxiety and allowing parents opportunities to positively interact with their child in the intensive care unit decreases the number of caregivers with symptoms of post-traumatic stress disorder following their child's hospitalization (Melnik et al., 2004; Nelson & Gold, 2012). A future study could also assess parental engagement with follow up anxiety measures to further explore the potential for stress reduction in parents as a secondary gain of live music therapy interventions.

Conclusion

In summary, the study's results suggest live music therapy interventions may be successful in combating pediatric pain and anxiety as a result of being mechanically ventilated and sedated. Study data demonstrated a significant decrease in heart rate as a result of the live music therapy intervention that trends below baseline following its cessation. It could be proposed that a secondary gain of the intervention are feelings of happy and calmness described by caregivers, but more information is needed to fully understand the experiences of participating caregivers. While music therapists are specially trained to deliver this type of

intervention to critical patients, more research is needed to fully inform and support the use of live music with this population.

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APPENDIX A

Parental Beliefs Scale for Hospitalized Children (Melynck, 1991)

Below are 20 statements that relate to you and your child's hospitalization. Hospital experiences differ for every parent. There are some parents who are not so sure about their children's needs and how they can best meet them while they are in the hospital, while other parents are more sure about how to help their children through this experience. Keep in mind that your confidence (how sure you are) about helping your child deal with being in the hospital may be different from the confidence you usually have in dealing with your child at home. There are no right or wrong answers to the following statements or how you feel while your child is in the hospital. Please circle the number that best describes your agreement or disagreement with each statement.

1. I know what changes in behavior to expect in my child while he (or she) is in the hospital.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

2. I do NOT know what my child's emotions will be like while he (or she) is in the hospital.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

3. I am sure that what I do for my child will be what is best to help him (or her) deal with being in the hospital.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

4. I am NOT sure about how my child will behave when painful things are done to him (or her) in the hospital.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

5. I know what changes in behavior to expect in my child AFTER he (or she) leaves the hospital.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

6. I am NOT sure about what I can do to best help my child get through the painful things that are done to him (or her) in the hospital.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

7. I do NOT understand why my child is behaving the way he (or she) is in the hospital.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

8. I am sure I can meet all of my child's emotional needs while he (or she) is in the hospital.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

9. I do NOT know what my child will think about the things that are done to him (or her) in the hospital.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

10. I am clear about the things that I can do to best help my child deal with being in the hospital.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

11. I am NOT sure how my child will act towards me while he (or she) is in the hospital.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

12. I know how my emotions will affect my child while he (or she) is in the hospital.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

13. No matter how my child behaves while he (or she) is in the hospital, I am sure I will be able to handle it.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

14. I am NOT sure of what things I can do to best help my child deal with his (or her) illness or injury.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

15. I am NOT sure about what I can do to make my child feel most secure while he (or she) is in the hospital.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

16. I feel confident in telling the nurses and doctors about what will best help my child while he (or she) is in the hospital.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

17. I am NOT sure about how my child will behave when things frighten him (or her) in the hospital.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

18. I do NOT know what I can do to best help my child deal with frightening things in the hospital.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

19. I feel confident in asking the doctors and nurses questions about my child's illness or injury.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

20. I know how to prepare my child for things that will frighten or hurt him (or her) in the hospital.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

Parental Beliefs Hospitalized Children
8/29/06 update

APPENDIX B

Qualitative Survey

Did the music you received help you engage with your child? If so, please describe how this helped you engage with your child.

Please describe any thoughts, feelings, or responses you had to this intervention.

Did this music intervention help you cope with your child's hospitalization? If so, how?

Is there anything else you would like us to know about the music intervention?