The Effects of Music Therapy and Harmonica with Pediatric Patients Admitted for Respiratory Issues

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ABSTRACT

Asthma and wheezing are common illnesses among children today. The effects on the respiratory system, and other health factors such as having sickle cell disease, can further contribute to an exacerbated health issue resulting in respiratory distress and/or acute chest syndrome. The causes and effects these issues have on the growth and development, education, and psychosocial aspects of a child’s life are numerous. The main purpose of this study was to investigate whether a specific music therapy intervention, targeting lung function, could increase oxygen saturation (SPO2), decrease respiration rate (RR), and lower heart rate (HR). Hospital inpatients (N=40) between the ages of 4 to 12 years participated in a three-day randomized control study with control and experimental groups. Those in the experimental group received 3 days of music therapy treatment in addition to standard respiratory treatment, a fifteen- to twenty-five-minute intervention (N=20). The control group (N=20) received no additional intervention. A pre- and post-test consisted of the researcher documenting HR, SPO2, and RR before and after each interaction. Self-reports of breathing difficulty were also given by the subjects, pre and post intervention. For the experimental group, an exit survey was given to parents/guardians who were present at the conclusion of the final day. Results indicated that while music therapy did have a positive short-term effect on HR, SPO2, and RR, three days was not a sufficient amount of time to establish long-term side effects. A multivariate test indicated that between the groups and the collective physiological factors there was a significant difference (p=0.046). Comparisons between days and groups showed more significant difference in the experimental groups HR levels (p=.000 to .001) than the other areas.
CHAPTER 1

INTRODUCTION

Background and Significance of Pediatric Asthma

“Asthma is a common, chronic inflammatory disorder of the airways associated with airway hyper-responsiveness. Asthma exacerbations are the leading cause of hospitalization in children…” (Ortiz-Alvarez, 2012). While asthma is a complex illness that can be triggered by any number of things, it is no longer as deadly as it once was. It is, however, one of the most common chronic childhood illnesses that represents a major health concern (Walders, 2002). As a result, an alternative definition of the disorder that takes into account the differences between adults and children exists: “…asthma is most often a diagnosis of exclusion, particularly in preschool children, comprising wheeze and/or excessive cough, accompanied by breathlessness and respiratory distress, which is usually intermittent with periods of remission; other respiratory conditions have to be excluded by clinical history, physical examination, and any indicated special tests” (Bush, 2009, p. 791). According to the Centers for Disease Control and Prevention (CDC), as of 2013, the current asthma prevalence in the United States for those under age 18 is 8.6%, which is approximately 6.3 million. Within that percentage, 4.2% are between ages 0-4 and 9.8% are between the ages of 5-11. The CDC’s most recent data show that within the above mentioned age ranges, males are more likely to have asthma than females, 9.3% to 7.3%. In the United States, the average yearly cost for a child with asthma was $1,039, and caused 10.5 million missed days of school. As a response, and in an effort to control asthma in the United States, the CDC launched the National Asthma Control Program (NACP).

Asthma also tends to be one of the leading causes for hospitalization. In children asthma has a substantial allergic component; however, a viral infection can also trigger an asthma attack that results in hospital admission. “The most common triggers for asthma exacerbations in both younger and older children are viral respiratory tract infections; other typical factors are exposure to allergens and a suboptimal control of asthma as a baseline. Acute exacerbations are frequent cause of emergency department (ED) visits” (Ortiz-Alvarez, 2012, p. 257). A number of factors have contributed to the increase in numbers of those suffering from asthma, especially among children. And because of this there have been “increasing numbers of children are taking
bronchodilators and immune suppressive medication such as inhaled steroids” (Lewith, 1996, p.106). To add further to the issue, many general health practitioners are having problems with parents/guardians who are reluctant to give their children “suppressive conventional medication continually.” For many, the continued use of medication is seen as a hassle and an added expense.

**Background and Significance of Pediatric Acute Respiratory Distress Syndrome**

Seventeen years after the 1994 American-European Convention, where the distinction between adult (ARDS) and pediatric (PARDS) acute respiratory distress (ARDS) was made, a new (second) consensus conference brought about another change. The 1994 consensus also introduced the acute lung injury (ALI); however, after the second consensus conference ALI was removed and PARDS became classified by levels of severity (mild, moderate, and severe). Unfortunately, the new consensus still focused on adults, which resulted in limitations for the pediatric population. As a response to concerns presented by the limitations for PARDS, the organization of the Pediatric Acute Lung Injury Consensus Conference was developed. The pathophysiology of PARDS is when, “Acute lung injury follows a direct pulmonary or systemic insult resulting in injury to the alveolar-capillary unit. Several diseases can cause ARDS, more commonly following pneumonia, aspiration, and sepsis.” (Feng, 2015). ARDS is a lung condition that prevents enough oxygen from getting to the lungs and into the blood. This can be the result of any major direct or indirect injury to the lungs, such as: breathing vomit into the lungs, inhaling chemicals, pneumonia, septic shock, trauma, and lung transplant (Medline Plus, 2016). The result is a build-up of fluid in the alveoli (air sacs), which prevents the required amount of oxygen from passing through the bloodstream. Due to the build-up of fluid the lungs become heavy and stiff, which affects the lung’s ability to expand. In the case of PARDS patients, several modes of ventilator support are recommended for use, depending on the severity classification: positive end-expiratory pressure (PEEP), High-Frequency Ventilation (HFOV), endotracheal tubes (ETTs), and gas exchange. Most other modes are either not recommended or are recommended with very specific criteria due to their extreme nature. In the case of this study, the majority of pediatric patients admitted to the study with a diagnosis of PARDS, were first admitted and diagnosed with pneumonia, and received PEEP treatments.
Background and Significance of Pediatric Acute Chest Syndrome

Acute chest syndrome “is defined as the presence of a new pulmonary infiltrate along with fever, chest pain, respiratory distress, or new onset hypoxemia” (Abbas, 2013, p. 115). Acute chest syndrome (ACS) almost always accompanies the sickle cell disease (SCD) disorders. Individuals that have both a sickle cell disorder and a past history of acute chest tend to have a higher mortality rate. One-fourth of the SCD fatalities are a result of ACS and it is “the second most common cause of hospitalization in patients with SCD” (p. 115). The etiology of ACS, like PARDS, cannot be linked to any one cause; however, there are a number of triggers. In children, typically different strains of pneumonia trigger ACS, which also triggers a SCD crisis. Another trigger for ACS in SCD patients is either a pulmonary or bone infarct. With pediatric patients that have a pulmonary fat embolism (PFE), which is complication of a bone fracture, it has been a noted cause of 44% of moderate to severe ACS (Abbas, 2013). Most SCD patients admitted to the hospital are not admitted with a diagnosis of ACS; it frequently becomes a secondary diagnosis a few days after admission (Vichinsky, 2000). Vichinsky’s study also found that while the pulmonary embolism typically results in the onset of ACS, the number of patients who acquire SCD is also directly related to the number of patient’s that have an infectious pathogen. It is also important to note that ACS prevalence is higher within specific types of SCD. Typically, SCD patients with either homozygous sickle cell disease or sickle cell-beta(0)-thalassemia have a higher risk for ACS. Another correlation found that “Within each Hb type the incidence was strongly but inversely related to age, being highest in children 2 to 4 years of age…” (Castro, 1994, p. 643). According to Castro’s study, other contributing factors to an individual’s susceptibility to ACS are degree of anemia, fetal Hb count, and even a steady-state leukocyte count.

Current Course of Treatment for and Management of Asthma, ARDS, and ACS

For those with asthma who take controller medications, they are daily taking corticosteroids. The standard list of corticosteroids prescribed can be one or more of the following: fluticasone, budesonide, mometasone, ciclesonide, flunisolide, and beclomethasone. Some individuals take inhalers that are a combination of inhaled corticosteroids and a long-acting beta-agonist (LABA). For some individuals the use of LABAs comes with health risks. Two LABAs that are most often paired with one of the controller medications listed earlier are salmeterol and formoterol. There are oral medications, such as montelukast, zafirlukast, and zileuton, that are
available for use as well. In the case of acute asthma flare-ups, the use of oral and intravenous corticosteroids is often required; however, if used on a long term basis, there is a risk of serious side effects. Many individuals that suffer from asthma are most familiar with the fast-acting, quick-relief inhaled medications (bronchodilators), albuterol, levalbuterol and pirbuterol. The use of proper medications are used as proactive measures of defense, but this does not mean the individuals taking the medications are “cured”. Other factors that contribute to the appropriate management of asthma involve being aware of environmental factors (allergens, pollutants, etc), general health education, and regular exercise. Many hospitals, family physicians, and websites have Asthma Action plans and other useful information available for individuals. When it comes to less traditional treatment methods, there have also been a few studies that support the use of/playing of musical wind instruments as a complementary “health prescription” (Lucia, 1993).

Depending on the level of severity, there are several methods of treatment for Acute Respiratory Distress Syndrome. Unfortunately, there are no indisputable benefits to the suggested treatments. One of the key things to remember when treating a patient with PARDS is that treatment is supportive (Saguil, 2012). Patients that have symptomology of PARDS come through the emergency department (ED). So long as physicians in the ED are able to increase the mean airway pressure, and supplemental oxygen is successfully administered in conjunction with the patient having good respiratory effort, non-invasive airway pressure support is typically all that is required. If the patient is transferred to the pediatric intensive care unit (PICU), a stronger approach is required. The key to treating the patient successfully lies in ventilation. Noninvasive modes of ventilation are continuous positive airway pressure (CPAP) and bilevel positive airway pressure (BiPAP) therapies, with either a nasal cannula or face mask (Prashant 2016). In the case of PARDS, any form of liquid ventilation and steroid therapy are not recommended. It is important to remember with PARDS that “The key for optimal global oxygen delivery is determining the best possible balance between cardiac output…and arterial oxygen content. It must be stressed that close cardiorespiratory monitoring is essential when titrating PEEP, especially in younger pediatric patients…” (Cheifetz, 2011, p. 1595). Worst case scenario, severe cases of PARDS require intubation.

In regards to ACS, Dr. Cage Johnson states, “The mainstay of successful treatment is high quality supportive care. Consultation with pulmonary, infectious disease and intensive care specialists is a necessary part of management. Fluid management, oxygenation, chest
physiotherapy, bronchodilators, and intermittent incentive spirometry are essential elements of management in the absence of a specific therapy that consistently ameliorates clinical course” (1995). It is not uncommon for physicians of pediatric patients that are at risk for, or have previous history of, ACS to put the patient of preventative medication during the early stages of their admission of SCD crisis. Medication that is commonly used to help prevent ACS is hydroxyurea, as well as the use of an incentive spirometer (CDC 2016). Physicians may prescribe similar breathing treatments that one would find with an asthmatic patient (corticosteroid treatment). Another form of treatment that has been beneficial in treating ACS is the blood transfusion, just as an individual in SCD crisis receives (Bernini 1998).

Other Consequences of Asthma, ARDS, and ACS

The physical complications that come with these respiratory issues can be pulmonary hypertension, confusion and extreme tiredness, low blood pressure, persistent cough, inability to sleep, and pale and clammy skin. In children, the loss of sleep and low blood pressure can have serious effects on their growth and development. When it comes to the psychological effects of such illnesses, the impact hospitalization has on children varies per the individual. When treating pediatric patients, it is important to keep in mind the effects hospitalization has on their psychosocial development. Of course, one must also take into consideration that as a result of their chronic illness and/or hospitalization, the patients also may experience psychological and emotional distress. “Studies on the quality of life in asthma patients have indicated that symptoms depend not only on the severity and duration of the disease, but also on the social and psychological condition of the patient and their family” (Sliwka, 2014, p. 757). For asthmatics, not only can depression affect a patient’s compliance, the lack of adherence to the medication regimen can cause the loss in assurance in the effectiveness of the treatment. In the pediatric asthmatic population, “The fear of attacks, restrictions in daily activities, and the possibly social stigma of “being on the sidelines” in school and home activities can be deeply disturbing” (Lucia, 1993, p.3). Individuals who have had ARDS run the risk for psychological side effects. “Psychiatric illness is also widely prevalent after ARDS, with 17 to 43 percent of survivors reporting depression, 21 to 35 percent reporting post-traumatic stress disorder, and 23 to 48 percent reporting anxiety.” (Saguil, 2012, p. 356). For adult patients, “reports of social isolation and sexual dysfunction,” on top of persistent depression and/or anxiety can be long-term effects of ARDS. Because individuals
with SCD already have a higher mortality rate, the additional strain on the body that ARDS or ACS can cause further damage to their body. Additionally, these illnesses do not just affect the patients, but their caregivers. It is not uncommon for there to be comorbidity between the health of the patient and the mental health issues of the caregiver. Another case of comorbidity lies between these illnesses and behavioral problems. For many children the internalizing of behaviors presents a difficulty.

Statement of the Problem

It is important to note that as respiratory issues in both adults and children continues to exist, and in some cases become more prevalent, research demonstrates multiple methods of proven and supported treatments. These methods of treatment include both the pharmacological and non-pharmacological. The amount of research done in relation to asthma and acute respiratory distress is fairly large; the amount of research in regard to acute chest has grown in the past decade (Abbas, 2013; Intzes, 2013; Traill, 2008). Unfortunately, the amount of research that has been done in regard to alternative, non-pharmacological treatment methods is limited. Research related to the three mentioned illnesses that involves either alternative treatment, or utilizes a holistic approach when dealing with the illness, is wanting. Techniques in managing pediatric asthma are developing, and the use of coping strategies are standard. Alternative managing techniques are often related to pain, symptom management, or emotional well-being.

To the best of the researcher’s knowledge, the number of published studies that specifically examine music therapy techniques in conjunction to standard medical treatment is small in number. There are publications that deal with music and the breath, focusing on Nordoff-Robins Techniques, life force, voice work, or music entrainment with individuals that are in a coma (Bradt, 2009; Robbins, 2009, Piccinini, 2009; Sokolov, 2009; Montello, 2009). The number of published music therapy studies related to pulmonary care is limited, and often focused on pulmonary diseases (Griggs-Drane, 2009) or had a psychotherapeutic approach (Harris, 2009, Rondina, 2009; Azoulay, 2009). The Louis Armstrong Center for Music and Medicine’s music therapists have been studying the impact of the use of wind instruments. At Beth Israel’s Department of Pediatrics at Phillips Ambulatory Care Center, wind instruments are used improvisationally with more acute phases of exacerbation and as a preventative initiative (Loewy, et al., 2009). The studies that did
focus on the use of wind instruments as an alternative treatment method used adolescents or adults, and the instruments used were typically more complex and required training.

**Purpose of this Study**

The purpose of this study was to determine whether an alternative music therapy method of treatment affected the symptoms of children with acute respiratory distress syndrome and acute chest syndrome.
CHAPTER 2

REVIEW OF LITERATURE

A Brief History of Music Therapy

One of the earliest references available to the profession of music therapy is from a magazine article from 1789, titled “Music Physically Considered”. As early as the 1800’s, two medical dissertations addressed the therapeutic value of music. During the 1800’s there was also the first recorded use of music therapy interventions in an institution in New York, as well as its use in psychotherapy. Over the next 100 years music therapy continued to gain support, but as of 1940 there was no established, organized clinical profession. By 1944, Michigan State University began the first academic program in music therapy, and soon other prominent universities followed suit. It is also important to recognize three individuals that emerged during the 1940’s as important developers in the profession: Ira Altshuler, MD; Willem van de Wall; and E. Thayer Gaston, also known as the “father of music therapy” (AMTA 2016).

June 2, 1950, the National Association for Music Therapy (NAMT) was founded, and established standards of training, registration, and the publication of research and clinical journals. Between 1950-1997, the number of practicing music therapy professionals went from a few-dozen to thousands. The next association to develop, the American Association for Music Therapy (AAMT), was in 1971. This organization was developed due to “differences in philosophy, education, and approach.” (AMTA, 2016). In 1983 the Certification Board for Music Therapists (CBMT) was integrated in order to enhance the credibility of the music therapy profession. By 1998 NAMT and AAMT merged to form the American Music Therapy Association (AMTA). It was the first time since 1971 that the profession had been united. AMTA currently serves over 5,000 music therapists, publishes two research journals, serves as an advocate for music therapy on both the state and federal level, promotes the profession, and provides several academic and professional resources to its members. The AMTA website not only offers resources to its members and professionals, but to individuals seeking general information. AMTA represents both music therapists in the United States and 30 other countries (AMTA, 2016).
An Overview of Music Therapy

“Music therapy is 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, 2016, p.1). The history of the profession shows it to be a well-established health profession that uses music within the therapeutic relationship to focus on physical, emotional, cognitive, and social needs of individuals. It is through the use of music in this therapeutic context that the abilities of individuals are strengthened and then transferred to other areas of their life. To be a credentialed, practicing professional one must have at least a bachelor’s degree from an AMTA approved college or university (includes 1,200 hours of clinical training) and a MT-BC credential. Some states also require licensure (AMTA 2016). It is also important to note that there is a difference between the therapeutic use of music and clinical music therapy. The AMTA website (www.musictherapy.org/about/quotes) lists these differences.

Music Therapy in Hospitals

Music therapy is both a valid and valuable option for medical patients. Music therapy can be used to address patient needs such as: respiration, chronic pain, diabetes, surgery, physical rehabilitation, and cardiac conditions. There have been research results, as well as clinical experiences, that confirm the effectiveness of music therapy with patients that are resistant to other treatment approaches. “Music therapists use music activities, both instrumental and vocal, designed to facilitate changes that are non-musical in nature. Music therapy programs are based on individual assessment, treatment planning, and ongoing program evaluation” (AMTA, 2006, p.1). The benefits of music therapy, when addressing objectives (pain management/reduction, reduction of anxiety, communication, etc.) that are both specific and relevant to the medical diagnosis and course of treatment, are then described in medical terms.

Physiologic Parameters for Pediatric Patients

Appropriate physiological indicators have been generalized to a child’s age. On average, if oxygen saturation is between 90% - 92% or higher, assistive respiratory devices are not typically needed (National Jewish Health, 2016; American Thoracic Society, 2015). For those between ages 2 to 5, the average heart rate ranges between 80 to 140 beats per minute. The average respiration
rate ranges between 22 to 34. Those between the ages 6 and 12 will typically have a heart rate between 70 to 120 beats per minute and a respiration rate ranging between 18 and 30. Children over the age of 12 typically have a heart between 60 to 100 beats per minute, and a respiration rate between 12 and 16 (Wedro & Conrad Stöppler, 2015; Kleigman, 2011).

**Anxiety and Mood Effects on Physiologic Measures**

Independent of diagnosis or reason for hospital admittance, the majority of children in the hospital are going to experience some sort of anxiety and mood alteration. Whether it is related to separation from parents, physician exams, loss of freedom, et cetera, the child’s mood and anxiety level are effected (Hendon & Bohon, 2008). “Therefore, consideration of stress and coping is an important part of integrative care for patients with asthma. Music therapy may engage the autonomic nervous system as well as the mesolimbic system, an area of the brain involved with emotion, offering an additional therapeutic support in the treatment of asthma” (Raskin & Azoulay, 2009, p. 71). Oftentimes physiologic indicators show signs of anxiety and/or pain. Increased heart rate and respiration rate are typically higher in more anxious patients. There is little research on the effects of music therapy on anxiety and mood specifically related to respiratory patients. Also, much of the research related to the effectiveness of music therapy as an anxiety reducer and mood elevator was done in conjunction with medical procedures or with behavioral health patients. The intention behind the research related to these areas can be transferred to this study. Because music itself is a form of sensory stimulation, and often employs the use of music or music interventions that are familiar, patients may have a stronger sense of security (American Music Therapy Association, 2010). Therefore, the use of music therapy to reduce anxiety and improve mood can often be secondary goals.

**Music Entrainment**

There is a significant amount of research that has studied the effect of music therapy on physiologic responses such as blood pressure, respiration rate, heart rate, muscular activity, galvanic skin response, and stress hormone levels (Bradt, 2009; Dileao & Bradt, 2005). “Entrainment involves first musically matching the physiological rhythm and then gradually changing the music in the desired direction, thereby changing the vibrational patterns of the physiological responses” (Bradt, 2009, p. 13). Depending on the technique of music therapy being
used, this can also be referred to as the isoprinciple. In regards to entrainment, it is important to know that the very first brain structure to receive auditory input is the medulla. The medulla is the part of the brain that controls the autonomic functions, heart rate and respiration rate, which just so happen to be “the two most vital and continuous rhythms in a human being” (Bradt, 2009, p.13).

Just as muscular feedback (gait pattern, movement) can be entrained by a variety of inputs, so can the respiratory system. According to several different researchers and studies, the respiratory pattern generating system is a type of oscillator (Bradt, 2009; Niizek & Miyamoto, 1993; Deguchi & Takano, 1997), which allows for it to be entrained by the variety of inputs. The number of studies that support and show the effect specific types of music have on heart rate and respiration rate continue to point to entrainment/isoprinciple.

A recent study published in the European Heart Journal, “Music and the Heart,” looked at current literature, and while it found no direct correlations to music and entrainment of the heart rate, it did find that respiration rate was more easily influenced by music tempo and music preference. While the author of the study found there to be a significant amount of inhomogeneity among the studies looked at (Koelsch & Jäncke, 2015), the number of associations between intentional use of music and the effect it had on both heart rate and respiration rate indicate some sort of autonomic significance. Other studies have tested the effects of rhythmic input on breath, and found that due to significant integer input on breath period to beat period ratio and phase coupling there is a significant indication of entrainment between rhythm and breathing (Hass, Distenfeld, Axen, 1986; Takano, Deguchi, 1997).

During the late 1980’s and early 1990’s, studies looked at the effects of perceived musical rhythm on respiration, perceived breathlessness with and without music during exercise, and the synchronization of heart rate, respiratory rate, and locomotor rhythms (Haas, Distenfeld, & Axen, 1986; Takano & Deguchi, 1997; Niizeki, Kawahara, & Miyamoto, 1993). These studies direct researchers to this: varying forms of exercise, combined with some sort of rhythmic stimulus, results in better synchronization of respiratory, cardiovascular, and locomotor systems. Perceived exertion and breathlessness also vary with the exercise. An inference to this study can be made that if music is preferred, the possibility of perceived exertion being decreased is higher. For the coupling of cardiac and respiratory rhythms, neither could be paired with locomotor rhythmic cadence (Niizeki, Kawahara, Miyamoto, 1993). The inference from the above supported the researcher in ensuring subjects remained in their hospital bed during study sessions.
Studies on COPD and Music Therapy

Chronic Obstructive Pulmonary Disease (COPD) is a multicomponent disease with inflammation at its epicenter encompassing a number of different underlying disease processes, which in turn lead to deteriorating lung function, symptoms, and exacerbation. In 2004, the American Thoracic Society/European Respiratory Society defined COPD as “…a preventable and treatable disease state characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and is associated with an abnormal inflammatory response of the lungs to noxious particles or gases, primarily caused by cigarette smoking. The most common features of COPD are difficulty breathing, dyspnea, cough, wheezing and sputum production. Although COPD affects the lungs, it also produces significant systemic consequences” (Celli, 2006, p.58). Studies that look at the efficacy of music on both psychological and physiological outcomes tend to show mixed results in physiological outcomes, while showing improvement in psychological outcomes (quality of life, dyspnea and anxiety) (Panigrahi, Sohani, Amadi, & Joshi, 2013).

In a major medical textbook for Asthma and COPD, which included details of other therapies used to treat the disorder and the disease, the use of music therapy interventions (music related breathing techniques, wind instrument use, relaxation techniques, etc.) were not mentioned; however, the use of acupuncture, yoga, and massage therapy were mentioned as complementary therapies (Thomson, 2009). Future therapies listed in the next chapter of this same textbook list medicinal forms of therapy, but once again there is an absence of music therapy as a complementary therapy (Barnes, 2009). As a result, the researcher had to search the limited amount of research literature within the field of music therapy. Individuals with COPD undergo pulmonary rehabilitation. Essential goals for pulmonary rehabilitation include reducing symptoms, increasing participation in physical and social activities, and improving overall quality of life (Raskin & Azoulay, 2009).

Non-Pharmacological Interventions

“Asthma and chronic obstructive pulmonary disease (COPD) involve impaired function of the lungs that significantly impacts health and wellbeing. Integrative care is beneficial for individuals with these chronic illnesses to enhance overall quality of life and level of functioning.” (Raskin & Azoulay, 2009, p. 69). Music therapy offers unique interventions that can address
shortness of breath and endurance, while improving the quality of life for the individuals with the above mentioned chronic illnesses. There have been several previous research studies that have demonstrated physiological benefits and improved lung function for pulmonary patients (Griggs-Drane, 2009). The use of a musical wind instrument is providing an enjoyable mode of complementary therapy – the individual enjoys the activity and the instrument is providing both inspiratory and expiratory resistance. In 2002, a study tested the importance of inspiratory muscle training (IMT), and found that it is important to add IMT to COPD pulmonary rehabilitation (Lotters, 2002). Because a goal for pulmonary patients is consistent airflow, the use of musical wind instruments is also beneficial because they require a continuous airflow in order to produce quality sound. Playing a wind instrument can also provide a benefit for airway clearance value improvement. Studies have shown the long-term benefits of playing a musical wind instrument in adolescents with asthma, as evidenced by fewer asthma exacerbations and hospitalizations, and healthier perceived coping (Raskin & Azoulay, 2009). All the research stresses the importance of seeking physician approval before working with a client/patient. The reason for this is obvious: the physician has more knowledge of the patient or client’s health related capabilities. Also, the music therapist using wind instruments with individuals who have poor pulmonary functioning, needs to be trained in the methods of the instruments being used, in order to promote proper technique (especially with breath support).

Other interventions that have been utilized regularly when addressing those with pulmonary diseases and/or disorders are vocal exercises and singing, and music-assisted relaxation. The importance of diaphragmatic breathing is an important tool to teach to the pulmonary patient. This tool not only focuses on lung expansion, but it also is a more efficient mode of breathing. Diaphragmatic breathing reduces the amount of shallow (clavicular) breathing done, which often takes place in the chest. This type of breathing also tends to increase circulation, due to the massage-like pattern elicited from contracting and pushing the organs located in the abdomen down and forward. “Breathing deeply and rhythmically reverses the ravages of chronic sympathetic nervous system overdrive (stress), naturally balancing out all the rhythms of the body and allowing you to function at peak levels of performance.” (Montello, 2009, p. 59). For the use of singing interventions, there have been noticeable increases and improved maintenance of lung function (Raskin & Azoulay, 2009; Lucia 1993). A benefit in using singing as a therapeutic intervention is that by teaching proper techniques that professional vocalists use, better breathing
habits, breath control and support, projection and tone quality are promoted (Raskin & Azoulay, 2009). Research shows the use of feedback on quality and successive approximation is used more efficiently by the instructor (or music therapist) than the medical professional, when the use of music-vocal techniques for proper breathing patterns are being taught (Engen, 2005). Engen believes that this is because of the consistency of the music instruction versus clinical instruction.

**Summary**

The amount of research that pertains specifically to the pediatric population with respiratory disorders is limited. Research used for this study often was pulled from other professional disciplines or from within the medical field, and concepts were transferred from research on the COPD population. There are a small number of studies that look at the use of and effects of specific music interventions with pediatric asthmatic patients. Research related to other pediatric respiratory issues similar to respiratory distress or acute chest, involved relaxation techniques, rather than techniques that would strengthen the pediatric respiratory muscles.

**Hypotheses**

Research hypotheses related to the proposed intervention with pediatric patients admitted to the hospital for asthma exacerbation, respiratory distress, acute chest, and/or wheezing were:

1. Participants receiving music therapy (MT), in conjunction with standard respiratory treatment, will experience significantly lower heart rate and respiration rate and an increase in oxygen saturation, compared to those not receiving MT.
2. Participants receiving MT, in conjunction with standard respiratory treatment, will experience a reduced perception in respiratory exertion, compared to those not receiving MT.

The researcher asked for qualitative feedback, using yes or no questions, from the participant’s parent/guardian, if present upon either discharge from hospital or Day 3 of the study. The first two questions were regarding if they found music therapy helpful and if they’d like the service to be offered in the future. The remaining questions asked if the tools used during the study were beneficial and applicable outside of the hospital, and if they noticed any improvement in their child.
CHAPTER 3

METHODS

Approval Section

Approval to conduct the present study was obtained from the Human Subjects Committee at Florida State University and the Institutional Review Board at Broward General Hospital (see Appendices A and B). Broward General Hospital Institutional Review Board required both a consent and assent form for their site that was accepted by the Human Subjects Institutional Review Board at the Florida State University. (Consent and assent forms are included in Appendix C and D.)

Design

This study was a pre- and post- randomized control and experimental design with repeated measures. The dependent variables of this study were the post-music therapy physiological indicators – heart rate, oxygen saturation, and respiration rate. Also, the researcher used a Likert scale, 0-10, for subjects to self-report the level of ease (0) or difficulty (10) of their breathing.

In order to ensure confidentiality and guarantee the randomization of group assignment, each participant was assigned, via a computer generated randomization program, a number that corresponded with their treatment condition, pre- and post-tests, as well as any other information documented by the researcher. Parents/guardians of the participants in the experimental group that were present during discharge or the final day, received an exit survey with questions pertaining to the music therapy session, their opinion of the validity of using the techniques and skills from the sessions at home, and their awareness of music therapy as a service.

Setting

The study was conducted at Chris Evert Children’s Hospital (CECH), which is a part of the Broward Health Medical Center (BHMC) located in Fort Lauderdale, Florida. CECH includes a pediatric emergency department (PED), general pediatric unit, pediatric intensive care unit (PICU), pediatric hematology and oncology unit, pediatric sedation unit, pediatric outpatient clinic, and neonatal intensive care unit (NICU). Staffing of CECH includes psychiatrists,
specialized pediatricians, physicians, social workers, administrators, coordinators, palliative care
teams, speech/occupational/physical therapists, and other variety of certified professionals. In this
study, potential subjects were recruited and/or referred on a daily basis by the General Pediatric,
Hematology/Oncology and Pediatric Intensive Care Unit nursing staff, Child Life Specialists, and
the Music Therapist.

Subjects

Subjects for this study were inpatients at Chris Evert Children’s Hospital. The number of
subjects accrued (N) was 40. The criteria for referral (inclusion) were as follows:

1. Participant were required to be between the ages of 4 and 12.
2. Participants were to be male and/or female.
3. Participants could be any ethnicity.
4. The participant’s primary language had to be English.
5. Patients were to have the diagnosis of [acute] respiratory distress, asthma, asthma exacerbation, acute chest, wheezing, etc.

For subjects to be included, they had to fulfill all of the above requirements. Subjects that
were chronologically at or above age 4, but developmentally below age 4, were ineligible. Subjects
that were on continuous BiPap were also ineligible, due to the severity of their status and the nature
of study, should they have been randomly assigned to the experimental group.

Sample Demographics

Before the first session, the researcher asked the parent/guardian (if present) how often the
participant had been admitted to the hospital in the past year for respiratory related issues and how
long the admittance typically was. Age and gender of participants were collected the first day of
the study. The mean age of the participants in this study was 6.425 years. There was a total of 19
males and 21 females that participated. In the control group there were 10 males and 10 females;
in the experimental group there were 9 males and 11 females. The minimum age of those who
participated in the study was 4 years old and the maximum age of participants was 11 years old in
both groups and overall.

Parents/guardians of eligible participants were given a flier for the study, an opt-in/opt-out
form, an informed consent form that contained the details, the expectations, and procedures of the
study. The researcher also had an informed assent document prepared for participants that were age 12. Participation in the study did not exclude patients from standard medical care and treatment; this study was done in conjunction with their standard treatment.

Subject’s Self-Report

For assessing self-perception in both children and adults, visual analogue scales (VAS) are used frequently (Cohen et. al, 2008). The researcher chose to focus primarily on the use of a horizontal, numeric Likert scale for subjects to self-assess and self-identify the ease or difficulty they experienced when breathing, as well as tightness of chest. The reason the researcher focused on the numeric Likert scale, based on research that concluded that young children had a difficult time responding accurately if just using a VAS (Shields, et al, 2003). Also, the researcher had a difficult time finding a standardized and frequently used self-assessment tools for individuals that were in the hospital for respiratory issues. At Chris Evert Children’s Hospital, the established VAS system in place for patients to report their pain level to hospital staff is the Wong-Baker FACES® Pain Rating Scale. The scale is paired with numeric values, 0-10. The use of this scale is a mode of self-assessment that patients are already familiar with using, and it is used when developmentally appropriate. For this study, the researcher used two images that were familiar to the patients, the similar face image already in use by the hospital and a more hand-drawn sketch of a face. “Previous research with children between the ages of 5 and 9 has demonstrated that children are capable of easily discriminating among…levels of pain depicted in the pictures” (Stanford, 2006). Because the age range of participants was from 4 to 11 the researcher included multiple modes for self-assessment. The additional modes used are the previously mentioned numeric Likert scale, in order for the patient to report the level of difficulty of breathing and the tightness level of their chest, and verbal cues. This method of the mixed self-assessment was chosen in order to give the subject maximum modes to express their self-assessment and to minimize confusion or difficulty for self-report for those between the ages of 4 to 12. Also, scales using faces, “are the type of self-report measure preferred by most children” (Stanford, 2006). The addition of visual characters that are familiar to the subjects was simply used for the very young subjects that had a difficult time in expressing the tightness level of their chest and how their breathing felt.
For the subjects that still remained unclear of where they fell on the chart, the researcher asked the subjects how their levels of breathing and chest were while reenacting examples of the best and worst (0 and 10). A copy of the tool is found in Appendix G.

**Independent Variable**

As of 2010, according to the National Center for Health Statistics, provided by the CDC, the average hospital stay for an admittance of asthma to inpatient care is 3.6 days (Centers for Disease Control and Prevention, 2016). Because of this, the researcher designed a three-day protocol, in which the length of session was dependent upon the group participants were randomly assigned to.

The experimental group received music therapy; the control group did not. This was done in order to ascertain any significant difference between those receiving the specific music therapy intervention in conjunction with their medical treatment. Each group then received a pre-session questionnaire that consisted of being asked how often they had been admitted to the hospital for a respiratory issue in the past year, as well as a rough estimate of how long their stay in the hospital was. The researcher also looked in the patient’s chart and documented the type of medication received, how often the subject received a breathing treatment during their current admission (Q # of hours), and the dosage of prescribed medication(s). The pre-test also included the researcher documenting the patient’s initial heart rate, oxygen saturation, and respiration rate each day. If in the experimental group, the patient was then given the musical instrument, a plastic harmonica, which the patient used during the instrumental portion of the sessions, for the duration of their time in the study. The experimental group was administered a 15- to 25-minute session of music therapy and breathing techniques. Sessions consisted of the researcher talking briefly with the subject to either describe what would be done, or refresh the participant’s memory.

Each day, the experimental group session began with breathing exercises. These exercises consisted of deep inhalations/exhalation and counted inhale/exhale, using techniques employed by vocalists and wind players. The goal of these exercises was to promote diaphragmatic engagement instead of clavicular engagement when breathing, and to increase lung expansion and endurance. From there the researcher had the participant use the provided harmonica and begin the instrumental exercise portion of the session. This portion required the participants to transfer the concepts of the breathing exercises to the harmonica. The exercises used via the harmonica were:
long versus short exhale/inhale on harmonica, a complete exhalation from one end of the harmonica to the other, and a complete exhalation from one end of the harmonica and back again. During the first exercise, long breaths were used to increase the duration and quality of both inhalations and expirations, short breaths were used to establish the difference in quality and effort used between short and long breaths. In using the next two exercises, which required utilization of all sections of the harmonica, the primary intent was to maintain quality of sound and exhalation at a constant and steady rate. This required the participant to be very intentional in how they utilized the breath and force at which they expelled it.

To conclude the music portion of the session for the experimental group, the researcher focused on the endurance of the participant. The participant was asked to play the harmonica in an improvisational manner, utilizing the techniques learned in the previous steps, while the researcher played through the “12-Barre Blues” in the key of C, to match the harmonica. Ultimately, the goal was for the participant to have the stamina to make it through the progression a maximum of three times. For some participants, completing the “12-Barre Blues” twice was taxing during the first day, and sometimes even the second day, of the study. At this point the session would end for that patient. Sessions for those able to complete the three rounds of “12-Barre Blues” were concluded with a song preferred by the participant. This too was done only if the participant was not over-exerting themselves. For the first two days of the study, the researcher would have the participant play their harmonica while the researcher played the guitar and sang. On Day 3, the participant was given the option to alternate between playing their harmonica and singing during the preferred song, which was done at the conclusion of the session. At the conclusion each of the three sessions (post-music therapy treatment), the researcher would document the post-test: the heart rate, oxygen saturation. It was during this time that the researcher also asked the patients to self-report the ease or difficulty of their breathing, using the self-report scale again. As previously mentioned all of the above measures were repeated throughout day’s two and three. At the end of final session, the third day, if a parent/guardian was present, the researcher would ask the parent/guardian if they were willing to fill out the approved exit survey (Appendix H).

For the control group, the research also had participants provide self-report on their ease or difficulty in breathing and tightness level of chest using the self-report scale. This was then followed by the researcher doing the pre-test, which once again simply consisted of documenting the participants heart rate, oxygen saturation, and respiration rate. The researcher would then leave
the room and return fifteen to twenty minutes later and document the post-test results (heart rate, respiration rate, and oxygen saturation). This was repeated during the second and third day of the study.

**Duration of Study**

The researcher collected data for 12 weeks in order to reach the required number of participants. Data accrual was completed on February 24, 2016. The treatment phase was over a 3-day period, for each participant. The 3-day treatment phase began as soon as consent was received from the parent. For the experimental group, each session ranged from between 15 to 25 minutes. Due to control group participants not receiving music, the length of their “session” lasted no more than 15 minutes.

**Randomization Procedure**

The researcher chose a website that used a program called “Research Randomizer” in order to have pre-established randomization of participants. Options for the type of randomization were given, and the researcher chose to use the following option: “1 Set of 40 Unique Numbers Ranging from 1 to 40”. This option provided the researcher with randomly produced numbers ranging from 1 to 40. While the program was running, the researcher decided that the experimental group would be represented by the odd numbers that were produced and the control group would be represented by the even numbers. Going off the set order, the first number in the set was odd (participant number one), that individual was placed in the experimental group. The second number (participant number two) in the set was an even number, which placed that individual in the control group. And so the researcher went down the set list.

**Procedure**

CECH hospital staff, such as the nurse managers, charge nurses, unit nurses, child life specialists (CCLS), and music therapist (MT-BC) gave referrals of eligible patients to the researcher. Staff and researcher reviewed the daily census to identify children who fit the criteria of this research study, as was outlined in the inclusion and exclusion criteria provided to them. Recruitment was then done via verbally informing the researcher of eligible participants. Initial contact for the study was done through the above mentioned staff, by means of a study flier and
an opt-in/out form. Upon receiving this from a hospital staff person, and verbal affirmation of parent/guardian interest, the researcher would make contact with parents/guardians. An informational packet and an informed consent form were delivered and the researcher discussed the study with both patient and parent/guardian. During this discussion any questions and/or concerns had by the parent/guardian were answered by the researcher. Once the opt-in/out form and consent form were signed and given to the researcher, the participant was informed of their random group assignment. Before beginning, the researcher then asked the parent/guardian of the participant for both groups the two questions from the approved pre-initial session questionnaire (Appendix G).

After the pre-initial session questionnaire was administered, the repeated measures (pre-test and post-test) of the study began. For the experimental group, the researcher asked the participant before and after the session each day to provide self-report using a combined Likert scale and related images (Appendix I) on their respiratory function. Before beginning the session, the researcher would then document the pre-test (Appendix I), which consisted of the heart rate, oxygen saturation, and respiration of the participant before the breathing exercises and harmonica playing commenced.

**Exit Survey**

The exit survey was to be given to the participant’s parent/guardian after completing the third and final day. There were a total of six, yes or no, questions (Appendix H). Two of the questions were designed to gain a better perspective of the parent/guardian’s perception and awareness of music therapy. The remainder of the questions asked if what was taught to the participant would be considered beneficial and if what was taught is transferable to the home. No one was required to take the survey and there were no identifiers present on the exit survey. This exit survey was designed and done with anonymity in mind. The number of responses were dependent on whether or not a parent or guardian was present the final day. Out of 40 participant-guardians, less than one-third were present during Day 3 and able to respond. All parent/guardians that were present were willing to take the survey and did so. Results of the survey are shown later on in Chapter Four, on Graph 3.
CHAPTER 4
RESULTS AND DISCUSSION

Feasibility

A total of 48 referrals for participation were made. Out of the 48 referred subjects, 4 subjects who were enrolled were discharged from the hospital before the final (Day 3) intervention was completed. There was 1 referral that refused to participate in the study. There were also 3 subjects referred that did not meet criteria. In total, 40 referrals were enrolled and participated in the full 3-day study. Refusal rate, which was calculated by dividing the number of refusals by the total number of samples (OECD, 2005), and multiplying it by 100, was 2.2%.

Descriptive Statistics

Descriptive statistics were used to examine the demographics of the study groups (Table 1, Table 2). Pearson Chi-Squared test was used in order to assess whether there was a significant difference in gender ratios and age between the experimental and control group. Proportionally, there was no significant difference between the number of participants in each group; however, the gender proportions of the participants did differ slightly. In the experimental group there was an even number of males and females, 10. In the control group the genders were disproportionate, 11 females to 9 males. Overall, 52.5% of the participants were female and 47.5% were male. There was no significant difference in gender between the two groups (p=1). This study was designed with age eligibility ranging from 4 to 12 years. The age range of enrolled participants was from age 4 to 11, with a mean age of 6.43 years. Participants in the experimental group (the music therapy treatment group) had a mean age of 6.45 years; the control group participants had a mean age of 6.4 years. According to the Pearson Chi-Square test there was no significant difference in the age of participants within or between the groups, p>.05, p=1 (Table 3).

Results

In order to test the effects of the music therapy treatment on respiratory patient’s heart rate, oxygen saturation rate, and heart rate levels (physiological factors), a 2-way ANOVA with repeated measures was run for each group. The differences between the pre- and post-test was used
for the 2-way ANOVA’s. This was done in order to compare whether there was any improvement within the groups, over the three days of the study. This was done in order to compare whether there was any improvement within the groups, over the three days of the study. By using the 2-way ANOVA with repeated measures, the researcher found there to be no significant difference between the control group and the experimental groups improvement.

Table 1.
Participants Gender

<table>
<thead>
<tr>
<th>Participants Group</th>
<th>Participants Gender Crosstabulation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
</tr>
<tr>
<td>Participants Group</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>11</td>
</tr>
<tr>
<td>E</td>
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<td>Total</td>
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Table 2.
Participants Age

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<tr>
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<tr>
<td>Participants Group</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>5</td>
</tr>
<tr>
<td>E</td>
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<tr>
<td>Total</td>
<td>12</td>
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Table 3.
Chi-Square Result of Participant Age per Group.

Hypothesis Test Summary

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>S Ig.</th>
<th>Decision</th>
</tr>
</thead>
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<tr>
<td>The distribution of Age of Participants is the same across categories of Treatment Groups.</td>
<td>Independent-Samples Mann-Whitney U Test</td>
<td>1.000$^1$</td>
<td>Retain the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is .05.

$^1$Exact significance is displayed for this test.
Heart Rate

Due to the influence the respiratory system and heart rate have on one another, the researcher included measuring pre- and post- heart rate in this study (Billman, 2011). For the tables below, the researcher took the mean differences between pre- and post-tests in order to see the direction of change.

Table 4, the ‘Groups’ F-value of 0.4086 is not significant at p>0.05, with p=0.530313. This shows that in general there was no significant difference between the heart rate levels of the control and experimental groups. In ‘Days’, the F-value of 0.7705 is not significant at p>0.05 (df=2,38; p=0.469876). Not even taking into account the group the subject was in, there was not a significant difference in heart rate over/between three days. Between ‘Groups*Days’, with F-value of 0.8686, there was no significant interaction between the two variables, group and day (df=2,38; p=0.427701) because p>0.05.

Table 4
Two-Way ANOVA, Repeated Measures, Heart Rate

<table>
<thead>
<tr>
<th>Source:</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
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<td>Within Subjects:</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Groups</td>
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<td>66.0083</td>
<td>0.4086</td>
<td>0.530313</td>
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<tr>
<td>Subj x Groups</td>
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<td>19</td>
<td>161.5346</td>
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<tr>
<td>Days</td>
<td>179.45</td>
<td>2</td>
<td>89.725</td>
<td>0.7705</td>
<td>0.469876</td>
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<tr>
<td>Subj x Days</td>
<td>4425.2167</td>
<td>38</td>
<td>116.4531</td>
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<td>4057.8167</td>
<td>38</td>
<td>106.7846</td>
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</tr>
<tr>
<td>TOTAL</td>
<td>14135.925</td>
<td>119</td>
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<td></td>
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</tbody>
</table>

The mean differences for heart rate are displayed in Table 5. Day 1, there is very little difference between the means of the two groups (M=4.55, SD=8.817; M=4.30, SD=9.143). Day 2 saw the greatest gap in differences between the control group (M= -1.30, SD=10.658) and experimental group (M=4.10, SD=12.226); however, it was not significant (p>0.05, p=0.145). By Day 3, the means between the groups are once again close (M=2.30, SD=14.914; M=2.00, SD=8.379). Overall and in general, there was no significant difference or interaction between the groups over the three days of the study.
Table 5  
**Repeated Measures, Descriptive Statistics, Table of Means for Heart Rate**

<table>
<thead>
<tr>
<th></th>
<th>Group</th>
<th>Mean</th>
<th>Std. Deviation</th>
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<td></td>
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<tr>
<td>Control</td>
<td>4.55</td>
<td>8.817</td>
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<tr>
<td>Experimental</td>
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<tr>
<td>Total</td>
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<td>8.866</td>
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<td><strong>Day 2</strong></td>
<td></td>
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<tr>
<td>Control</td>
<td>-1.30</td>
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<td>20</td>
<td></td>
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<tr>
<td>Experimental</td>
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<tr>
<td><strong>Day 3</strong></td>
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<td></td>
</tr>
<tr>
<td>Control</td>
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<td>20</td>
<td></td>
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<tr>
<td>Experimental</td>
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<td>8.379</td>
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<tr>
<td>Total</td>
<td>2.15</td>
<td>11.941</td>
<td>40</td>
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</table>

**Oxygen Saturation**

With this physiological measure, the researcher was looking at increases in oxygen saturation (SPO2).

In Table 6, the F-value of 0.0029 in ‘Groups’ shows the lack of significant difference in oxygen saturation rates between the experimental and control group, at p>0.05 (df=1,19; p=0.957616). F-value of 6.2906 for ‘Days’ is significant at p<0.05 (df=2, 38; p=0.004366).

Table 6  
**Two-Way ANOVA, Repeated Measures, Oxygen Saturation**

<table>
<thead>
<tr>
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<td></td>
</tr>
<tr>
<td>Days</td>
<td>36.0667</td>
<td>2</td>
<td>18.0333</td>
<td>6.2906</td>
<td>0.004366</td>
</tr>
<tr>
<td>Subj x Days</td>
<td>108.9333</td>
<td>38</td>
<td>2.8667</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groups x Days</td>
<td>8.8667</td>
<td>2</td>
<td>4.4333</td>
<td>1.2137</td>
<td>0.308353</td>
</tr>
<tr>
<td>Subj x Group x Days</td>
<td>138.8</td>
<td>38</td>
<td>3.6526</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>418.9917</td>
<td>119</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This means that, ignoring whether participants were in the control or experimental group, there is an overall significant difference in oxygen saturation over the three days the study took place,
regardless of them receiving the music therapy intervention or not. There was no significant interaction between groups and days, with a F-value of 1.2137, p>0.05 (df=2,38; p=0.308353). Overall, there was no significant difference in oxygen saturation between groups over the three days the study took place.

Table 7, one can view the mean differences per group over the three days the study took place. Once again, it was during Day 1 that the greatest gap in oxygen saturation between the control (M=1.45, SD=2.685) and experimental (M=0.70, SD=1.949), at 0.75. While it appears to be a significant gap, there is no significant difference between the two groups on Day 1 (p=0.318). Day 2 held the least amount of difference between the two groups, (M= -0.25, SD=1.251; M= -0.10, SD=1.861). On Day 3, there is once again no significant rate of change between the control group (M=0.60, SD=1.465) and experimental group (M=1.15, SD=1.226).

Overall, there was not enough of a significant difference between the groups to reject the null. The only area of significant improvement in SPO2 is between the days of the study.

Table 7
Repeated Measures, Descriptive Statistics, Table of Means for Oxygen Saturation

<table>
<thead>
<tr>
<th>Descriptive Statistics</th>
<th>Treatment Group</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>Control</td>
<td>1.45</td>
<td>2.685</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>.70</td>
<td>1.949</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1.08</td>
<td>2.347</td>
<td>40</td>
</tr>
<tr>
<td>Day 2</td>
<td>Control</td>
<td>-.25</td>
<td>1.251</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>-.10</td>
<td>1.861</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>-.18</td>
<td>1.567</td>
<td>40</td>
</tr>
<tr>
<td>Day 3</td>
<td>Control</td>
<td>.60</td>
<td>1.465</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>1.15</td>
<td>1.226</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>.88</td>
<td>1.362</td>
<td>40</td>
</tr>
</tbody>
</table>

**Respiration Rate**

In participant respiration rate, the researcher was looking for signs of reduction. Comparisons between the means of the control and experimental groups give an idea of what kind of effects there were between standard medical treatment and the music therapy treatment.
In Table 8, ‘Groups’ F-value of 1.382 is not significant at p>0.05, with p=0.254282. This means that overall there was no significant difference in respiration rate between the two independent variables, the control and experimental groups. F-value of 1.8636 for ‘Days’ is not significant with p>0.05 (p=0.169014). Whether the subject was in the control or experimental group, there was no overall significant difference in respiration rate between the three days. There was no significant interaction between the groups and days, with a F-value of 0.2247, p>0.05 (p=0.799810). Overall, there was no significant difference among heart rate levels between groups over three days.

Table 9, the mean differences, per group are displayed by day. In Day 1 there was the greatest gap in respiration rate between the control (M=2.55, SD =8.799, p=0.419) and experimental (M=4.65, SD=7.379) group. Day 2, while the difference between the control (M=.25) and experimental (M=2.00) appears to be significant, it is not (p=0.240). By the third day, the gap between the control group (M=1.50, SD=4.046, p=0.668) and experimental group (M=2.10, SD=4.701) had closed to a mere 0.6 difference.

Due to these results, we fail to reject the null hypothesis – there was no difference between the two groups. The ancillary hypothesis is then rejected, as the experimental group does not have more significant change than the control group.
Table 9
Repeated Measures, Descriptive Statistics, Table of Means for Respiration Rate

<table>
<thead>
<tr>
<th></th>
<th>Treatment Group</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>Control</td>
<td>2.55</td>
<td>8.799</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>4.65</td>
<td>7.379</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3.60</td>
<td>8.085</td>
<td>40</td>
</tr>
<tr>
<td>Day 2</td>
<td>Control</td>
<td>.25</td>
<td>3.864</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>2.00</td>
<td>5.292</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1.13</td>
<td>4.659</td>
<td>40</td>
</tr>
<tr>
<td>Day 3</td>
<td>Control</td>
<td>1.50</td>
<td>4.046</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>2.10</td>
<td>4.701</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1.80</td>
<td>4.339</td>
<td>40</td>
</tr>
</tbody>
</table>

Self-Report of Breathing

The self-report scale and questions form can be found in Appendix G. Subjects were asked to self-report for both the pre-test and the post-test. Question 1 looked at the tightness level of the subjects’ chest. Question 2 looked at the ease or difficulty of breathing (Figure 1, Figure 2). For each question the subjects chose a number from the Self-Report scale discussed in Chapter 2. The majority of responses throughout both groups was 0 – which represented the “best” feeling available (easiest to breathe and chest was not tight at all). Due the researcher looking for signs of improvement in the data collected, the results of the self-perception report will document the subjects correlating response. With that being said, the graphs below reflect the upward trend in “0” responses shown; this represents the subject’s perception of improvement.

In Question 1, between the pre-intervention and post-intervention self-assessments, both groups show fairly consistent self-perceived improvement. The experimental group leaps from a self-perceived no tightness of chest at 65% on Day 1 to 90% on Day 3. Whereas the control group increases from 45% on Day 1 to 85% by the end of the study on Day 3.

In Question 2, both groups show a self-perceived improvement. From the graph (Figure 2), the consistency of self-perceived improvement is greater in the experimental group than the control group. The experimental group went from 75% of participants responding with ‘0’ on
Day 1, to 90% on Day 3. In the control group, the participants went from 60% responding with ‘0’ to 85% by Day 3.

Figure 1 Self-Report, Question 1 Responses of ‘0’

Figure 2 Self-Report, Question 2 Responses of ‘0’.

Exit Survey Results

The exit survey (Appendix H) results were compiled into a graph (Figure 3). Half of the questions were directly related to the study. Just looking at the graph below, one can clearly see
that Question 2 was the only one to receive the “No” response. This question was unrelated to the study; it was inquiring whether the parent/guardian knew that music therapy was an available service option for their child within the hospital. Because many parents were not present at the conclusion of the study, there was a limited number of responses to the survey.

![Exit Survey Responses](image)

Figure 3
Exit Survey Results – Parent/Guardian Responses

**Discussion**

The negative effects that asthma has on a child, their physical growth and development, and social development have been discussed in length. It is important to note the added financial burden on families with individuals who are prone to respiratory illnesses and asthma, especially if they are already classified under the lower socioeconomic status (Chen, et al, 2006). Education is also affected when a child is absent from school for prolonged periods of time, and the social aspect of development is affected when a child feels limited to what they are able to participate in, without fear of having an asthma attack (Lung Health Program, n.d.). The leading question in this study was: Will the use of this specific music therapy intervention have a positive, significant effect on pediatric patients in the experimental group? Physiological indicators, such as heart rate, oxygen saturation rate, and respiration rate were used to measure data related to this question. The
null hypothesis while running this study was that there would be no significant difference between the experimental and control groups physiological factors. This was followed by the ancillary hypothesis that the experimental group would contain more significant difference in physiological factors than the control group. The researcher was looking for significant differences in heart rate (HR) and respiration rate (RR), by noting any significant decreases in levels. For oxygen saturation (SPO2) the researcher was looking for significant differences demonstrated by a higher mean SPO2 level. Using those factors, the area of greatest significant difference (positive improvement) was in SPO2 over the three days of this study. For the music therapy treatment group, the researcher would notice significant improvements in all physiologic levels during sessions. When data was collected/notated for the post-test, there was not a noticeable significant difference between the two groups.

Confounding variables in this study became more and more apparent to the researcher as the study progressed. To the researcher, three of five noted confounding variables held the greatest potential to impact data. The five confounding variables are listed in the researcher’s opinion of significant impact on data: use of nasal cannula, subject’s age/attention span, physician/nurse/respiratory therapist entering during session, parent/guardian presence, and whether music was even the preferred activity of the subject. If a subject was on a nasal cannula, the researcher would not get an accurate read on whether the music therapy intervention was significantly impacting oxygen saturation and even respiration rate. Another major confounding variable was that the rate of maturity is different in every individual – age did not always influence the maturity level and attention span of participants. Every so often there were sessions that the researcher had more difficulty keeping the subject focused and following the protocol/treatment. Finally, when physicians, nurses, or respiratory therapists entered the room of an experimental group participant, the researcher was required to pause the intervention while examinations were made. The effect that this had on data is clear – the interruption of continuous treatment. Other confounding variables were simply a case of distraction and preference, which can be encountered in any session, with any patient, in any therapeutic setting.

Another question the researcher had was whether the subject’s self-perception of respiratory function would change and how it would relate to results. As discussed in the results section the percentage of patients that responded as feeling the “best” (0) that they could, increased to the point that by Day 3’s post-intervention self-assessment, 87.5% of all subjects were
responding with “0”. On occasion, subjects would respond with their breathing or chest as a feeling – “My breathing feels happy today”. It was in these instances that the researcher would further investigate with the subject where their level of happy fell on the Likert scale.

The literature on non-medical, or alternative, treatments has a very limited supply in relation to the use of music therapy with pediatric asthmatic and respiratory patients. It is the hope of this researcher that the positive effects of the use of music therapy in this study as a conjunctive treatment method in the hospital will lead to a change in that trend. For the subjects that this was not their first admittance related to asthma or a respiratory issue, and whose parent/guardian was able to recall the previous length of stay, length of stay during this admittance was noted by the researcher. Most subjects’ previous length of stay was between three to five days, which aligns with the average timeline given by the CDC (Centers for Disease Control and Prevention, 2016). Infrequently parents/guardians would respond that they had only gone to emergency department, but had not been admitted to the hospital, and had left within the day. However, for the majority of the subjects under the age of 8, this hospital admittance was their first.

The relationship between the data collected and the data provided by subjects’ self-report correlate in the sense that both increase in signs of improvement. The rate of improvement in this comparison, however, does vary. Where self-report showed improvement of >10%, improvement marked by data was often no greater than 2%. When measuring improvement, the researcher used the patients monitor to collect the desired data. On the monitor SPO2, RR, and HR are listed, as well as blood pressure (BP). The pulse oximeter (pulse ox) and three non-invasive leads attached to different locations on the subject’s chest are what these numbers were received from. For improvement in this study, and as a way to better measure the improvement of lung strength and function, use of an incentive spirometer would give a more in-depth and accurate indication of any effects being made by the music therapy intervention. The incentive spirometer measures and “emphasizes deep inspiration up to total lung capacity” (Renault, et al, 2009). Also, the use of this tool was recommended by a member of the Broward Health IRB committee.

Music therapy did positively affect subjects, but did not indicate greater significant improvements than those receiving standard medical treatment. Both groups showed similar signs of improvement in their level of increase in oxygen saturation and decrease in respiration rate. The long-term effects and benefits of music therapy interventions, specifically the playing of wind instruments, for asthmatic and respiratory patients can be further explored as well. This study only
looked at an immediate improvement over a very short span of time. Most of the studies that did looked at long-term effects on music therapy interventions spanned over months and/or years (Barnes, 2009; Bradt, 2009). Music activities and music therapy interventions that employ similar techniques, principles, and goals have great potential to improve the health and social aspects of children suffering from asthma and other respiratory issues. Results from the exit survey show that parents/guardians found the techniques and interventions to not only be beneficial for their child, but also easily utilized at home. If carried into the home, expanded to school and social experiences/activities, the benefits and potential to strengthen the respiratory function of the pediatric population would only be likely to increase.
APPENDIX A

FLORIDA STATE IRB AUTHORIZATION LETTER

Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 - FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 09/29/2015
To: Kylie Chivington
Address: 
Dept.: MUSIC SCHOOL
From: Thomas L. Jacobson, Chair
Re: Use of Human Subjects in Research
   The Effects of Music Therapy and its Use of the Harmonica with Pediatric Patients Admitted for Respiratory Issues such as: [Acute] Respiratory Distress, [Acute] Asthma Exacerbation, Acute Chest, & Wheezing

The application that you submitted to this office in regard to the use of human subjects in the research proposal referenced above has been reviewed by the Human Subjects Committee at its meeting on 08/12/2015. Your project was approved by the Committee.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals which may be required.

If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by 08/10/2016 you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report, in writing, any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: Jayne Standley
HSC No. 2015.15913
APPENDIX B

BROWARD HEALTH IRB AUTHORIZATION LETTER

December 1, 2015

Kyle J Chieffo

Re: Follow Meeting Date: 11/11/2015

RECORD NUMBER: 2015-50


Approved 11/11/2015

Dear Ms. Kyle Chieffo:

This letter is to advise you that the above referenced study has been presented to Broward Health’s Institutional Review Board for initial review. Modifications were approved as requested by the board. The following action(s) takes are subject to the conditions and explanation provided below.

Sponsor: University Grad Student - FSU

Reason 1: Follow-Up to Initial Review

Description: *Service authorization
*Social Behavioral Application
*Letter of support/FSU approval letter/FSU Informed Consent Approval
*Protocol design
*Investigator training document
*Revised Opt Out form
*Revised recruitment flyer/Revised Subject Invitation to Participate Letter
*Parental consent document/Assent document
*Revised delegation log

IRB ACTION: Approved - Modifications approved as requested by the board

Max number of subjects allowed: 40

Current Enrollment: Status: Open enrollment

Risk Assessment: The IRB has determined this research satisfies the requirement (45 CFR 46.404 and 21 CFR 50.81). Research not involving greater than minimal risk to the individual subjects with the permission of at least one parent required. Solicitation of consent is required for children participants ages 12 thru 17 years of age. The IRB granted waiver for children younger than 12 years old due to general lack of maturity and psychological state and are incapable of providing consent. Non-English speaking subjects: Except as provided in 56.104c, any information disclosed about this research must be translated into a language understandable to the subject or subject’s legally authorized representative. A short form should be used when oral presentation of the informed consent process is needed. When this method is used, a third party impartial witness is required. In addition, when using the short form method, it must be used in conjunction with the full version IRB approved consent, 21 CFR 50.27(b).

All research activities including data collection is prohibited after study expiration 11/10/2016 unless continued renewal is granted by the IRB.

It is the responsibility of the principal investigator to communicate protocol progress, changes, and/or terminations in accordance with the Code of Federal Regulations. The information contained herein is true and correct as reflected in the records of Broward Health Institutional Review Board (IRB). This institutional review board operates in accordance with the Office of Human Research Protections and Good Clinical Practices (GCP) under the U.S. Food and Drug Administration (FDA) regulations.

Sincerely,

Robin M. Smith, MBA, CJM, CSP
Institutional Review Board Manager
FWA00001248
1600 S. Andrews Avenue, Fort Lauderdale, FL 33316 T: 954-385-8911 F: 954-385-8950 http://www.browardhealth.org/irb/
APPENDIX C

INFORMED ASSENT FORM

FLORIDA STATE UNIVERSITY

CHILDREN'S ASSENT DOCUMENT

Project Title: The Effects of Music Therapy and its Use of the Harmonica with Pediatric Patients Admitted for Respiratory Problems such as: [Acute] Respiratory Distress, [Acute] Asthma Exacerbation, Acute Chest & Wheezing

Investigator(s): Principal Investigator: Kylie J. Chivington, MT-BC, NICU-MT, NMT
Academic Supervisor: Dr. Jayne Standley

I (Kylie Chivington) am doing a research study. A research study is a special way to find out about something. I am trying to find out if music therapy and its use of the harmonica and specific breathing activities, will make the hospital stay shorter and help strengthen your lungs.

If you decide that you want to be in this study, I will ask you to do several things. There will be two different groups that are a part of my study. If you are randomly, as in flipping a coin, chosen to be in Group 1, then you will receive a harmonica. If you are chosen to be in Group 2, there will not be any music. If in Group 1, you will be playing the harmonica and doing breathing activities. I want to tell you about some things that might happen to you if you are in this study.

Risk: You might choose a song that has lyrics or a melody that may produce a negative emotional reaction – meaning it could make you feel more sad or angry or frustrated.
Risk: If we work too hard and do not pay attention to your monitor, the harmonica and breathing activities could trigger an asthma attack or respiratory distress (low oxygen in your bloodstream) during the 15-20 minute session.

Not everyone who is in this study will benefit. A benefit means that something good happens to you. I don't know if you will benefit. But I hope to learn something that will help other people someday. There are many possible benefits, such as your hospital stay might be shorter, your breathing could get better, you will have learned how to do something new, and music can help with the pain and/or discomfort you might feel while in the hospital.

When I am done with the study, I will write a report – a big paper - about what I found out. I won't use your name in the report.

You don't have to be in this study. It's up to you. If you say okay now, but you want to stop later, that's okay too. All you have to do is tell me. If you have an asthma attack or have a really hard time breathing we will stop, too.

It's ok to ask your doctor if you have questions about your treatment. If you have questions about your participation in this research you can talk to the Institutional Review Board committee. This committee is a group people who protect your rights while you are in this study. The Institutional Review Board can be reached at (954) 355-4941.

If you want to be in this study, please print and sign your name below.

I, __________________________________________, want to be in this research study.

(Please print your name here)

________________________________________
(Sign your name here)  ____________________________
(Date)

APPROVED FOR USE

DEC 01 2015

BROWARD HEALTH

INSTITUTIONAL REVIEW BOARD

Version 2
APPENDIX D

INFORMED CONSENT FORM

FLORIDA STATE UNIVERSITY
PARENTAL INFORMED CONSENT:
AUTHORIZATION TO DISCLOSE PROTECTED HEALTH

The Effects of Music Therapy and its Use of the Harmonica with Pediatric Patients Admitted for Respiratory Problems such as: [Acute] Respiratory Distress, [Acute] Asthma Exacerbation, Chronic Chest & Wheezing

Principal Investigator: Kylie J. Chivington, MT-BC, NICU-MT, NMT
Contact Number: [redacted]
Address: [redacted]
Facility Research Site: Chris Evert Children’s Hospital, Broward Health
Name of Sponsor: Florida State University, School of Music, Graduate Program

Introduction
Your child is invited to be in a research study to see how music therapy and its use of a musical instrument, the harmonica, paired with specific breathing exercises, can assist in the treatment of pediatric patients admitted to the hospital for acute respiratory distress, asthma, wheezing, and other pulmonary problems. Your child has been selected as a possible participant because they are an inpatient between the ages of 4 and 12, with the primary diagnosis of either acute respiratory distress, acute asthma [exacerbation], acute chest, and/or wheezing. We ask that you read this form and ask any questions you may have before agreeing to be in the study. Exacerbation is simply a way to say worsened; acute simply means serious.

This study is being conducted by a music therapy student from Florida State University, who is currently studying to be a music therapist.

Background Information
The purpose of this study is to show how music therapy, can be used alongside standard medical treatment(s) to help treat pediatric patients admitted for acute respiratory distress, asthma, wheezing, and other pulmonary problems. The researcher is interested in two aspects of the patient’s recovery. The first, how music therapy benefits the patient physically, using physiological measures to monitor any improvement. Also the researcher is looking for whether the music therapy treatment used has any effect in reducing the patient’s length of stay in the hospital.

From this point on, any reference to you, is referring to your child.

Procedures
Approximately 40 children will be recruited. There will be two groups; patients will be chosen at random. This means a computer decides if your child will receive music therapy or not. Randomization is like pulling a name out of a hat; the researcher does not make the decision. This will be a three day study and will require the participation of your child for three days. If you agree to let your child participate in this study, they would participate in the following:

Group 1 – Music Therapy
Day 1:
• Parent or Legal Guardian complete a 2 question pre-session survey that will ask how often and how long your child is admitted (on average) for respiratory issues.
• The researcher will write down your Heart Rate, Respiration Rate, and Oxygen saturation before doing music therapy treatment. Oxygen saturation refers to how much oxygen is in the blood stream. The better your child is breathing the better the oxygen levels are.
• Breathing exercises, with and without the harmonica.
  o **Breathing exercises, pre-music instrument:**
    • Counted inhale/exhale on # count, with the goal to increase through sessions.
      The researcher will show you what you will do, and then you will try to do it.
      First you will try breathing with the researcher, and if you understand what to do, you will do the breathing exercise on your own while the researcher counts for you. The researcher will have you inhale up to a comfortable number. You and the researcher will set a breathing exercise goal to reach by the last session.
      During this process, the researcher will also be watching your monitor (the machine that you are attached to with the cords) to make sure you are okay.
    • Instrument (harmonica) provided by researcher, for you to keep and use during each session, and take home upon discharge from hospital.
    • The researcher will then show/teach you how to produce sound on the harmonica and take care of the harmonica.
  o **Instrument exercise:**
    • Long versus short exhale into harmonica
      • Long breaths out, like a sigh.
      • Short, quick, breaths out.
    • A “game” in two parts
      • Part 1: can you get same sound all the way across the harmonica from one breath?
        • You will try go from one end of the harmonica to the other end in one breath. You will try it fast, first. The goal is to have enough. The goal is to have the same sound quality coming out of the harmonica when you blow out, all the way across the instrument, both at fast and slow speed.
      • Part 2: Similar to Part 1, but the goal of Part 2 is blow from one end to the other, and back again.
  o **Musical Activities to Build Endurance:**
    • **Play the blues:** you will play harmonica, playing anything you want (blowing out/breathing in wherever you want). The researcher will play the blues on the guitar while you are playing your harmonica. You and the researcher will play through the progression 3 times.
    • **Song of choice:** The researcher will give you a list of songs on the iPad to pick to play. The researcher will once again play the guitar while you play whatever you want on your harmonica.
  • The researcher will write down your Heart Rate, Respiration Rate, and Oxygen saturation after your music therapy treatment.
  • The whole session, including the questionnaires, will last no more than 30 minutes.

**Day 2:**

• The researcher will write down your Heart Rate, Respiration Rate, and Oxygen saturation before doing music therapy treatment.

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**APPROVED FOR USE**

**DEC 01 2015**

**BROWARD HEALTH**

**INSTITUTIONAL REVIEW BOARD (IRB)**

**FWAC0001248**
• Breathing exercises, with and without the harmonica.
• Play the blues – just like Day 1.
• Song of your choice – just like Day 1.
• The researcher will write down your Heart Rate, Respiration Rate, and Oxygen saturation after doing music therapy treatment.
• This will last no more than 25 minutes.

Day 3:
• The researcher will write down your Heart Rate, Respiration Rate, and Oxygen saturation before doing music therapy treatment.
• Breathing exercises, with and without the harmonica.
• Play the blues – just like Day 1.
• Song of your choice – just like Day 1.
• The researcher will write down your Heart Rate, Respiration Rate, and Oxygen saturation after doing music therapy treatment.
• An exit survey asking if you/your child found music therapy to be helpful, if it's something you all would like offered in the future, and if the tools given are something that can and will be used outside of the hospital.
• The session, including time for the questionnaires, will take no longer than 30 minutes.

Follow Up
• 4-6 weeks after, you will receive a follow up survey asking if the exercises are still used, if your child still plays the harmonica, and if your child has been readmitted for similar reasons since completing the music therapy treatment.

Group 2 - Non-Music Group

Day 1
• Complete a 2 question pre-session survey that will ask how often and how long your child is admitted (on average) for respiratory issues.
• The researcher will write down your Heart Rate, Respiration Rate, and Oxygen saturation.
• The researcher will leave the room and come back 25 minutes later to write down your Heart Rate, Respiration Rate, and Oxygen saturation.

Day 2
• The researcher will write down your Heart Rate, Respiration Rate, and Oxygen saturation.
• The researcher will leave the room and come back 30 minutes later to write down your Heart Rate, Respiration Rate, and Oxygen Saturation.

Day 3
• The researcher will write down your Heart Rate, Respiration Rate, and Oxygen saturation.
• The researcher will leave the room and come back 30 minutes later to write down your Heart Rate, Respiration Rate, and Oxygen Saturation.

If your child has trouble reading the questions on the pre- and post-tests, as well as the survey, the questions will be administered orally through the investigator or yourself, the parent or legal guardian.

SBR Version 08.01.13

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INSTITUTIONAL REVIEW BOARD (IRB)

FWA00001248

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In the event that your child is unable to continue due to respiratory distress or oxygen desaturation, the researcher will stop the study session. Oxygen desaturation simply means that the amount of oxygen in the bloodstream has become too low.

If at any time you wish to withdraw your child from the study, please inform the researcher.

Possible Risks and Benefits of being in the Study:
The study has the following Risks: This study has no known risks, but there is a chance of your child becoming emotionally distressed or having brief respiratory stress. In an event of such an issue arising, the study will stop and your child will be referred to the appropriate Broward Health staff member. Please know that music therapy literature, there are no known physical and emotional risks to receiving music therapy.

The Benefits to participation are: The benefits may include the possibility of making it easier to breathe for you, possibly make your stay in the hospital shorter, might make having to stay in your room less boring or scary thing, might make you feel less sad, and might even lower your pain and how scared you may feel.

Compensation
You will not receive any payment for participating in this study.

Confidentiality
The records of this study will be kept private. In any sort of report we might publish, we will not include any information that will make it possible to identify your child as a subject. Research records will be stored securely and only researchers will have access to the records.

Authorization to Use Your Health Information for Research Purposes

Because information about your child and their health is personal and private, it generally cannot be used in this research study without your written authorization. If you sign this form, it will provide that authorization. This form is intended to inform you how your child’s health information will be used or disclosed in the study. Your child’s information, diagnosis, vital signs, medication information (dosages and frequency of administration) will only be used in accordance with this authorization form and the informed consent form and as required or allowed by law. Please read it carefully before signing it.

Do I have to sign this authorization form?
You do not have to sign this authorization form. But if you do not, your child will not be able to participate in this research study.

If I sign, can I revoke it or withdraw from the research later?
If you decide to let your child participate, you are free to withdraw your authorization regarding the use and disclosure of their health information (and to discontinue any other participation in the study) at any time. After any revocation, your child’s information will no longer be used or disclosed in the study, except to the extent that the law allows us to continue using your child’s information (e.g., necessary to maintain integrity of research). If you wish to revoke your authorization for the research use or disclosure of your child’s health information in this study, you must write to:

Kylie J. Chivington
What Personal Information Will Be Used or Disclosed?
No identifiable information will be disclosed to persons not mentioned in the section below.

Who May Use or Disclose the Information?
The following persons or organizations are authorized to use and/or disclose your health information in connection with this research study:
- Principal investigator
- Broward Health Workforce
- Broward Health Institutional Review Board
- Office of Human Research Protections Office (OHRP)

When will my authorization expire?
Your authorization for the use and/or disclosure of your personal identifiable information will end on December 31, 2025.

Voluntary Participation in the Study
Your participation in this study is voluntary. Your decision whether or not to allow your child to participate will not affect your current or future relations with the Broward Health. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

Contacts and Questions
If you have any questions, concerns or complaints about this research study, its procedures, risks and benefits you may contact the person in charge of this study at (713) 606-2513, kje13g@my.fsu.edu.

Or
1505 W Tharpe Street, Apartment 433
Tallahassee, FL 32303

If you are not satisfied with how this study is being conducted, or if you have any concerns, complaints, or general questions about the research or your rights as a participant, please contact:

Broward Health Institutional Review Board
Robin Smith, Institutional Review Board Manager
(954) 355-4941
rsmith@BrowardHealth.org

Florida State University Institutional Review Board
Human Subjects Office
2010 Levy Avenue
Tallahassee, FL 32306-2742
Ph: (850) 644-7900

For questions regarding your privacy rights contact the Corporate Compliance Officer/Privacy Officer at the following address:
Broward Health
Mail: 1608 SE 3RD AVE, Suite 502
Fort Lauderdale, FL 33316. Phone: 1.855.209.5295 (Toll-Free), 954.847.4295 (Local)
Email: Privacy@browardhealth.org. Fax: 954.847.4299
Statement of Consent
I have been given a copy of all 6 pages of this form. I have read it or it has been read to me. I understand the information and have had my questions answered. I agree to take part in this study.

Your signature below means that you voluntarily agree to allow your child to participate in this research study. You also authorize the disclosure of protected health information. By agreeing to participate in this study, you do not give up any legal rights.

Print Parent/Legal Guardian Name _______________________________ Date & Time ____________

Parent/Legal Guardian Signature _______________________________ Date & Time ____________

Print Participant Name _______________________________ Date & Time ____________

Participant Signature _______________________________ Date & Time ____________

Signature of Person Obtaining Consent _______________________________ Date & Time ____________

Signature of Principal Investigator _______________________________ Date & Time ____________
APPENDIX E

OPT IN/OPT OUT FORM

COMPLETE OPT IN/OPT OUT FORM

Please complete this form and return this to care provider

The Effects of Music Therapy and its Use of the Harmonica with Pediatric Patients Admitted for Respiratory Problems such as: [Acute] Respiratory Distress, [Acute] Asthma Exacerbation, Acute Chest & Wheezing

OPT-IN

I am interested in learning more about this study. Please contact me using the information provided below.

Check Box/Initial
☐ ___________________ (Subject/Guardian Initials). I give the researcher permission to contact me.

Name: ____________________________

Telephone(s): ____________________________

Best time and day to call: ____________________________

Email: ____________________________ @ ____________________________

OPT-OUT

Please do not contact me again about this study.

Check box/Initial
☐ ___________________ (Subject/Guardian Initials). I do not give the researcher permission to contact me about this study.

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"I" NUMBER: IRB 15-04348

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APPENDIX F

RECRUITMENT FLIER

The study will be conducted at Chris Evert Children's Hospital, Broward Health, while the patient is admitted.

Eligibility to Participate:
- Must be between ages of 4 - 12
- Must have [acute] respiratory distress syndrome, [acute] asthma exacerbation, acute chest, or wheezing.

Please Consider Participating in a Music Therapy Research Study!

Chris Evert Children's Hospital, Broward Health

We are seeking individuals' participation in a research study investigating the effects of music therapy on acute respiratory distress syndrome patients. The results of this study may be used to offer more individual treatments for those who have respiratory issues.

If you have any questions and/or are interested in joining the study, please contact:

Phone: [Redacted]
E-mail: [Redacted]@my.fsu.edu

Approved for Use
DEC 01 2015

Chris Evert Children's Hospital
Broward Health
APPENDIX G

SELF-REPORT PAGE

Pre-Post-Test, Patient Self-Report

1. Does your chest feel tight? What number? Pre: Post: (Use Likert/Images Scale to give patient a visual)
2. How easy or difficult is it for you to breathe? Pre: Post: (Use Likert/Images Scale)

Pre-Initial Session Questionnaire
(to be asked by PI pre-session Day 1)

1. Approximately, how often have you (your child) been admitted to the hospital for a respiratory issue in the past year? _________________________________
2. Approximately, how long is your (their) stay in the hospital typically? ________________
APPENDIX H

EXIT SURVEY

Exit Survey

1. Music therapy was helpful: Yes No

2. I was aware that music therapy was an option to me/my child as part of my hospital treatment. Yes No

3. I would like music therapy offered, when appropriate, to me/my child during other hospital admissions: Yes No

4. The tools given, such as the breathing exercises and harmonica exercises, were beneficial. Yes No

5. I (my child) can use the things learned during this study outside of the hospital. Yes No

6. I noticed improvement in my (child’s) breathing after participating in the study. Yes No
## APPENDIX I

### DATA COLLECTION CHART

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<thead>
<tr>
<th>Day 1</th>
<th>Pre</th>
<th>Post</th>
<th>Averages</th>
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<tbody>
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<td>Averages</td>
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<td></td>
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</tr>
</tbody>
</table>
REFERENCES


Hoffmann, C. P., Charles P Hoffmann, & Benoît G Bardy. (05/01/2015). Experimental brain research: Dynamics of the locomotor-respiratory coupling at different frequencies. Springer. doi:10.1007/s00221-015-4229-5


BIOGRAPHICAL SKETCH

EDUCATION

Master of Music in Music Therapy, April 2016
  Florida State University, Tallahassee, FL

Bachelor of Arts in Music History, May 2013
  Trinity International University, Deerfield, IL

PROFESSIONAL EDUCATION:

  Neurologic Music Therapy Certified (NMT), May 2015
  Board Certification in Music Therapy (MT-BC), November 2015
  NICU MT Certified (NICU-MT), December 2015
  AMTA National Conference, Jacksonville, FL, November 2013

CLINICAL EXPERIENCE

Music Therapy Clinical Graduate Assistant, Adult Medical and Rehabilitation Setting, August 2015 – December 2015, Tallahassee Memorial Healthcare, Tallahassee, FL

  • Assessed patients with various diagnoses, and implemented appropriate music therapy interventions to achieve appropriate goals.
  • Provided end of life care.
  • Led individual session at bedside.
  • Led group sessions for patients and family members.
  • Worked with treatment goals of other therapeutic disciplines.
  • Assisted with mentoring music therapy interns.

Music Therapy Internship, Pediatric Medical Setting, January 2015 – June 2015
  Chris Evert Children’s Hospital, Broward Health, Fort Lauderdale, FL

  • Provided Music Therapy in the NICU with the PAL and use of Neurodevelopmental Stimulation
  • Led individual sessions at the bedside and in playrooms.
  • Led group sessions for toddler to adolescent patients and siblings.
  • Assessed patients with various diagnoses and disabilities, and implemented music therapy interventions to achieve appropriate social/emotional, developmental, and medical goals.
- Applied skills for assessment, documentation, treatment planning, and public speaking/presentations of case studies.
- Further developed a relationship between the Broward IRB and Child Life Department.

**Music Therapy Practicum, Adult Medical Setting**, September 2014-December 2014
*Tallahassee Memorial HealthCare*, Tallahassee, FL
- Led individual sessions at bedside.
- Assessed, implemented treatment plans for goals, and learned medical documentation.

- Led and participated in group sessions.
- Applied skills for assessment, lesson planning, group discussion/counseling, and documentation.

*Resounding Healing Music Therapy Inc.*, Tallahassee, FL
- Improved quality of life and cognitive skills through use of music therapy interventions.
- Learned documentation appropriate to private practice.