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Exploring the Relationship between Therapeutic Voice Work and Duration of Held Tone, Tone Quality, and Volume with School-Aged Children Diagnosed with Asthma

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by

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EXPLORING THE RELATIONSHIP BETWEEN THERAPEUTIC VOICE WORK AND DURATION OF HELD TONE, TONE QUALITY, AND VOLUME WITH SCHOOL-AGE CHILDREN DIAGNOSED WITH ASTHMA

A THESIS

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Abstract

Asthma is one of the most prevalent diseases diagnosed in young children today, and has been the focus of many research studies in the medical field. Despite recent breakthroughs in medical research, children are still suffering from asthma symptoms in their daily routines and lifestyles. Because asthma is directly connected to one's breath and lung function, focus has shifted in recent years to include alternative medicines such as breathing techniques, yoga, and music. This thesis reviews the sparse literature on music and relaxation techniques – most specifically the use of voice and breath – as it relates to asthma, in order to clarify and define their role in treatment and prevention. Once defined, a Music and Asthma Program was designed with a quasi-experimental, naturalistic framework that tracked the duration of held note, quality of voice, and volume of voice over the course of eleven sessions with six school-aged children diagnosed with asthma. Data was collected and analyzed for the mean and standard deviations of each of the three variables being studied in order to investigate trends for the overall group progress. Calculated linear regressions of the mean produced an overall upward trend for tone quality and volume, suggesting that continued exposure to therapeutic vocal interventions would strengthen lung function and capacity. Implications for future research studies were presented via anecdotes from the case material of the Music and Asthma group. The purpose of this thesis therefore was to investigate the relationship between voice and breath-oriented music therapy group interventions and the symptoms of asthma.

Keywords: music therapy, voice, asthma, breathing techniques, respiratory disease

Exploring the Relationship between Therapeutic Voice Work and Duration of Held Tone, Tone Quality, and Volume with School-aged Children Diagnosed with Asthma

Introduction

I had the opportunity to intern at Beth Israel Medical Center from September, 2010 to June, 2011 where my work focused specifically on the treatment and prevention of asthma with the use of music; group interventions included playing recorders and slide whistles, singing favorite songs, or listening and imaging to music. I conducted treatment protocol according to the Asthma Initiative Program (AIP) study that had concluded its two-year research in the spring of 2010. The AIP study, organized in 2004 after an initial protocol trial in the mid-90's, focused on the specific use of "music-assisted relaxation and breathing exercises combined with playing a wind instrument" as treatment for increased lung function and quality of life for children and adolescents diagnosed with asthma (Harris, B., 2009, p. 5). The AIP program offered music therapy groups at four different inner-city schools in New York to students ranging in age from seven to eighteen years old. These students were randomly assigned to a control or music group and received weekly treatment over the course of six months. In order to measure observed behavior and change, researchers took Spirometry readings, provided a daily journal, and reviewed questionnaires that were filled out by parents and students. Although quantitative data is still being collected and analyzed, preliminary findings in qualitative data showed an increase in emotional coping skills and improved breath

capacity and offer some insight into the benefits of music with the school population (Harris, B., 2009).

Having learned more about asthma and all of its symptoms – mild to severe – I was intrigued in how treatment and prevention could be aided through the use of one's breath and voice. According to the research, symptoms of asthma are directly connected to one's breath and voice, and they can often be detected after hearing someone speak and identifying wheezing, coughing, and breathiness (Ellis & Thayer, 2010; Singh, Rao, & V, et al., 2009; Szilagyi & Kemper, 1999). As I led AIP groups each week, I began exploring the different ways that voice and breath could be used; the group sang together, joined in deep breathing exercises, and explored the sounds of recorders and slide whistles. After participating in any one of the above activities, responses from the students initially included "I'm thirsty", "I'm having trouble breathing", "my chest feels tight", and "this reminds me of my last asthma attack…" Discussions unfolded about asthma and how we take care of ourselves, and I soon realized that I needed to learn more about the treatment of asthma in order to better meet the needs of my students in the music and asthma groups.

Although my work with the AIP focused on the use of woodwinds and relaxation, I became more interested in therapeutic vocal work as a tool for treatment and decided to complete my thesis research with these groups in order to investigate a connection between therapeutic vocal interventions and the symptoms of asthma. Using the AIP program design, I created a program that specifically targeted vocal work. In order to better understand the role of one's voice and breath as it related to asthma, I focused my review of the literature on the use of music and breathing techniques on

clients diagnosed with asthma while integrating research on the specific music therapy techniques of vocal improvisation and holding. After reviewing the unfortunately sparse literature, a twelve-week session series was designed for a music group for six school-age children diagnosed with asthma that focused on the use of voice and breath in music. Students were asked to complete a Music Questionnaire at the beginning and again at the end of the twelve-week session series in order to assess their asthma symptoms and interest in music. Measurements were recorded during each session to observe the students' quality and volume of voice, and duration of held tone or breath (See Appendix F and G). Suggestions and clarifications will be discussed using anecdotal material from this session-series on the role of the voice and breath through music in the treatment and prevention of asthma. The purpose of this thesis therefore is to investigate the relationship between voice and breath-oriented music therapy group interventions and the symptoms of asthma as manifested in tone quality, volume, duration of breath, and self-report in school-aged children diagnosed with asthma.

Related Literature

Asthma is a chronic inflammatory disorder of the airways, and can be affected by environmental factors as well as genetic markers and respiratory ailments from early childhood years (Raskin & Azoulay, 2009). This disease has been a growing medical concern in the treatment of child illnesses over the past decade (Shaw, Thompson, & Sharp, 2006), 7.1 million children currently have a diagnosis of asthma according to the Centers for Disease Control (2009), and it is the most widespread medical crisis in children (Schuh, Reisman, Alshehri, et al., 2000). Common treatments focus on reducing respiratory impairment and decreasing the risk for recurrent asthma

attacks (Raskin & Azoulay, 2009), with medical interventions focusing on the use of corticosteroids, inhalers, nebulizers, and heavy doses of medication in order to promote optimal lung function (Singh, Rao, & V, et al., 2009; Szilagyi & Kemper, 1999).

Many studies have been conducted on the use of medical interventions with asthma clients. Schuh (2000) conducted a study on the use of medications such as inhaled and oral corticosteroids in order to understand their strengths and weaknesses. He determined that oral prednisone is more effective than inhaled medication for the treatment of severe asthma and inhalers should be used in conjunction with oral treatment in order for the medicine to be more effective. Many other studies have been conducted on the use of specific medications, each offering significant insight into the role of the medicines being used in the hospital and at home (Ellis & Thayer, 2010; Singh, Rao, & V, et al., 2009; Szilagyi & Kemper, 1999). Even with such medication children continue to show symptoms during their daily routines, often struggling with sports and other physical activities (Anonymous, 2009; Bavbek, Misirligil, 2008).

It is important to note that that although strict focus on medical treatment may offer a new vision into more effective uses of these medications, information may be missing when researchers neglect to look at the whole picture of the disease and child being treated. When observing the chemistry of asthma, two specific questions need to be addressed: What can alternative medicine and/or therapeutic treatment options offer to asthmatic children, and how can they play a role in the treatment and prevention of asthma?

Asthma is known as a chronic inflammatory disease of the respiratory track (Raskin & Azoulay, 2009); its symptoms are intricately connected with one's breath and

lung function. Common treatments and assessments focus on lung function or presented symptoms related to breath and air flow, while other tests focus on the exhalation of breath as a means of determining the level of exhaled breath condensate Ph levels and sputum eosinophils – airway secretions including a specific type of white blood cells (Corradi, Zinelli, & Caffarelli, 2007; Kostikas, Koutsokera, et al, 2008). One study in particular by Habukawa, Nagasaka, Murakami, and Takemura (2009) recognized a pattern in children diagnosed with asthma and discovered how the sound of one's breath could help determine the level of airway restriction. They measured the highest frequency of inspiratory breath sounds and the highest frequency of expiratory breath sounds in one hundred and thirty-one children diagnosed with asthma by recording their sounds and comparing them with spirometry measures. It was determined that any tool focusing on the sound and/or control of one's breath may be a vital option for a non-invasive diagnosis of the disease and ultimately presents the breath as a significant element in the treatment and prevention of asthma. Because of the importance of improved breath and lung function, this literature review will aim to discover significant meaning in the use of alternate treatment options – such as breathing techniques, yoga, relaxation, and music therapy – for asthma that include the controlled use of one's breath.

Breathing Techniques, Yoga, and Relaxation for Asthma

In the mid-1970's and early 1980's, initial research was conducted on the use of relaxation techniques in the treatment and prevention of asthma. Alexander, Miklich, and Hershkoff's (1972) research offered some insight into the ways in which relaxation could be used in order to improve breath flow and open restricted airways in clients diagnosed with asthma. Less than a decade later, Erskine-Milliss,

Psych, and Schonell (1981) presented the differences between the psychological and physiological factors that result in the symptoms of asthma, suggesting the use of muscle relaxation techniques, breathing exercises, and biofeedback-assisted relaxation in conjunction with traditional medical treatment. A relaxed mind and body resulted in a decrease in stress levels and a slowing of the heart rate, allowing the breathing process to become more open and free. The results of these initial studies offer important clinical applications for the treatment of asthma and promote the use of alternative medicine practices in conjunction with the medicine. However, little research exists between 1985 and 1999, suggesting that the use of alternative medicine was likely not wide-spread.

In recent years, researchers interested in alternative medical practice have once again looked into the use of therapeutic treatment such as yoga, breathing techniques, and relaxation. Since 2006 more research has been conducted on the use of breathing techniques such as the Buteyko Breathing Technique or yoga meditation, and it is widely agreed that significant changes are present when one of the above-mentioned therapies is introduced in conjunction with medical treatment (Eley, Gorman, & Gately, 2010; Saxena & Saxena, 2009; Vempati, R., Bijlani, R.L., & Deepak, K.K., 2009). Focusing on one's breath flow in addition to medical interventions allows the clinician to treat the whole person and disease. Instead of stopping the presented medical problem, clinicians are teaching clients how to become aware of their breath flow, strengthen their lung muscles, and identify how to control – and regulate – the use of their breath during an asthma attack. Alternative treatment interventions used to help increase optimal lung function include the use of breathing techniques, yoga, relaxation, and meditation

(Courtney, 2008; Huntley, White, & Ernst, 2002; Saxena & Saxena, 2009; Shaw, Thompson, & Sharp, 2006; Singh, Rao, V, RC, Pai K 2009; Szilagyi & Kemper, 1999; Vempati, R., Bijlani, R.L., & Deepak, K.K., 2009).

In 2009, Saxena and Saxena conducted a study with bronchial asthma patients that focused on the use of Sasankasana, Brahmari, and Omkara, traditional breathing techniques that focus respectively on deep breathing, chanting, and humming. Buteyko, another traditional breathing technique that focuses on limiting the intake of air, holding one's breath, and breathing less often, was another breathing technique researched for the treatment of asthma (Courtney, 2008). Results showed significant improvements in air flow and lung function in those clients receiving training in the aforementioned breathing exercises. The use of ones breath in conjunction with medical treatment was able to improve quality of life and lessen the severity of asthmatic symptoms (Courtney, 2008; Saxena & Saxena, 2009; Shaw, Thompson, & Sharp, 2006).

Yoga has also offered asthmatic clients an outlet for meditation and muscle relaxation through the controlled use of one's breath and body movements. Studies have shown a decline in negative behaviors with significant improvements in physical and mental health (Berger, Silver, & Stein, 2009; Huntley, White, & Ernst, 2002). Other researchers have observed significant changes in breath control and lung function after clients practiced Sahaja or Hatha yoga (Manocha, Marks, Kenchington, et al., 2002; Vempati, R., Bijlani, R.L., & Deepak, K.K., 2009). After tracking client progress as they received the aforementioned yoga techniques researchers found an increase in lung function and health, and clients gained a better understanding of their own breathing process. In the little research that exists, worthwhile results can be found in the addition

of "the mind-body approach of yoga to … conventional care, [resulting] in measurable improvement in subjective as well as objective outcomes in bronchial asthma" (Vempati, R., Bijlani, R.L., & Deepak, K.K., 2009). These findings provide a foundation for further research and offer possible treatment interventions that may be used with asthmatic clients.

Music Therapy for Asthma

In addition to yoga meditation, breathing techniques, and relaxation, researchers interested in alternative medical interventions have looked into the use of music with asthmatic clients. Dating back to the mid-1700's, apothecaries in London began writing about the medicinal effects of music, singing, and dancing on the human body (Browne, 1729). When discussing lung disorders, Browne (1729) believed that singing could have a negative effect on the person being treated because, "if the pressure of the air [should] be increased beyond what is natural, it is possible that the fatal catastrophe of blood-spitting may be the consequence (p. 56)". However because Asthma patients suffered from obstructed bronchial passages, Browne (1729) suggested that singing would be beneficial in treatment; vocal exercises such as singing intervals and scales help to exercise the lungs in order to prevent or delay another asthma attack. Music as medicine has been investigated throughout history as a concurrent treatment option for patients with medical ailments. Very little data actually exists on the use of music as medicine during the 1800s and early 1900s; focus on music as medicine did not shift back into view until the 1970's, with research entering the forefront of the medical and psychological field only in recent years.

Over the past few years, significant changes have been reported when music was added in conjunction with medical treatment (Eley, Gorman, & Gately, 2010). Music therapists are now employed in medical settings in order to treat clients with respiratory ailments and work in conjunction with the medical team in order to meet the needs of each client being treated. However the literature base is small with few references on the use of music and most specifically on the use of the sung, chanted, and spoken voice. The research base does focus on the use of breath in order to optimize lung function and open restricted airways. As discussed earlier, yoga has been proven to increase quality of lung function in asthmatic clients. Montello (2009) based her practice on the breathing techniques and holistic quality of yoga, and introduced musical elements such as rhythmic singing to her treatment protocol. This investigation found that the combination of sound through vocal toning and the breathing techniques of yoga offered clients an outlet to achieve more control and awareness of breath and lung function (Montello, 2009). By focusing on deep breathing either through singing or through breathing relaxation exercises, LaPine (2008) found that one can deepen his or her breath and increase lung capacity and lung function.

In order to effectively treat asthma using music therapy, Raskin and Azoulay (2009) point out the need for music therapists to work with the medical team in order to connect musical interventions with the goals for asthma control as stated by the National Heart, Lung, and Blood Institute in 2007. These goals focus on reducing lung impairment, preventing recurrent hospitalizations, maintaining normal activity levels and "near normal" pulmonary function, reducing use of inhaled corticosteroids, preventing progressive loss of lung function, and meeting patient and family needs and expectations.

Connecting these broad-level goals to the goals and treatment interventions in music therapy is relatively new and – according to Raskin and Azoulay (2009) – "shows potential (p. 77)". In order to better understand the psychological and physiological effects that asthma may have on a person it is important to discover how the use of one's voice – whether spoken, sung, or chanted – can either help treat or cause more severe asthma symptoms. This next section will offer insight into the voice's many uses in the treatment of respiratory ailments – including asthma – and will serve as a foundation for the structure and chemistry of the case study being conducted.

The use of breath with musical instruments.

The use of breath through music as a therapeutic intervention for children with asthma has only recently been researched as a viable treatment option. Eley, Gorman, and Gately (2008; 2010) suggest the use of woodwinds and singing as a way to improve respiratory health. Their research has shown significant improvements in lung function after asthmatic clients participated in music interventions focusing on breath and voice. In other studies focusing on respiratory health, Tamplin (2009) and Noppen, Verbanck, Harvey, et al. (2004) present case material on the use of music in the prevention or reduction of respiratory symptoms. Their work shows clients becoming more in tune with their breath rate by playing musical instruments and strengthening their lung muscles.

Griggs-Drane (1999) observed that "asthma, cystic fibrosis, and chronic obstructive pulmonary disease are three pulmonary diseases that differ in etiology, yet are quite similar in treatment protocol (p. 66)"; treatment goals focus on optimal lung function, symptom control, and a restoration of normalcy in the clients' life. Her findings

show how music therapy interventions utilizing wind instruments offer clients the ability to achieve and maintain deep, controlled breathing and promote respiratory endurance through the expiratory resistance of blowing air through a more restricted and refined channel (Griggs-Drane, 1999). More specifically, results showed that instrumental play focusing on one's use of the breath increased vital capacity, lung capacity, expiratory pressure, and positive mental health (Bouhuys, 1964; Griggs-Drane, 1999). According to the results from multiple studies, music-making connected to one's breath is beneficial for the treatment and prevention of asthmatic symptoms.

Another study completed by Loewy, Azoulay, Harris, and Rondina (2009), further investigated the use of wind instruments as a tool to help improve quality of live in people diagnosed with asthma. Wind playing has the potential to "integrate physiological, mental and emotional domains across a multitude of clinical populations (Loewy, Azoulay, Harris, & Rondina, 2009, p. 87)"; it can enhance relaxation, provide opportunities for visualization, and elicit active music making for expression, stress release, and breath enhancement. Their research showed how the controlled use of one's breath allowed clients to increase lung function and awareness to their breath flow. Wind playing not only supports optimal breathing, but also provides a deeper understanding of the breathing process to all those who play (Loewy, Azoulay, Harris, & Rondina, 2009).

Two additional studies completed by Raskin and Azoulay (2009), and Harris and Rondina (2009) discuss the Asthma Initiative Program at the Louis Armstrong Center for Music and Medicine at Beth Israel Medical Center in New York City. This program focused on the effects of music therapy – most specifically on the use of wind playing – on lung functioning and quality of life for children and teens with asthma. Results

showed that wind playing served as a muscular training activity that enhanced lung function and capacity, strengthening the findings of Grigg-Drane's 1999 research that had discussed the use of inspiratory muscle training devices to promote optimal lung function and health (Raskin & Azoulay, 2009). Research focusing on muscle strength and endurance shows that clients are able to breathe deeper and understand their physical reactions when a respiratory attack occurs. Through these treatment protocols, and with traditional medical interventions, clients are better equipped to help themselves regulate their breathing when respiratory trouble occurs.

Harris and Rondina (2009) focused on the Asthma Initiative Program in more intrinsic detail, further noting that breathing techniques, progressive muscle relaxation, music-assisted relaxation, and playing the recorder all helped participants "gain more control over their physical and emotional health." As mentioned earlier data is still under collection and review for this study, however preliminary findings show overall improvement in participants attending inner city schools in New York. Implications from this study suggest that more research is needed in order to help treat and prevent the symptoms of asthma.

The use of the breath with voice.

The voice is the body's personal musical instrument; the heart beat offers a rhythmic foundation, the breath serves as a tempo, the blood flows in rhythm, and the voice adds tone and melody. Our body as an instrument may therefore serve as a therapeutic and healing outlet for asthmatic clients. Lisa Sokolov (2009) discusses how the breath, tone, and body all serve each other in an intrinsic web; "breath illuminates and activates that with which it comes into contact… and tone vibrates matter… [that you can

feel in your head or in your belly]… the nature of tone both reveals and affects the state of the body from which it comes" (p. 44-45). Her program, Embodied VoiceWork, focuses on the use of breath, tone, touch, imagery, and improvisation as tools to guide her clients to open up to the nature of themselves. Through exploration, awareness, release, balance of strength and openness, and integration, Lisa Sokolov (2009) helped guide her clients through the process of "what it is to be embodied, breathing, feeling, [and] knowing human being (Sokolov, 2009, p. 53)". The work suggests how clients struggling from respiratory ailments can integrate their mind and body in order to become more in tune with their breath flow and lung function. Asthma is one disease directly linked to breath and voice, and its symptoms may be treated through the tools of Embodied Voicework that help engage their use.

Because the voice is deeply rooted within the body, its use – whether sung, spoken, or chanted – can have both physiological and psychological effects on a person. Austin (2001; 2008) notes that singing facilitates deep breathing; "in order to sustain tones one has to take in more air, thus expanding the belly and diaphragm, and [fully releasing] the breath in order to continue the process (p. 24)". This form of deep breathing relaxes the body and offers clients with respiratory ailments an outlet to regulate and control their breath flow. Other studies conducted by Wan, Ruber, Hohmann, and Schlaug (2010) and Wiens, Reimer, and Guyn (1999) observed that singing involves strong and fast inhalations followed by extended and regulated exhalations, requiring higher vocal intensity and vocal control. These findings have led researchers to believe that the act of singing enhances lung function and increases lung capacity and muscle strength.

One randomized, controlled trial conducted by Tamplin (2011) offers insight into the use of vocal interventions with patients suffering from respiratory dysfunction. Her work, focusing primarily on quadriplegia and the symptoms of spinal chord injuries, suggests that therapeutic singing may improve respiratory strength and lung capacity for persons diagnosed with any disease affecting the respiratory system. Vocal production is created within the roots of the respiratory system because "it provides the driving air pressures required to initiate and maintain vocal fold function (Tamplin, 2011, p. 148)". The act of singing may then be described as exercising the respiratory system and offering an outlet for patients to become more aware of their use of their breath in order to support vocal production. Tamplin's (2011) work with patients diagnosed with spinal chord injuries follows a specific routine: vocal warm-up, vocal preparation, song-based singing, and vocal improvisation. Vocal warm-ups and preparation exercises help to stretch activated respiratory muscles in order to attain the "appropriate body alignment for the breathing and singing (Tamplin, 2001, p.152)". The additional incorporation of familiar songs offers an outlet for increased breath support and control and may help increase lung function and capacity in patients diagnosed with respiratory diseases. Her twelve-week session-series taught patients how to control and support their airflow in order to produce full, clear vocal sounds. At its conclusion, Tamplin (2011) discovered an increase in lung function and capacity in all participating patients, and thus strengthened the importance of therapeutic voicework in the treatment of respiratory ailments.

It can therefore be implied that singing has the potential to allow asthmatic clients to focus on their breath in a playful way that offers an ability to strengthen and/or relax

their breathing muscles. In addition to breath flow and lung function, research suggests that singing allows the body to become the instrument; vibrations are felt throughout the body and "massage our insides" or rather, release any blockages of energy in order to allow "a natural flow of vitality and a state of equilibrium to return to the body (Austin, 2001, p. 117)". Singing is rooted within the breath flow of our bodies and may prove to be a vital treatment option for asthmatic children because of its simple and creative way of engaging the lung muscles.

Not only is vocal production through song rooted within the respiratory system, but it is also tied to everyday life: babies produce sounds that mimic melodies, mothers sing to their infants, and children grow up learning and singing their favorite tunes (Chong, 2010; Wan, Ruber, Hohmann, & Schlaug, 2010). Singing then becomes a universal form of musical expression that can be as natural as speaking, and may offer asthmatic clients an additional outlet for therapeutic healing and optimal lung function. All potential clients have a voice and have had some experience with singing during their lifetime. A person may not know how to play a piano, guitar, or violin, but that person does know how to use his or her voice, even if only in spoken conversation. Because of its personal relationship with each individual, the use of one's voice offers a deeper understanding of one's breath flow. The tools needed to sing exist within each person and are available for exploration through the many vocal interventions present in music therapy treatment.

According to the literature, researchers show a connection between the playing of woodwinds and lung strength in persons diagnosed with asthma (Griggs-Drane, 1999; Raskin, J. & Azoulay, 2009; Harris & Rondina, 2009; Loewy, Azoulay, Harris, &

Rondina, 2009). Playing woodwinds requires a person to use his or her breath in a controlled way in order to produce sound through an instrument. Singing, as suggested by additional researchers, also requires a person to control his or her breath in order to produce a sung tone (Austin, 2001; LaPine, 2008; Tamplin, 2011). By learning how to identify breath control and support through woodwind playing – or singing as it pertains to this thesis – a person diagnosed with asthma may become more aware of his or her breath before, during, and after an asthma attack, and may additionally be able to identify tools that can help him or her recover from that asthma attack. Tamplin (2011) further defines therapeutic voicework as an outlet for patients to strengthen respiratory muscles and gain control over the amount of airflow that is breathed into and out of the lungs. It can therefore be hypothesized that vocal interventions in music therapy can help a person diagnosed with asthma increase his or her lung capacity and function.

Statement of Purpose

The purpose of this thesis is to investigate the relationship between voice and breath-oriented music therapy group interventions and the symptoms of asthma as manifested in duration of held tone, tone quality, volume, and self-report in school-aged children diagnosed with asthma. Research questions being addressed in this thesis are:

1) Is there a relationship between lung function and duration of held breath?
2) Is there a relationship between lung function and tone quality of sung voice?
3) Is there a relationship between lung function and volume of sung voice?
4) Will there be a difference in the way students report their asthma symptoms before and after the session-series?

Method

The design of this research study was based on a quasi-experimental, naturalistic, quantitative/qualitative, multiple case framework within the context of the specific clinical group being studied. The overall structure of the group was to flow similar to that of a clinical group even though data was being collected on duration of held breath, tone quality, and volume of sung voice. The Music and Asthma program for the purposes of this thesis was designed to help treat and/or prevent the symptoms of asthma while also addressing the needs of each client in the moment. Music interventions were introduced to a group of six school-aged children based on student preferences and common vocal interventions in music therapy treatment. All sessions focused on therapeutic voicework and tracked student's vocal path as it pertained to their breath support, lung capacity, and lung function. The therapist separately rated each student's vocal score on the Measurement Tool Document (See Appendix F) after each session. Video files were then watched after the session-series was complete in order to validate the initial scores that were given.

Within the reviewed literature, no specific measurement tool had been established that showed how the use of voice and breath in music relates to improved lung function and health. Because of the researcher's interest in using music to measure duration of held note, tone quality, and volume as it relates to lung function, she created a new measurement tool based on personal experience with vocal studies and the results from the research discussed above on therapeutic vocal interventions with persons diagnosed with respiratory ailments. The advantage of using singing as a metric is due to its existence in every day life. Singing manifests in many forms, and its use is identical to speech: a baby cooing, a mother singing lullabies, people speaking on rhythm, people

singing in the shower or along with the radio, people performing in musical theater or opera, and the natural melody of a spoken conversation all represent different forms of singing. In fact, the three variables being studied in this thesis – duration of held note, tone quality, and volume – could be measured by analyzing someone's spoken conversations in addition to that of their singing voices. This thesis aimed to devise a scale based on the function of speech. Many researchers have written about the use of breathing exercises and playing woodwinds with asthmatic clients, and yet none have scrutinized the aspect of speaking and singing even when the symptoms of asthma can be heard via vocal production. The pilot study designed for this thesis was an initial attempt to investigate that connection by using music as a mathematical tool for measurement. Please refer to the Data Collection section for more detailed descriptions of each measurement.

Participants

Six participants were selected at random to participate in the research protocol. All students were female of Hispanic, Chinese, and African-American descent, and ranged in age from eight to eleven. Having only female participants was not initially part of the design, however the first six consent forms that were received were from the parents of female students only. According to the enrollment procedure, the researcher was unable to accept additional students after the first six forms had been received. All students selected to take part in this Music and Asthma program were enrolled at PS-142 in Manhattan, NY. This school has had a long-standing relationship with Beth Israel Medical Center – where the researcher completed her internship year – and has been a part of past studies in the use of music and relaxation in the treatment and prevention of

asthma. Because the researcher interned at Beth Israel during the time of this study, permission was granted to use one of their student lists for the purposes of the research group. None of the students selected for this study had been part of a music and asthma group, and all were eligible for the spring semester asthma groups according to the enrollment forms received from their parents. The students chosen for this particular study were randomly selected from the list of students provided by Beth Israel. If a participant declined, another student was selected from the list at random until six students were enrolled in the study. All students were in the third, fourth, or fifth grade and had a diagnosis of asthma.

Materials

In order to track student progress during the session-series, an iFlip camera was used to record all sessions. The *Measurement Tools* document and the *Music and Asthma Questionnaire* were used in order to assess asthma symptoms, musical preferences, and personal reactions to the music group (See Appendix E & Appendix F). Musical instruments included piano, guitar, slide-whistles, and drums, all of which were used in order to support the groups' singing and or breathing exercises.

Procedure

The selected group met once a week attending forty-five-minute music sessions focusing on voice and breath work. These groups were to consist of twelve weekly sessions, however it should be noted that only eleven sessions were held during the session series. At the point that all permission slips were received from parents and the group was formed, the researcher had thirteen weeks left in the semester; two of those

weeks being New York State testing days during which groups were not able to run. This session series was offered to the students during the school day in conjunction with their primary studies once permission was received by their parents, and the researcher ran all Music and Asthma groups in the following order:

1. Start video-recording
2. Engage students in hello ritual
3. Introduce vocal warm-up
4. Participate in student-selected music activity/song
5. Engage students in goodbye ritual
6. End recording
7. Record student progress on individual *Measurement Tools* document

Clinical Interventions

At the first session, all students were asked to fill out a questionnaire. The therapist also conducted a warm-up experience for the students to become more comfortable in the music space. This warm-up focused on the use of the voice by inviting each student to "make a silly sound" and introduce one another to their peers, the music space, and the therapist. A discussion unfolded at the end of most sessions in order to assess how the students felt and what reactions they may have had to the music experiences, both positive and negative. All responses both on the questionnaire and in group discussions helped target selected musical choices during the twelve-week session series. Music interventions focused most specifically on singing and breathing exercises,

and encouraged students to play with their voices while challenging themselves with holding their breath or singing long notes.

The next ten sessions focused on the music, most specifically on the use of breath and voice. The following interventions were primarily used throughout the treatment process:

1. "Silly sounds" – vocal improvisation focusing on the exploration of the voice and breath
2. Drumming and Chanting – drum circle call-and-response intervention focusing on the use of voice and breath in conjunction with physical activity
3. Music guided progressive muscle relaxation – vocal holding technique focusing on one's breath placement within the body
4. Singing – vocal techniques focusing on the use of the voice in conjunction with the breath; students will select 4 songs from a list of 10 that they would like to learn and sing as a group during the semester. The therapist will select songs according to the specific age of the group, and will focus on familiar and simple melodic passages.
5. Vocal improvisation – structured improvisation that focuses on the use of voice and breath in conjunction with peer interaction and relatedness

Each session was videotaped in order to receive more accurate results on the measurements being collected. After each session, the researcher reviewed the video recordings in order to rate the three variables being studied for each student: duration, quality of voice, and volume.

The final session was used in order to provide closure to the music group. One final music experience took place, signifying the end of their experience as a music group. This activity was the culmination of the group band with the students performing their selected song of choice, singing, dancing, and celebrating their time in the music group. The students were also asked to once again answer the *Music and Asthma Questionnaire*. The familiar goodbye ritual took place in order for everyone to say their goodbyes to their peers, the therapist, and the music space. Once the entire session series was complete collected data was analyzed for trends over the course of the session series.

Data Collection

In order to assess lung function, the researcher tracked all students throughout each of the eleven sessions by measuring the duration of sung pitch, quality of sung voice, and volume of sung voice. The duration of held note was measured in relation to the first research question, "Is there a relationship between lung function and duration of held note?" and helped the researcher to determine current lung capacity and the student's ability to maintain a sung, held note. Duration of held note was measured with a metronome set to 60 beats per minute (bpm). The reason 60 bpm was chosen was because of its clear, moderate tempo. Research has shown that 60 bpm activates the brain and helps promote relaxation, however the researcher chose 60 bpm from her own experience as a singer as well as to ensure that there was some element of consistency for the targeted measurement.

Quality of sung voice was measured in response to the second research question, "Is there a relationship between lung function and tone quality?" The lichert scale for tone quality was developed in order to measure the integrity of the voice based upon

consistency of breath pressure. This scale at its lowest point reflects weak and breathy voices and at its highest reflects clear, full tones. A weak, breathy voice suggests that the student is not able to use her breath support properly or consistently in order to produce a clear, full tone. Volume of sung voice was measured in relation to the third research question, "Is there a relationship between lung function and volume of sung voice?" The lichert scale for volume was designed to measure loudness of voice based upon strength of breath pressure. At its lowest point the voice is soft and too difficult to hear and at its highest the voice is appropriately loud and controlled. If a students' voice is difficult to hear, she may not be able to support her sound comfortably, or may be unaware of her breath as it connects to her voice. The fourth research question, "Will there be a difference in the way students report their asthma symptoms before and after the session-series?" was addressed with a descriptive comparison of pre and post-session series *Music and Asthma Questionnaire* responses for each student. The overall process in measuring duration, quality, and volume of voice as well as each student's self-report on the *Music and Asthma Questionnaire* was intended to help students become more aware of the use of their breath to support vocal sounds, and to identify tools that can be used to help regulate and/or control their breathing during an asthma attack.

Data Analysis

A linear regression of the group mean for duration of held note, tone quality, and volume was computed for each session in order to view the group progress over the session-series. This analysis will indicate the magnitude of changes at the group level

and investigate if there is clinical value in therapeutic vocal interventions for the treatment and prevention of asthma in school-aged children. Student responses on the *Music and Asthma Questionnaire* were descriptively compared for changes pre versus post-session series, and a general summary of the differences for each student was provided.

Ethical Considerations

All children participating in the Music and Asthma groups have a diagnosis of asthma so the researcher was in contact with the nurse in case a medical emergency arose. Because all musical interventions used in the study focus on the role of voice and breath, it was important for the researcher to be cognizant of the fact that an asthma attack could be triggered by any music played or sung during the group. No other foreseeable risks other than ordinary life occurrences were foreseen for this study. Although students were enrolled from a list provided by Beth Israel Medical Center, it is important to note that there was no conflict of interest for this research study because of the existing relationship with Beth Israel. This study did not put anyone in jeopardy or use coercion for participation.

In order to protect anonymity, all students enrolled in the study were identified by a pseudonym. Information from the questionnaire was used to help determine student interest in music and help formulate song choices and music activities used during each session. Video files were stored securely in a locked filing cabinet that only the primary investigator had access too, and were used solely to help the researcher obtain more accurate descriptions for the three variables being studied; quality of voice, duration, and volume. Strict confidentiality was kept for all participants; no distinguishing information

such as biographical facts or uniquely identifiable diagnoses was used in the reporting of these sessions in order to protect child rights.

Results

The following chart represents the data collected from each student and the use/quality of their voice during the music and asthma groups. When reviewing the chart it is important to note that "beats" refers to the amount of beats each student was able to sing a note as measured by a metronome set to sixty beats per minute.

Progress Chart 1

Student	Measurement	Jane	Rachel	Mary	Nadine	Beth	Sandra
Session 1: 3/2/2011	Duration	12 beats	8beats	6beats	8 beats	N/A	N/A
	Tone Quality	2	3	2	2		
	Volume	1	2	1	2		
Session 2: 3/9/2011	Duration	N/A	Absent	Absent	Absent	Absent	Absent
	Tone Quality	2					
	Volume	2					
Session 3: 3/16/2011	Duration	8beats	8beats	Absent	12 beats	Absent	10 beats
	Tone Quality	2	2		2		3
	Volume	2	3		3		3
Session 4: 3/23/2011	Duration	6beats	8beats	4beats	10 beats	8beats	8beats
	Tone Quality	3	3	2	3	3	3
	Volume	2	3	2	3	4	4
Session 5: 3/30/2011	Duration	8beats	8beats	8beats	8beats	8beats	8beats
	Tone Quality	4	3	4	3	4	4
	Volume	3	3	3	3	3	3
Session 6: 4/6/2011	Duration	8beats	8beats	8beats	Absent	12beats	15beats
	Tone Quality	3	3	4		4	4
	Volume	3	3	3		4	4
Session 7: 4/13/2011	Duration	8beats	8beats	4beats	N/A	N/A	8beats
	Tone Quality	3	3	3	2	3	3
	Volume	3	3	3	2	4	4
Session 8: 4/27/2011	Duration	8beats	8beats	4beats	N/A	12 beats	8beats
	Tone Quality	3	3	4	1	4	3
	Volume	2	3	4	1	4	3
Session 9: 5/18/2011	Duration	Absent	4beats	4beats	N/A	Absent	8beats
	Tone Quality		2	2	2		4
	Volume		2	2	2		4

Student	Measurement	Jane	Rachel	Mary	Nadine	Beth	Sandra
Session 10: 5/25/2011	Duration	8beats	8beats	8beats	8beats	Absent	Absent
	Tone Quality	3	3	3	3		
	Volume	3	3	3	3		
Session 11: 6/1/2011	Duration	8beats	8beats	8beats	8beats	8beats	8beats
	Tone Quality	4	4	4	4	5	5
	Volume	4	4	3	4	4	4

Each student's vocal path is documented in the following sections according to the three variables tested: duration, tone quality, and volume.

Duration

The following graphs represent each student's vocal path across the eleven music and asthma group sessions, according to the length of time that they were able to hold a sung note as measured by a metronome set to 60 beats per minute.

Figure 2 Duration 1

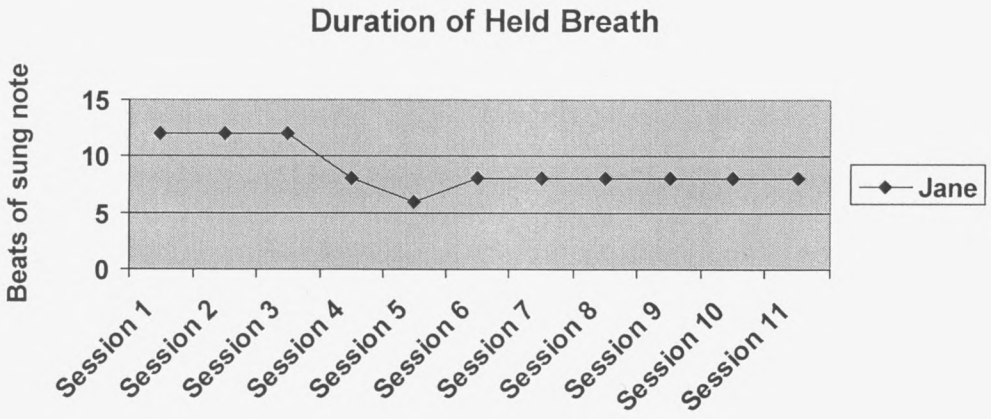


Figure 3 Duration 2

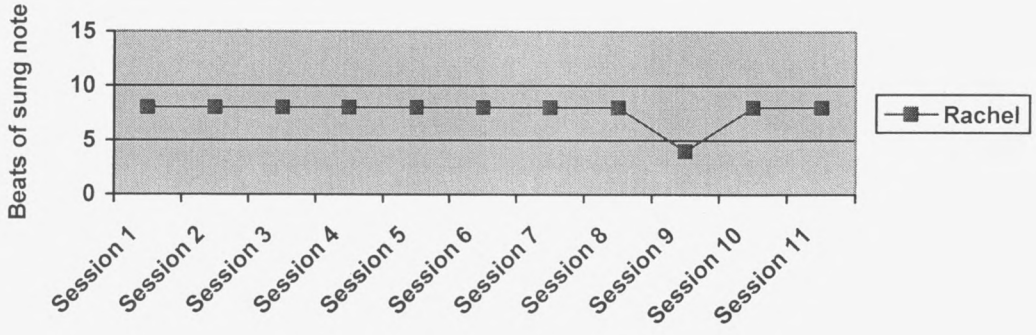


Figure 4 Duration 3

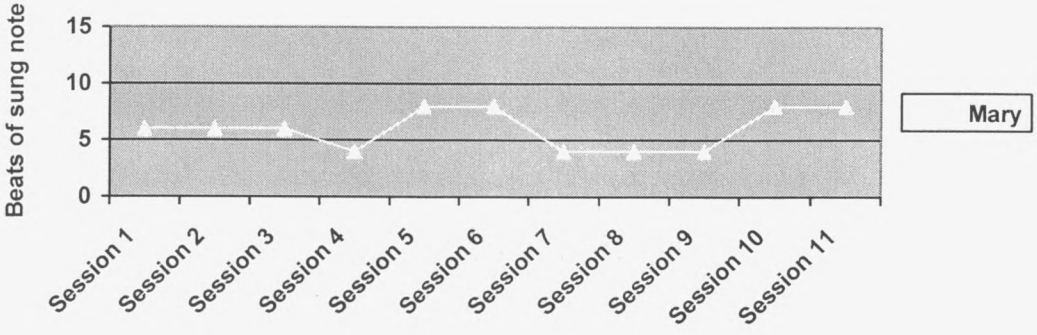


Figure 5 Duration 4

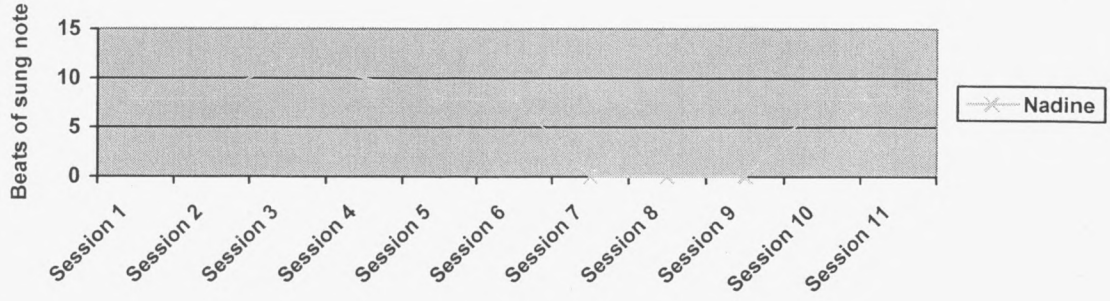


Figure 6 Duration 5

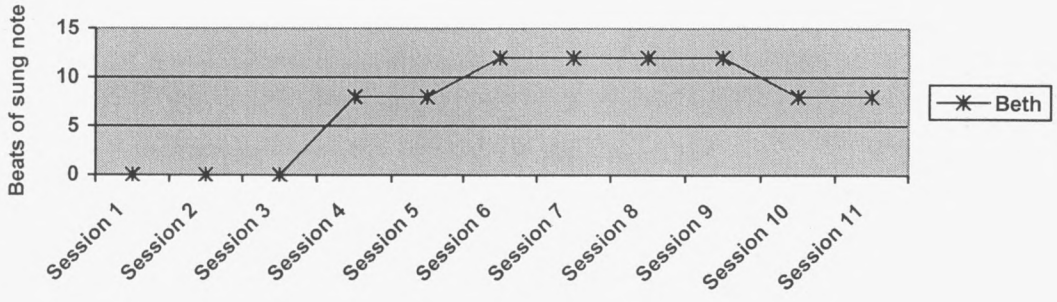


Figure 7 Duration 6

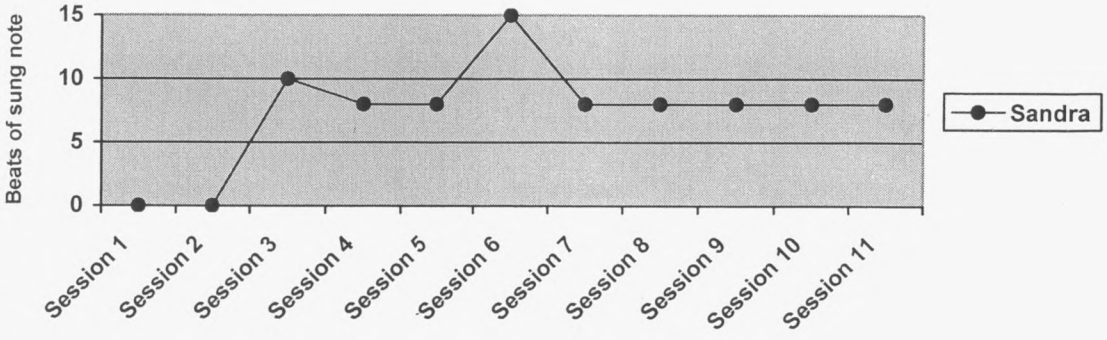


Figure 8 Mean Duration

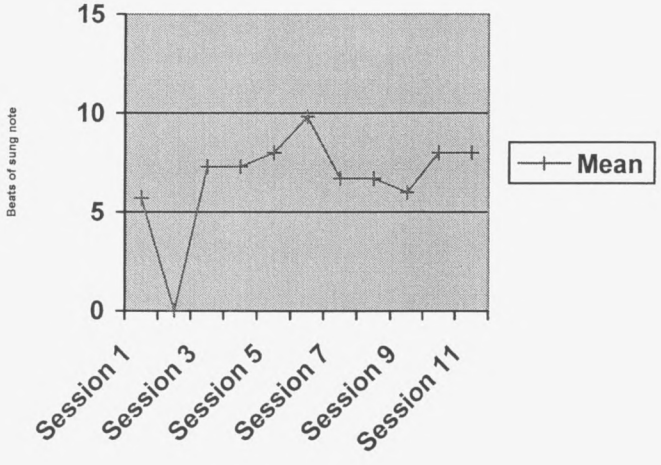
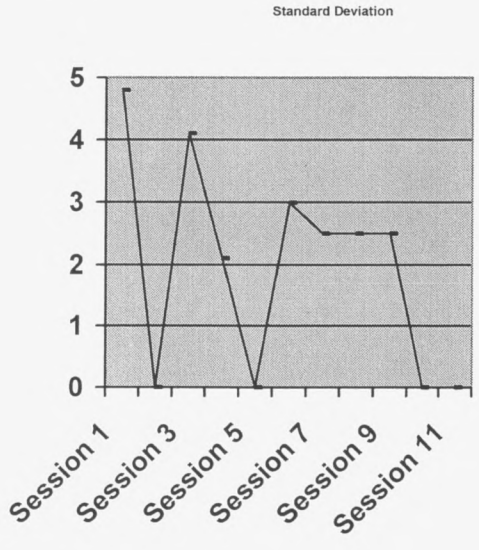


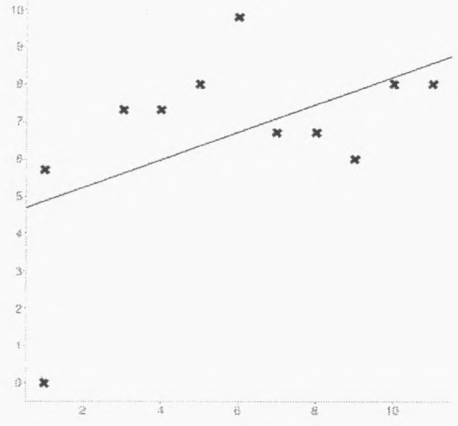
Figure 9 Duration Standard Deviation



In order to determine if meaningful changes were observed over the course of eleven sessions, a linear regression was performed on the mean score for all students. The regression coefficient of r= 0.187166 is relatively low and shows a small trend in an upward direction. According to the standard deviation graph, data points were spread out over a large range of values suggesting that the group's vocal duration was not consistent

over the course of treatment. Their results produced scattered plots, as found below on the regression line of the mean, however slight progression was seen.

Figure 10 Duration Regression Line



The sample size of 11 sessions had an overall slope (b) of .06819 which was relatively flat. When computing a score for a future session, for example session 18, the group mean for duration of held tone would be 11.1, suggesting a gradual increase in breath control, support, and muscle strength with continued exposure to therapeutic vocal interventions.

Tone Quality

The following graphs represent each student's vocal path across the eleven sessions that the asthma groups were held according to the quality of their sung vocal tone.

Figure 11 Tone Quality 1

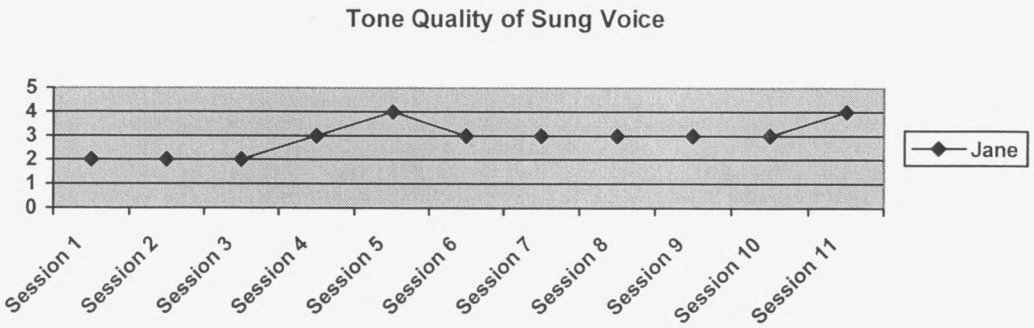


Figure 12 Tone Quality 2

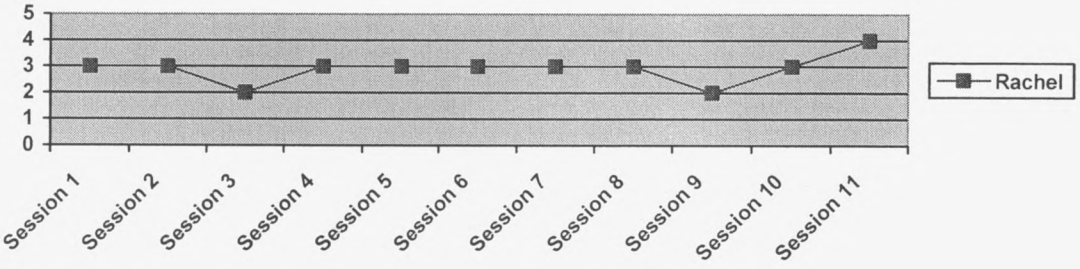


Figure 13 Tone Quality 3

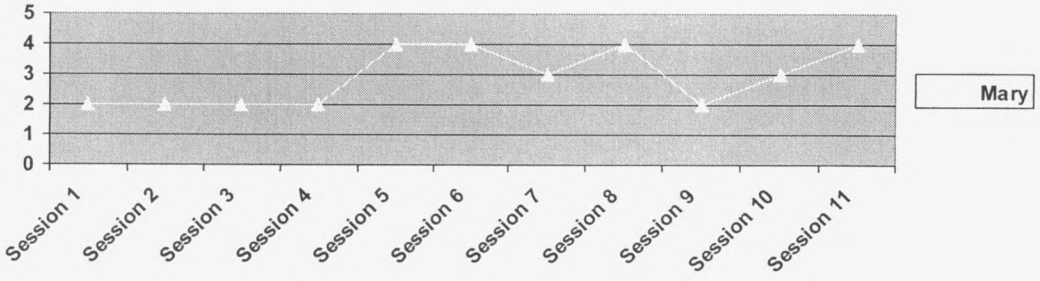


Figure 14 Tone Quality 4

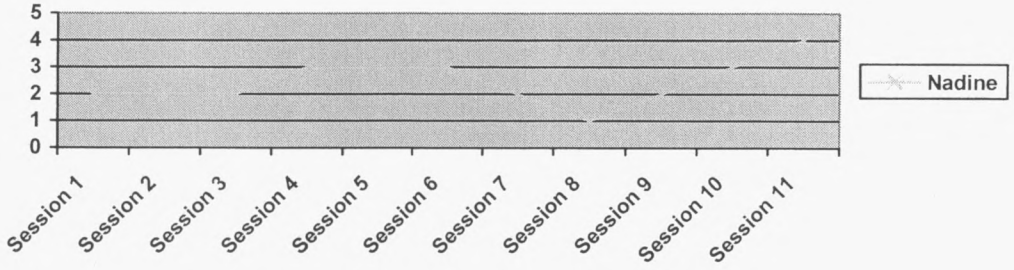


Figure 15 Tone Quality 5

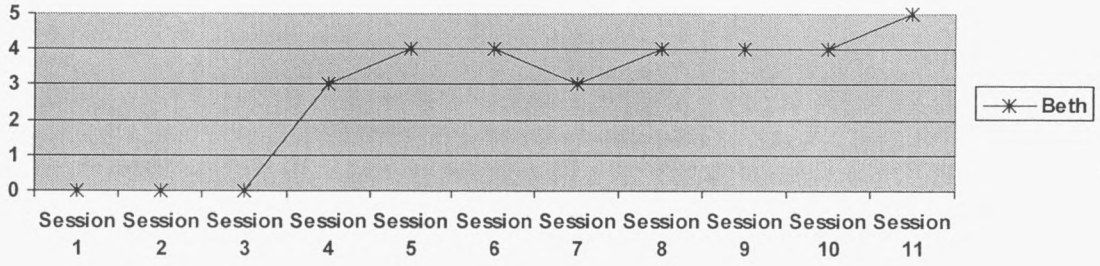


Figure 16 Tone Quality 6

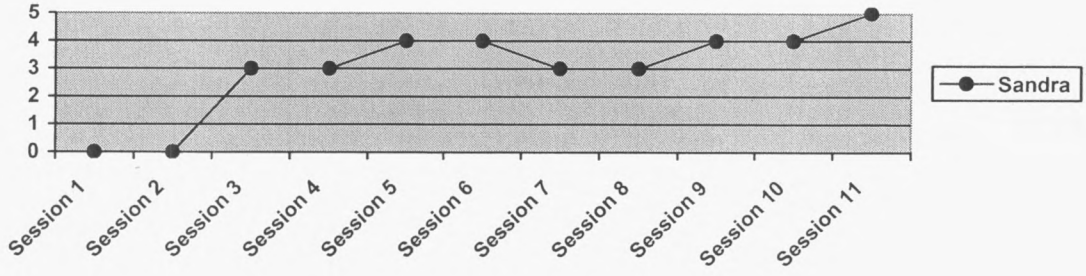


Figure 17 Mean Tone Quality

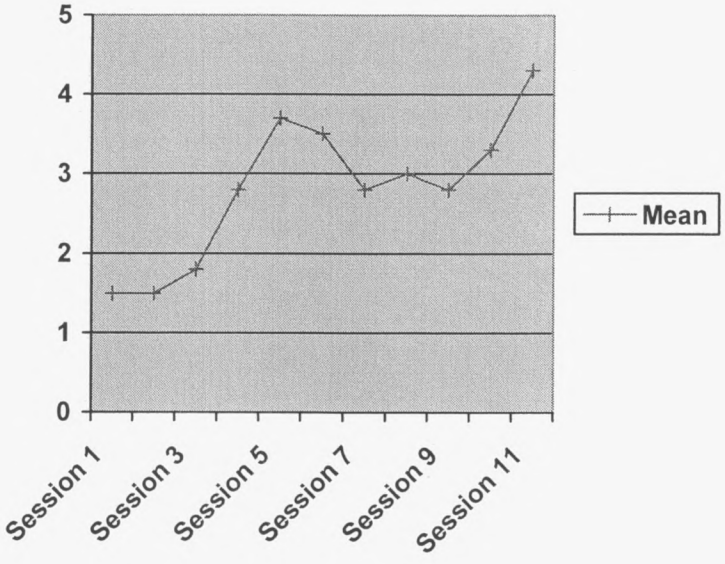
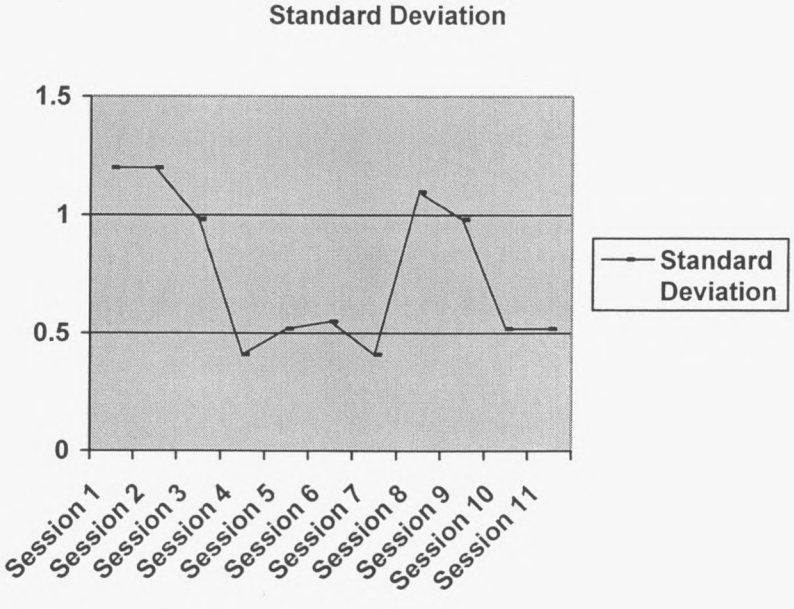


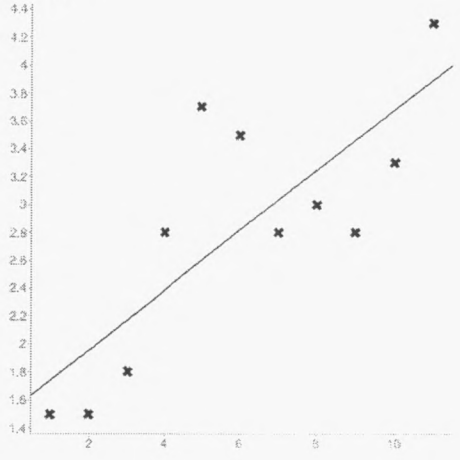
Figure 18 Tone Quality Standard Deviation



In order to determine if meaningful changes were observed over the course of eleven sessions, a linear regression was performed on the mean score for all students. The regression coefficient of r= 0.788337 shows a large upward trend between the variable of tone quality and overall vocal improvement and lung strength. Standard

deviation points show relatively close data points to the mean, suggesting consistent ratings in tone quality throughout the session-series. According to the regression line – found below – progression occurred in a relatively linear fashion, showing that the session-series addressed the targeted variable in a progressive and clinically meaningful approach for the group being studied.

Figure 19 Tone Quality Regression Line



The sample size of 11 sessions had an overall slope (b) of 0.21545. When computing results for a future session, for example session 18, the group mean for tone quality was rated at a 5.4, suggesting that a gradual increase in tone quality will occur with continued exposure to vocal interventions. This improvement in tone quality reflects a gradual strengthening of the lung muscles as well as an increase in lung functioning in order to support full, clear vocal tones.

Volume

The following graphs represent each student's vocal path across the eleven sessions that the asthma groups were held according to the volume of their sung vocal tone.

Figure 20 Volume 1

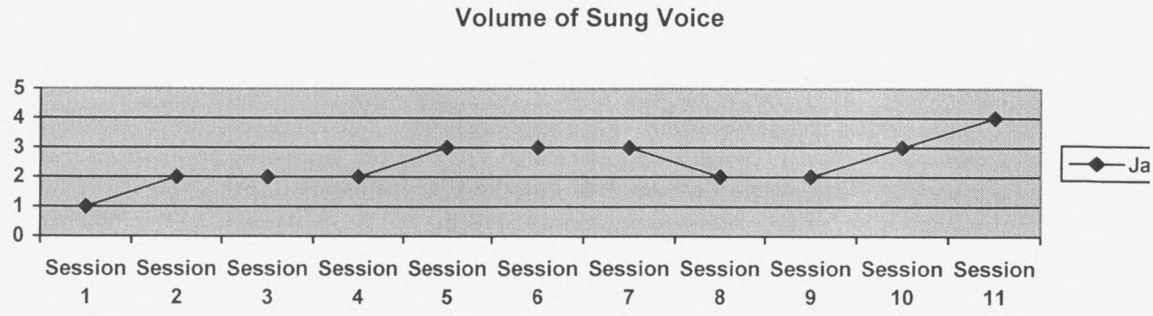


Figure 21 Volume 2

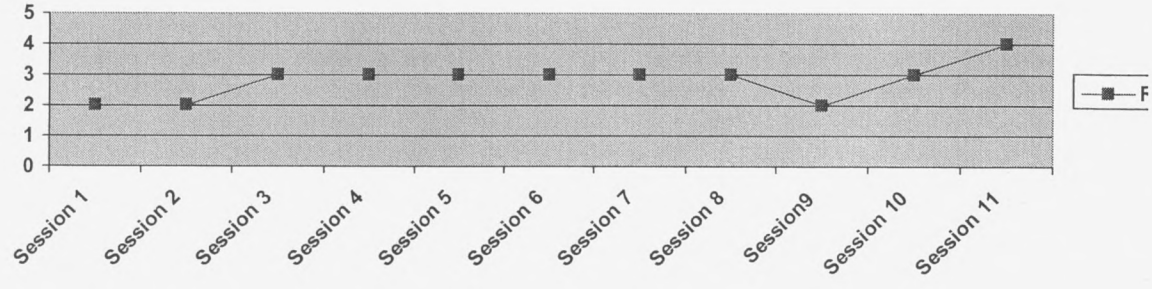


Figure 22 Volume 3

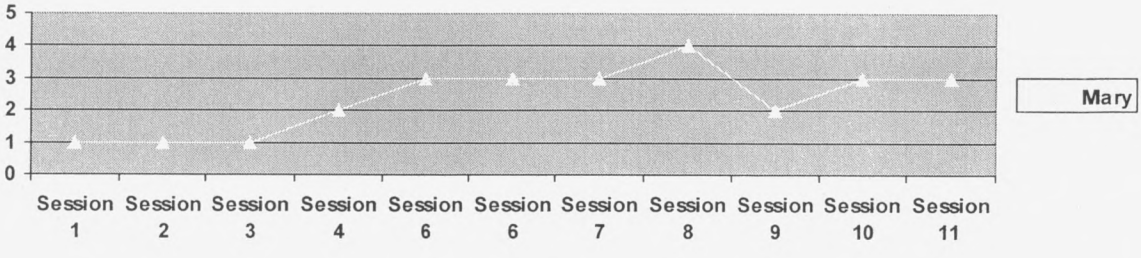


Figure 23 Volume 4

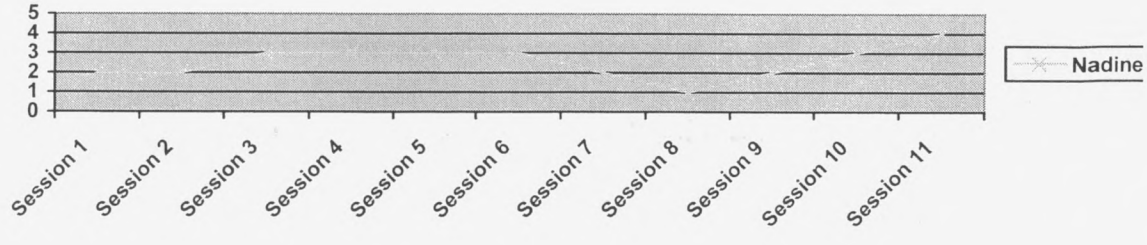


Figure 24 Volume 5

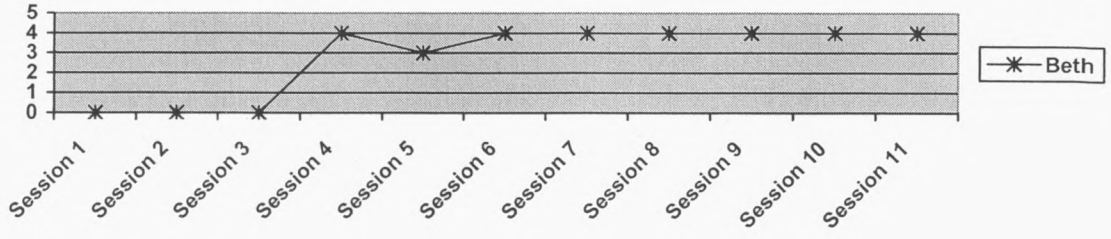


Figure 25 Volume 6

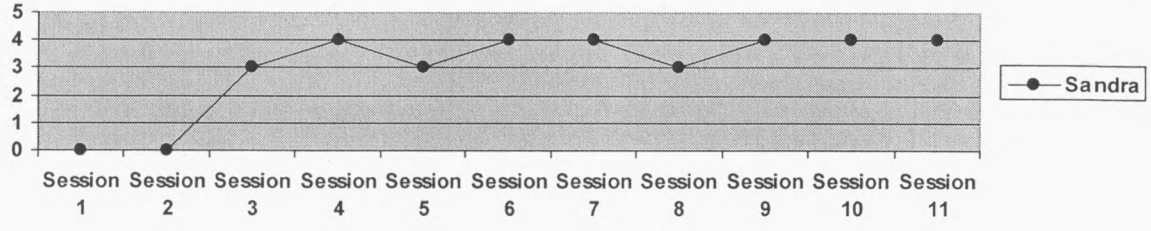


Figure 26 Mean Volume

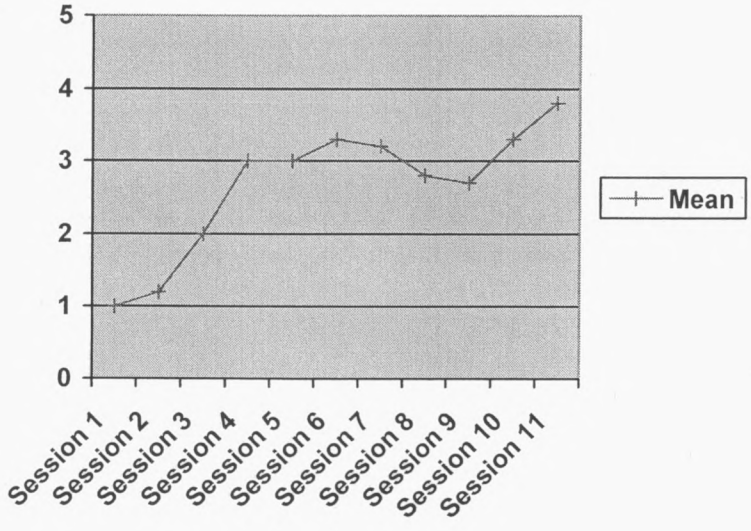
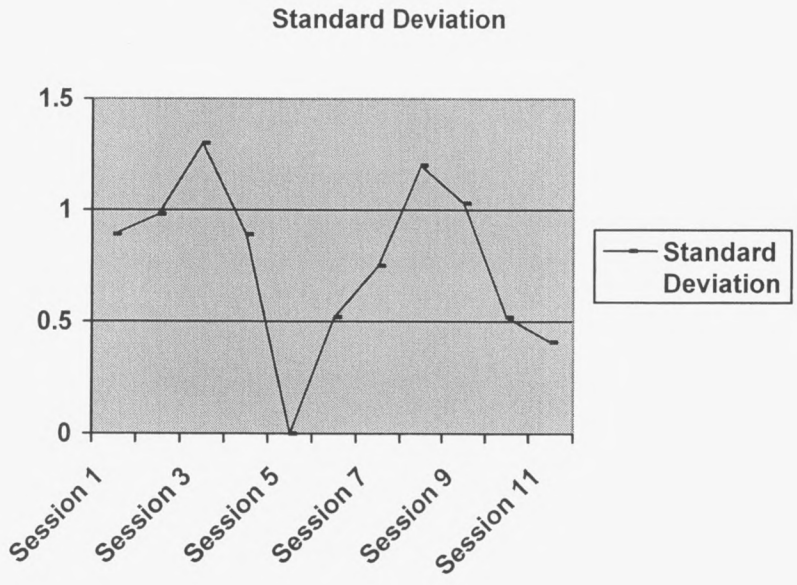
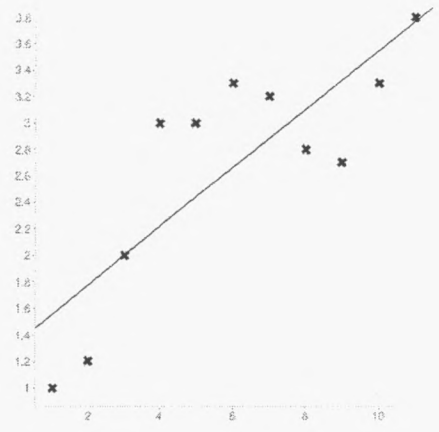


Figure 27 Standard Deviation of Volume



In order to determine if meaningful changes were observed over the course of eleven sessions, a linear regression was performed on the mean score for all students. The regression coefficient of r= 0.819899 shows a magnitude of improvement in vocal quality and lung function/capacity for the group being studied, suggesting that clinical meaning is found when studying the independent variable of volume. The standard deviation graph produced relatively low values – although they were widely scattered between sessions – which suggest some consistency for each student's scores in relation to the mean. According to the regression line – seen below – progression is relatively linear and suggests that the session-series addressed the targeted variable with a progressive approach that helped students in the group improve and strengthen their voices and lung functioning.

Figure 28 Volume Regression Line



The sample size of 11 sessions had an overall slope (b) of 0.2209. When computing results for a future session, for example session 18, the group mean hit 5.3, suggesting that continued exposure to therapeutic vocal interventions would gradually increase vocal volume, and may strengthen lung capacity as well as breath support and control.

Student Report

Before and after the completion of the session-series, the responses from the *Music and Asthma Questionnaire* were also compared in order to assess student reactions to the combination of music and asthma treatment. Each student response on the pre- and post- questionnaire was individually compared in order to report whether a change occurred for that specific student. Questions 1, 2, and 4 were the outcome variables hypothesized to shift whereas questions 3, 5, and 6 were designed to remain stable (See Appendix E). All cases were qualitatively analyzed via descriptive summaries of each response that commented on what the change in responses, if any, could imply.

The chart below represents student responses before engaging in the music and asthma group. Students asked many questions when completing the questionnaire and showed physical hesitance in discussing their asthma symptoms. All students appeared

interested in music and openly shared their favorite music artists and songs. Students did not report frequent occurrences of their asthma symptoms but were able to discuss how they felt when an asthma attack occurred. Breathing and relaxation were the most popular responses when asked about the things that help students recover during an asthma attack, and students appeared apprehensive about how music could help them "feel better".

Pre-Session Questionnaire Answers

Student	Jane	Rachel	Mary	Nadine	Beth	Sandra
How asthma feels	OK: "I have trouble breathing and sometimes I get dizzy."	"I have trouble breathing"	"No"	"It feels really bad and I feel like I am going to throw up"	OK; "when I catch asthma its when I'm running and when it's a rainy day"	OK; "I had an asthma attack and I get asthma in the spring"
Things that help an Asthma Attack	Breathing, relaxation	Breathing, relaxation, music	"I feel sick; medicine "	Breathing	Breathing, relaxation	Breathing
Seasonal asthma	Spring and summer	"When I am sleeping I can't breathe through my nose"	"Winter when its cold"	"The worse is March-Spring; the flowers make me sick"	"No, it's not seasonal."	Spring
Frequency of asthma attacks	Once a month or week	Two or three times a year	Once a year	Once a year	Once a year; "I don't have them much"	Once a month
Music preferences	Firework	Firework	Katy Perry, Bruno Mars	Firework, When I see Your Face	"I like music, singing, hip hop."	"I like singing and playing the guitar"

Student	Jane	Rachel	Mary	Nadine	Beth	Sandra
Music as a tool to help asthma	"Maybe because when I breath I get dizzy and yes because breathing helps me."	"The asthma pump"	"Better, tired, happy"	"I think its great because it will calm me down and help my breathing"	"Love it"	"it's fun and cool"

After receiving the music and asthma group, students answered the same *Music and Asthma Questionnaire* in order to assess student reactions to the group.

Post-Session Questionnaire Answers

Student	Jane	Rachel	Mary	Nadine	Beth	Sandra
How asthma feels	OK; "because music is helping me with my asthma"	Bad; "Because my chest hurts a lot sometimes "	OK	OK; "I'm kind of better"	OK	OK
Things that help an Asthma Attack	Breathing, music	Music	Medicine, breathing	Breathing	Relaxation	Medicine, relaxation
Seasonal asthma	Mostly summer	Winter	"Chest"	Spring	None	No
Frequency of asthma attacks	Two or three times a year	Two or three times a year	Once a Year	Once a week; "Not that much other than spring"	Once a Year	Once a Year
Music preferences	Firework	Firework and JB	Firework	Selena Gomez	"I like music; hit list/pop"	Every music
Music as a tool to help asthma	Great	Good	"Good =)"	Breathing	"I love it <3"	"Awsmazing" – amazing and awesome

When comparing student responses, only slight changes occurred. For Jane, her asthma felt "OK" for question 1 on both questionnaires, however her reasoning shifted from how she felt physically – trouble breathing and dizziness – to how she uses music to help her breathe better. Question 2's response also had a slight change, her tools to help her during an asthma attack having changed from breathing and relaxation to breathing and music. Question 4's response, the final variable expected to change, shifted from asthma occurrences happening once a month or week to only two or three times a year, suggesting that Jane did find a way to better help her asthma symptoms. Answers for questions 3 and 5 remained relatively stable as predicted, however Jane's response for 6 was more hesitant about using music as a tool to help treat her asthma symptoms before the session series, reporting that it was "great" after having participated in the Music and Asthma group.

Rachel's responses also had slight changes. For question 1, she reported difficulty breathing before the session series, but commented on how her chest hurt after participating in the Music and Asthma group. Relaxation, breathing, and music were initially chosen for question 2, with only music selected on the post-session series questionnaire. Responses on question 4 remained stable, reflecting no self-reported improvement to her asthma symptoms. Question 5's response remained stable, however responses for questions 3 and 6 changed from pre- to post- session series, indicating some lack of understanding in the questions being asked. For example, when asked about seasonal asthma, Rachel initially responded that she has trouble breathing when she sleeps; her post- session series response was the word "winter", which showed that a better comprehension of the question was achieved.

Mary's responses differed from pre- to post-session series only slightly. Question 1 was initially answered with a "no" because she did not think that she had asthma. After completing the session series, her answer shifted to "OK", and Mary began showing more awareness of her asthma symptoms. Before the session series Mary commented that medicine was the only way she felt better when she got sick; however afterward she included breathing in her answer. Question 4's responses remained stable, showing no self-reported improvement of her asthma symptoms. The responses for questions 5 and 6 remained relatively stable, as predicted, however question 3's response did change. Mary initially reported symptoms occurring in the winter but later only said "chest", perhaps due to her struggle with understanding her own asthma symptoms.

Nadine's responses were very different. For question 1, she initially reported her symptoms as being "really bad". After the session series she commented that she was "OK" and feeling better. Question 2's response remained stable with breathing as the tool that helps Nadine recover during an asthma attack. In question 4 Nadine initially reported her asthma attacks occurring only once a year. However, her post-session response changed to once a week but only in the spring, showing an increased awareness to her asthma symptoms. Question 3's responses remained stable but the responses to questions 5 and 6 changed. Initially Nadine reported similar interests to her fellow peers, however for her post-session series response she selected a recording artist that was not discussed in group sessions. In question 6 Nadine initially appeared interested about using music as a tool to help her asthma symptoms, but on the post-session questionnaire only commented that the breathing exercises helped the most.

Beth's responses remained relatively stable for all questions. She was more descriptive before the session-series began but her responses were the same for items 1, 2, 3, 5, and 6. Question 4's response did change slightly, with Beth initially reporting an occurrence of asthma attacks once a year and changing it to "none".

Sandra's responses changed slightly from pre- to post- session series. Question 1's response remained stable, with her asthma feeling "OK", but the tools used to help treat asthma in question 2's response changed from breathing to medicine and relaxation. Question 4's response changed from asthma attacks occurring once a month to once a year, suggesting an overall improvement in Sandra's asthma symptoms, and question 3's response changed from Sandra having spring seasonal asthma attacks to having no season-specific asthma attacks. Responses on questions 5 and 6 remained relatively stable as predicted. In general, responses for all students showed more awareness of their asthma symptoms and the tools used to help treat those symptoms.

Discussion

The purpose of this thesis was to investigate the relationship between voice and breath-oriented music therapy group interventions and the symptoms of asthma as manifested in duration of held tone, tone quality, volume, and self-reports in school-aged children diagnosed with asthma. The session-series was designed to include vocal interventions such as singing vocal-warm-ups on open vowels, listening and breathing deeply to relaxing music, chanting and drumming, and singing favorite songs. Two variables being studied –tone quality, and volume – were tracked on a five-point lichert scale and duration of held breath was measured with a metronome set to quarter note = sixty beats per minute during vocal warm-up exercises as well as during the hello and

goodbye songs (See Appendix E). In order to investigate the connection between voice, breath, and the symptoms of asthma, mean ratings and standard deviations were calculated for each variable and a linear regression analysis was conducted in order to determine if progressive trends were found over the course of the session series.

It should be noted that the research study tracked actual musical elements in a mathematical way, using the musical dimension as a means of functioning. A student's tone quality and volume of sung voice showed gradual improvements in lung strength and capacity through the type of sound that was produced. It was found that tone quality and volume did significantly progress from the beginning to end of the session-series, suggesting that clinical value did exist for the particular group being studied. The variable for duration did not reveal statistically relevant data, indicating that duration may not have been a strong variable to observe. Because clinically meaningful data was found for two of the three variables studied as they pertained to the small sample size of this thesis, the need for future studies on the role of voice, breath, and the treatment/prevention of asthma was revealed. Although small, the data found in this pilot study may serve as a foundation point for future studies with clients diagnosed with asthma. The results indicate a strong connection between tone quality and volume of sung voice with lung functioning and capacity, thus signifying that more research on the use of therapeutic vocal interventions with clients diagnosed with asthma as well as other respiratory ailments is needed. More specific answers to each research question are provided below.

Is there a relationship between lung function and duration of held breath?

Based on the results, a focus on duration of held breath did not show a strong clinical response. Perhaps duration was not the most significant variable for what music therapy can do for asthma symptoms. However it is interesting to note that the group appeared to regress to the mean in order to find balance with one another. The regression line was relatively flat, with students who had been singing longer phrases having their vocal lines move toward the rest of the group in order to phrase their singing lines as a unified whole. This movement reflects a parallel process to the group cohesion that was formed; initially as 4 individuals within a group and 2 individuals within a dyad, each student found a way to work supportively together within each separate group over the course of the session-series (See Appendix A).

It should be noted that the group was run with a naturalistic framework in order to best meet the needs of each student in the moment. Allowing for more flexibility within each session strengthened the clinical work of the group for the therapist but may have weakened the statistical findings for the researcher. Some sessions only measured a few songs because little singing occurred whereas in other sessions, singing made up a large part of the session. Future studies could introduce more controlled and systematic interventions in a behaviorally structured framework, which may produce more statistically relevant information.

Is there a relationship between lung function and tone quality of sung voice?

According to the results there is a strong linear relationship between lung function and tone quality of sung voice. A good upward trend and magnitude of slope suggests continued improvement in tone quality and strength for this group with continued exposure to therapeutic vocal interventions. An interesting observation shows that the

standard deviations were relatively close to the mean; the group was aligned to one another's needs within the context of the music being sung. It should be noted that students in each group did form cohesive units within the context of the clinical work that is reflected in the individual ratings on the tone quality scale. See Appendix A for this parallel process. The improvements in tone quality suggest an overall increase in lung capacity and breath control, and strengthen the need for therapeutic vocal interventions in the treatment and prevention of asthma.

Is there a relationship between lung function and volume of sung voice?

A strong linear relationship between lung function and volume of sung voice does exist according to the results. A good upward trend and magnitude of slope suggests continued improvement in vocal volume and strength for this group with continued exposure to therapeutic vocal interventions. The improvements in vocal volume suggest an increase in lung power and breath support, and strengthen the need for therapeutic vocal interventions in the treatment and prevention of asthma.

Will there be a difference in the way students report their asthma symptoms before and after the session-series?

Student responses did change pre- and post- session-series, and showed some increased awareness in the students' ability to maintain control of their asthma symptoms. When asked about the frequency of asthma attacks, students reported more symptoms pre- session series, and less symptoms post- session series. It is possible that responses for this question changed due to an increased awareness of their bodies and use

of breath, or due to their increased comfort level with the therapist and group. The Music and Asthma group appeared to teach students more tools that could help them gain control of their breath and air flow when having an asthma attack. Students reported that the music interventions introduced in group session helped to improve their breathing, and noted it as an additional tool alongside relaxation, breathing, and medicine, that can be used to help treat their asthma symptoms. Student overall responses to the Music and Asthma group was positive, and based on the more refined responses on the post-session questionnaire, students appeared to show more awareness about themselves and their asthma.

Design

The design of the study was created with a quasi-experimental, naturalistic, qualitative/quantitative, multiple case framework in order to allow for flexibility to meet the needs of each student in the group. In a few cases, the goals and objectives set by the therapist outweighed those of the researcher in order for the group to have more clinical meaning for each student involved. Even though the session-series attempted to flow as naturalistically as possible, standardized measures did exist in order to isolate the variables. However the ongoing paradigm clash in music therapy between clinically meaningful sessions and statistically relevant data presented itself strongly in this study. One could argue for a standardization of the protocol however there would be a sacrifice of the naturalness of clinical interventions and human life occurrences. For the purposes of this study, the researcher as the therapist allowed for more flexibility in each session because the needs of the clients were stronger. Larger sample sizes should be included in

future studies in order to investigate a more normalized connection between the variables being studied and the symptoms of asthma.

Session-Series

During the session series, students became more aware of themselves, their breathing, and their bodies in the music space, able to openly discuss their struggles with asthma. Questionnaire responses also indicated how the students had more awareness of their asthma symptoms, and the students achieved a better understanding of how they could help themselves regulate their breathing when they have an asthma attack. After reviewing the data collected from each session, it can be suggested that a focus on voice and breath in the treatment and prevention of asthma may help treat its symptoms. The students appeared more open and involved in the music groups and worked collaboratively together to create a band for their favorite songs, sing vocal warm-ups and improvisations, and engage in drum call-and-response games all while building a cohesive and supportive group.

Most sessions concluded with discussions about physical health and after reviewing the video tapes, students showed more awareness in their use of breath; most showed an ability to identify their physical responses to the music interventions used. Students were able to openly discuss asthma symptoms – including shortness of breath, tightness in chest, dizziness, and difficulty with breathing – while also discussing how the music played/sung in sessions helped them "slow down" and regulate their breathing. Although the results show little improvement across time, this study suggests the need for further research on the role that music – and most specifically vocal – interventions play in the treatment/prevention of asthma symptoms in school-aged children.

The overall structure of the Music and Asthma groups appeared effective; students became confident and comfortable in the music space, and were able to use their voices freely both in conversation and in singing activities. However, because the method included student-preferred song choices, some sessions consisted of very little singing, thus making it more difficult to track each students' vocal path. Future studies should place more emphasis on vocal interventions in order to receive more accurate data and should also include a larger sample size. This small case study served as a foundation for future research and offers insight into the use of therapeutic vocal interventions in the treatment and prevention of asthma.

Confounding Variables and Implications

It is important to mention a few confounding variables that appeared during the course of treatment. Due to school trips and illnesses, a high rate of absences from a few of the group members was seen, which may have affected the overall outcome of the results. New York State testing was also scheduled during days that the groups met, resulting in the session-series lasting only eleven sessions instead of the intended twelve. Although this did not have a significant effect on the outcome of the group, it did change the researcher's protocol for treatment. Two weeks were subsequently missed, causing a lull in treatment and requiring that the following sessions had to repeat steps in the treatment protocol in order to meet student needs.

It is important to note that all six students selected for this pilot study happened to be all female because their permission slips were the first ones returned by their parents. The initial design of this study was to include both male and female participants so the overall structure of the group could be used for future studies. The only foreseeable

change would be found in the types of vocal interventions used; each group may prefer different vocal interventions or select different songs which could impact the variables being studied. However if therapeutic vocal interventions are present during each group session, it can be implied from the results of improved tone quality and volume that other groups would show similar trends.

Another significant element of this research study was that the researcher also served as the therapist who ran and analyzed the group. By playing multiple roles in the research protocol, researcher bias could be present. In any therapy relationship, therapist and/or client may gain a certain level attachment to the other person in the relationship. Researcher bias could then be present in the different attachment levels toward each student; the therapist might not have enforced singing activities in each session depending on client needs, or may have rated scores higher because the perceived notion of student abilities during the sessions may have initially been stronger than those recorded and viewed from the video tapes after the session series was complete. However the researcher attempted to remain as neutral as possible by focusing specifically on measureable data and by video recording each session in order to collect more accurate results. Future studies should consist of a research team in order to account for researcher bias. The researcher could serve as the leader of the group and select another person to analyze the data being collected, or the researcher could be blind to the study until the session-series is completed by one therapist and all data is collected by another member of the research team. For the purposes of this study, and because it serves as foundational research for further studies, we assume that the researcher serving multiple roles did not cause an issue or hinder the quality of results produced.

The most important variables that were overlooked in this research study were the elements of human emotion and physical well-being. This study focused specifically on the role that music – and most specifically the human voice – plays in the treatment and prevention of asthma. A quantitative study focusing on duration of sound, quality of sung voice, and volume of sung voice were the only measurements taken. Although good as a foundational study, further research should focus on the combination of both quantitative and qualitative research. For example, the researcher could measure the same quantitative data but also include qualitative data such as personal reactions toward each music activity, weekly journals for the student to monitor his or her occurrences with asthma, or recording the perceived emotional state of each child before and after the music session.

As the session-series progressed, the researcher noticed how one's emotion and physical well-being are intricately woven with one's voice. For example, Nadine was sick during sessions seven, eight, and nine, and her vocal quality and volume weakened significantly. Her voice had been one of the strongest in the group, and during those three sessions her voice was barely audible and she was visibly struggling with an illness. Nadine's struggle with her physical well-being not only affected her vocal tone quality but also affected her emotional state. She presented as sad and reserved within the group and barely used her voice during those sessions. On the other end of the spectrum, when students were excited or eager about a project worked on in group – for example the music video in the last session – student voices became fuller, clearer, and stronger. The students' personal enjoyment was reflected in the use of their voices. It can therefore be determined that accounting for the elements of human emotion and physical well-being

are crucial in understanding the connection between voice, breath, and asthma and should be included in future research studies.

Concluding Thoughts

This research study, although limited in nature, did produce results that show the effectiveness of vocal techniques in music therapy to help treat and prevent the symptoms of asthma. Students showed more awareness of their bodies and the use of their breath when singing, and were able to openly discuss and compare their physical reactions from the music and from an asthma attack. Student voices strengthened over the course of treatment and most showed an ability to use their voices and their breath in a controlled and comfortable manner. Students also showed an ability to regulate their breathing and relax their bodies to music relaxation interventions, and appeared engaged and present during all music sessions. Lung function did improve as a result of the musical interventions introduced each week. Gradual improvement was seen in vocal quality, volume, and duration during the eleven sessions that were held. Overall, students learned effective tools that could help them control and regulate the use of their breath during an asthma attack.

The literature review on the use of alternative treatment options – such as breathing techniques, yoga, and music – offer additional insight into the many ways in which the symptoms of asthma can be controlled. Because asthma is such a prevalent and chronic disease in young children, it is important for us to understand the true nature and quality of the disease and child being diagnosed. Many medical treatment programs

exist and are beneficial to a child's health and lung function, however the addition of alternative treatment programs enhances daily life function and ultimately improves respiratory health.

The study discussed in this thesis was aimed at clarifying the role of voice and breath in the treatment and prevention of asthma. As is evident from the literature review, little research has been done on this topic. The research discussed in this thesis serves as a foundational study for future research. Important – and relevant – research from this study was found that shows how vocal interventions in music therapy can help improve lung function and capacity in school-age children diagnosed with asthma. However, the researcher strongly suggests that more research is needed in order to fully explore the depths that vocal interventions can reach in the treatment and prevention of asthma. After all, the voice is deeply connected to one's breath, and one's understanding of his or her breath is related to the alternative medical practices found in the treatment of asthma. As Lisa Sokolov observed, "The Body is the Riverebad, the Breath it is the river and the tone is floating on the currents of the River. There is One Ocean of Breath, moving from he to she to me. Every breath you take breathes me. Every move you make moves me. Every sound you make sings me (p.48)".

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Appendices

A. Description of Group Sessions

Before discussing the group process, it is important to note that the six students were tracked in two separate groups, one group of four and another group of two. The group was split according to age and student availability; groups were created around their primary teachers' schedules in order to ensure that the students did not miss any core classes. By working with the teachers to create a schedule for the music groups that fit with their classroom schedules, teachers were more open to discussions and willing to let the students out of their classroom.

Group a.

The first session introduced the students to the music group. Most of the time was spent on the questionnaire; students took about twenty minutes to write down their individual responses, ask questions to clarify some of the items on the questionnaire, and discuss a few of their responses with the group. Most students reported that they had asthma or severe allergies, and three group members responded that focusing on their breathing helps them relax during an asthma attack with the other group member saying that she takes medicine to help her symptoms. Most allergy and/or asthma attacks occur for this group during the winter or spring, and occurrences of those attacks seem sparse. The group answered that they like music, and musical preferences were pop songs; all group members mentioned, "Firework", by Katy Perry. Jane, Mary, and Nadine showed interest in using music to help control their asthma, but Rachel only commented about the Asthma pump, and might not have understood the question being asked.

An improvised "vocal warm-up" game was introduced in order to bring the group together in the music, however students mostly listened to the therapist's voice and copied all rhythms introduced. By the end of the session students felt more comfortable using their spoken voices, but appeared afraid to sing. It should be noted that when students appeared to have fun and/or were excited about a certain exercise, they would scream or yell as a method of singing, and when asked to sing loudly students would scream as if they did not understand how to increase their sound volume gradually. Perhaps this was due to the fact that they had yet to understand how to control their breath in order to support a strong, and moderately loud, vocal sound. They may have thought they were following directions and singing in their full voices, but instead they showed the therapist that they had little control of their breath and vocal quality. Students were also coughing during the vocal warm-up, and were subsequently asked to sit in a comfortable position and take deep breaths in order to become more aware of their breathing and how it affects their bodies. Rachel, Jane, and Nadine were the only three students who sang, "Party In the USA", by Miley Cirus, and appeared most comfortable using their voices to sing. The therapist rated tone and volume at a one or a two in order to signify the groups' lack of control with the use of their voices; the group either sang in soft and barely audible tones or in loud and uncontrolled yelling.

The second session encountered a few problems for the research protocol; three of the four students were absent and data could not be collected. The therapist worked individually with Jane, playing improvisations on the piano together, and drawing images to quiet, relaxing music. After the hello song, and when Jane did not engage the therapist in singing the hello, the therapist chose to have a musical conversation with Jane and

played a duet on the piano. Jane appeared more comfortable in the session without her peers, and her speaking voice was more audible and engaged. She did not sing in the session because the main music activities focused on instrumental play and she chose not to sing the hello or goodbye song with her peers absent, instead listening to the therapist sing and engaging in the music on a selected instrument of choice. The therapist rated her tone and volume quality at a two because of her more assertive vocal quality when speaking directly to the therapist, and her ability to focus on her breathing as she drew a picture reflecting on the music being played. These ratings were relatively similar to the first session, with her volume increasing just slightly.

The group was brought back together at session three, with only Mary being absent. The group engaged in music together by playing instruments, taking solo turns, and creating a relaxing music improvisation on ocean disc, xylophone, piano, tone bars, and voice about the rain. Students showed an ability to regulate their breathing and quiet their minds and bodies when playing soft and quiet tones. A dance and vocal game was then introduced in order to bring the energy level up before leaving the music room. Students appeared more comfortable using their voices during this session, and created many silly vocal sounds during the vocal warm-up. Nadine introduced the idea to "see who could sing a note the longest", and everyone appeared to enjoy competing with each other. Students reflected on their voices and discussed their physical responses to the vocal game created. All students showed an ability to regulate their breathing during the vocal and dance activities; Rachel and Nadine were aware when they needed to take a break during the session and decided to sit down for a few minutes in order to recover their breath before joining back in. Jane continued to sing quietly throughout the activity,

taking deep, full breaths. The therapist rated tone quality at a two for all three group members – which was the same rating received during the first session – because they still showed little control in the use of their voices; they would vary between soft breathy tones or loud, screaming tones. Volume for Jane was rated at a two because of her soft and barely audible tones and at a three for Rachel and Nadine because their volume was present and audible throughout the session, which had increased since the last group session.

The therapist had asked each student to share their favorite songs and/or recording artists with the group at the first session and the students unanimously selected "Firework", by Katy Perry. This song was to be used throughout the session series in order to teach the group how to comfortably sing by controlling their breath flow in order to support their sound and volume. In the fourth session, the group began their work on the group-selected song, and most appeared familiar with the melody when singing along with the therapist. However when singing alone, their melody changed and soon became difficult to hear. The therapist taught the group the song, asking them to listen first, just sing the chorus, and then take solo turns with therapist on the verses. Students appeared engaged during the session, singing "Firework" as a group and also singing the hello and goodbye song. They presented as a more cohesive unit, listening to each other's ideas and allowing space for every voice – both sung and instrumental – to be heard. Rachel's tone and volume were rated at a three because she appeared to gain some control over the use of her voice since the last session; her singing voice during the hello and goodbye songs were audible and slightly breathy, but during "Firework", she would often scream or shout in harsh, breathy tones when she appeared more excited about the music or

confused about how to sing louder. Nadine presented as being competitive, instigating the "who can sing the longest note" during the vocal warm-up, and always winning. Her tone and volume – as well as Jane's – were rated at a three because they appeared most comfortable singing in full, audible, and somewhat clear tones. These ratings were increased one level since the last session, perhaps due to an increase in the students' comfort level within the music space. Mary's tone and volume was rated at a two because her voice was soft and barely audible throughout the session. Her absence over the last two sessions resulted in her vocal ratings being similar to the ratings from the initial session. She also showed little control in the use of her voice because, when asked to take deep breaths and sing louder, she would scream the words of the song.

In the fifth session, the larger group continued to sing "Firework", and began to add various instruments to accompany their voices including drum, tambourine, and maracas. The tone of the group was a little sad and reserved; people began discussing memories of family members who passed away and students supported everyone by sharing their own stories. The group decided to sing "Firework" to family members that they never got to meet, or to family members that they miss. The group all sang in a clear, audible tone. As the session continued, the group began dancing to the song and created a dance game in order to see who could dance the longest. Once everyone finished dancing, a vocal relaxation exercise was introduced and students were able to sit and listen to the leader's voice as they breathed together and calmed their bodies down. Students began to show more awareness of their use of breath and voice in the music space. Vocal tone and volume was rated at fours and threes for all group members because of their ability to regulate and control their breathing according to each music

intervention introduced, and their voices were supported by their breath control in clear, audible, and full tones. These ratings were a relatively large increase for some group members, and show improvement in vocal quality and breath control since the initial ratings of ones and twos.

Students one again showed difficulty regulating their voices during session six; Rachel's shouting in the vocal warm-up instigated Nadine's high energy level, and the group became loud and vocally uncontrolled. Redirecting the group's energy, the therapist introduced structured singing in the form of a familiar song. When singing together as a group contained by that structure, the students were able to regulate their voices; they sang during the entire session on the hello song, group song, and goodbye song. Voices were clear and audible, and the group appeared more focused on the music interventions introduced. Nadine was observed coughing throughout the session so a breathing exercise was introduced in order to help the students learn how to breath deeply and use their breath control to support their voices comfortably. Students showed an ability to follow directions, and Jane, Rachel, and Nadine were able to regulate their breathing and sing in clear, soft tones. The group's tone and volume were rated at threes because of their ability to redirect their vocal behavior and learn how to control the use of their breath in order to support their vocal sound. This weeks ratings were slightly lower than the previous week because of the student's apparent difficulty in regulating their breathing and their lack of focus during vocal activities.

The group was back together with all members present during the seventh session. Students taught Mary the dance moves created during the previous session and the group continued to work on their "girl band"; Rachel and Jane became the singers as the other

group members danced or played instruments. Nadine started to cough, and sat down in order to remove herself from the group. Other students said that they were tired and wanted to relax, so a vocal relaxation exercise was introduced. Students accompanied on soft instruments such as tone bars, an ocean disc, and a xylophone, or sat and listened to the music being created while focusing on their breathing. Because of their "tired and quiet" state, the rest of the session focused on breathing and relaxing to music. Little to no singing was present during this session except for the hello and goodbye songs. Jane, Rachel, and Mary were rated at a three for tone and volume because of their ability to regulate their breathing and support their vocal tone in clear, slightly breathy tones. Nadine was rated at a two because her voice was breathy, soft, and barely audible throughout the session. Ratings were similar to the previous week, with only Nadine's vocal quality being weaker perhaps due to her illness.

Student energy levels were higher during the eighth session, and the group continued singing together with each student taking a turn to lead their "band" of instruments. This activity was created in order for the group to select what instruments they wanted to use in their adaptation of "Firework". Nadine kept herself removed from the group, informing everyone that she did not feel well. Her voice was soft, raspy, and often difficult to hear. Sensing Nadine's discomfort, the rest of the group supported Nadine with a quiet and relaxing instrumental improvisation and all students showed an ability to regulate their breathing and relax in order to create a supportive environment for Nadine. Mary's volume and tone was rated at a four for her ability to sing and speak in clear, full tones; she was the most vocally present in that day's group and served as the leader to offer support to Nadine. Jane and Rachel were rated at twos and threes because

their voices were soft, slightly breathy, and consistent throughout the session. Nadine's voice was rated at a one because her voice was difficult to hear and she chose not to speak or sing much during the session. All ratings dropped this week because of the apparent "group-tiredness".

During the ninth session, the group chose not to sing the vocal warm-up or "Firework", instead wanting to once again create their "girl band" in order to establish and define the instrumental accompaniment for the group song. Rachel showed a good sense of rhythm on the drum and was asked to keep the beat of the song. Mary's energy was unfocused and she appeared to have a difficult time staying with the group. The students did sing a little during "Firework" when trying to add instruments to the song, but they appeared to have trouble focusing their energy on one task. The therapist created a musical chairs game where each group member took turns playing different instruments – the piano, guitar, or drum. Students were able to collaboratively play together during this improvisation, and regained their cohesive unit by listening to their peers and anticipating when the "switch" would happen. Spoken voices were clear, full, and assertive during this session, but little singing was observed because of the groups' choice to focus on instrumental play. It should be noted that the therapist strayed from research protocol in order to better meet the needs of the group; students were able to regain their focus in the session and joined their voices with the therapist in order to sing the goodbye song. Although little singing was observed students did engage in physical activities that elevated their rate of breathing; students showed an ability to regulate and control their breath flow throughout the session. The group's tone and volume were rated

at a two – similar to the previous session – because of the infrequent amount of times that they used their voices to sing; when singing their voices were soft, breathy, and audible.

Students did not want to sing during the tenth session, asking to instead create their band on piano, guitar, and drums similar to last week's activity. Students showed a mastery of their spoken voices, using clear, assertive tones, and also showed an ability to control loud vocal outbursts. Because of their seemingly lack of interest in singing, slide whistles were introduced to the group and the students were all able to vary between loud, soft, long, and short notes. All group members showed an ability to regulate their breathing by taking a break when a rest was needed or by varying their sound on the slide whistles. The group's tone and volume was rated at threes during this session because of their ability to focus their breath support when playing the slide whistles, and for singing the hello and goodbye song with the therapist in clear, somewhat full tones. Slight increase in vocal quality was observed this week, and focus once again shifted to more active breathing exercises.

The final session focused entirely on singing and celebrating the end of the music group. Students asked to create a music video for "Firework" by performing the song directly to the video recorder used to track all sessions for the research study. Students used their voices playfully in the session, singing, laughing, and dancing. The researcher rated the groups' tone and volume at fours because of their ability to control the use of their breath flow in order to sing in clear, full tones. Students were observed singing throughout the session and appeared comfortable and confident with controlling their breath in order to sing in clear, audible tones. The students once again answered the questionnaire and shared their favorite moments of the sessions with the group. All

answers included breathing and music as tools that help them feel better during an asthma attack, with Mary staying with her original choice of medicine with the addition of breathing exercises. All students showed an ability to sing in clear, full tones, and appeared to enjoy their time in the music space, and ratings once again increased in order to reflect the students' ability to regulate and control the use of their breath when singing.

Group b.

The first session for Group B focused on completing the questionnaire. Beth and Sandra asked the therapist questions about asthma and shared stories about their family history with asthma. Responses on the questionnaire showed some awareness of their asthma symptoms; Beth commented how she has trouble breathing when running or on rainy days and Sandra said that her symptoms appear most in the spring. Both students appeared interested in music, sharing their favorite songs with the group and saying how they "love" the idea of using music to help with their breathing. Beth and Sandra did not seem comfortable singing in this session, but did engage on musical instruments. A call and response game was introduced on the drum in order to focus on group cohesion while establishing a safe environment for the students to feel comfortable expressing themselves in the music space. Because no singing was observed from each student during the session the researcher was unable to rate Beth and Sandra's vocal quality. However they did show an ability to control their breathing patterns when varying between active music playing and receptive music listening, and were vocally present during group discussions. This group did not run for the second session because Beth and Sandra's class went on a field trip. Research was once again unable to be collected.

At the third session, Beth was absent so Sandra joined another group and participated in a group call-and response on the drum and with vocals singing a chant to "I'm Not Afraid". She engaged in the group with a clear, relatively full voice, and discussed her thoughts and ideas about the tsunami in Japan. Sandra engaged in a song playing on the slide whistle and showed an ability to vary her sound by playing short, long, soft, or loud sounds. She held her breath for ten beats during this activity, and was able to discuss the difference between singing and blowing the slide-whistle, noting that "singing is easier because the slide-whistle makes me dizzy". Sandra appeared very aware of her body and use of her voice and breath. The therapist rated her vocal quality and volume at a three because of her ability to regulate her breathing during each music intervention and sing in soft, somewhat breathy, and audible tones.

Beth and Sandra became more vocally involved at the fourth session; both students sang the hello and goodbye song with the therapist, and openly discussed favorite songs with the group. In order to focus on breath support and control through singing, the group focused on these favorite songs in subsequent sessions. Students interacted with each other on the piano, identifying themes heard in each improvisation created. Beth and Sandra appeared connected to each other in the music space. Their tone quality was rated at a three with volume rated at a four because of their ability to sing in somewhat breathy but audible tones. A slight increase was noted in the ratings because student voices became more assertive and present.

Beth and Sandra sang throughout the entire fifth session; they joined the therapist on the hello song, sang "Firework", by Katy Perry as a group, followed the therapists lead in a call-and-response drum and chanting activity, and sang the goodbye song to each

group member. Both students showed an ability to sing in clear, full and round tones. The group also selected one of their favorite songs to teach the rest of the group in the upcoming weeks, and appeared interested in focusing on singing and breathing exercises. Their tone was rated at a four with volume rated at a three which were similar ratings as the previous week and also reflect vocal consistency; they showed an ability to regulate their breathing patterns for each music activity introduced and their ability to become vocally present and assertive in song.

The sixth session was more musically engaged; Beth and Sandra played collaboratively in the music on both the instruments and their voices. Students appeared to have fun creating silly vocal sounds during the vocal "warm-up" game, and were observed laughing and playing with their voices. After singing a long note Sandra – exasperated and out of breath but still laughing – said, "I'm dead!" and the vocal improvisation focused on sighing and breathing until both students once again felt comfortable with their breathing. Students played with their voices and were able to follow the leader in a call-and-response pattern. Their tone quality and volume was once again rated at fours today because of their ability to sing in clear, full tones, while regulating their breathing patterns between active singing exercises and receptive listening/breathing exercises.

During the seventh session, Beth and Sandra sang together on the hello and goodbye songs, but when singing different vocal scales and sighing patterns during the vocal warm-up, Sandra was reminded of a scary sound and the group began discussing the events of 9/11. The group spent most of the time talking about the conspiracies of the twin towers falling, and the students appeared very smart and interested in the politics of

America. After selecting favorite songs to share with the group in a previous session, Sandra sang, "You Are Not Alone", by Michael Jackson as a reflection on the 9/11 tragedy. She taught the song to Beth and the therapist, and the group sang together on the choruses while Sandra sang the verses as a solo. Beth decided to share "Grenade", by Bruno Mars, with the group in the following session. Both students were rated at a three for tone quality and at a four for volume because of their ability to sing in full, audible tones, and their ability to regulate their breathing during each vocal activity. Beth and Sandra continue to receive threes and fours for each session, showing consistency in the use of their voice and breathing patterns. Students were vocally present in this session both in song and in spoken conversation.

Beth and Sandra continued singing during the eighth session. After singing the hello song as a group, Beth said that she was "not ready to share" her song. The group chose to sing "You Are Not Alone", Sandra's song choice from the previous session. Instruments were added to this song, and the group created a "rock band". Beth's vocal tone and volume were rated slightly higher in this session with both receiving a four because of her strong vocal presence during each vocal activity; her volume was full and audible and her tone was clear and strong. Sandra was rated slightly lower in this session, receiving threes for both volume and tone quality today because her voice was slightly weaker than it had been in previous sessions; her tone was breathy and unfocused and her volume was mostly audible during each vocal intervention.

Beth was absent for the ninth session so Sandra had an individual session. She shared a song that her father wrote for her, singing in a clear, full tone, and expressing her desire to become a professional singer one day. Sandra also sang "You Are Not Alone",

and engaged the therapist in a discussion about her musical interests. She appeared comfortable and confident with her singing voice, and seemed to enjoy her music-making. Receiving individual attention, Sandra's voice was strong and clear; the therapist increased her ratings this week, giving both vocal tone and volume a four because of her ability to regulate her breathing and sing in relatively full and audible tones.

Group B did not meet for the tenth session because of a mandatory practice they had to attend for their graduation ceremony, resulting in Beth's inability to share "Grenade" with the group. Their final session was more reserved and quiet; students appeared sad about ending the music groups. Beth and Sandra sang the hello song together and asked to create a band on guitar and piano so that they would have the change to play their "favorite" instruments one last time. Students then took time to answer the questionnaire and discuss their favorite moments of the music groups. Responses indicated that relaxation helps control their breathing during an asthma attack, and that their interest in music helps them achieve the needed relaxation. Students also answered questions differently about their frequency and types of asthma; in the beginning of the group students noted that they had seasonal asthma with attacks occurring once a month however at the end of the group students said that they only had an asthma attack once a year and that there was no difference between seasons. Perhaps the music group helped Beth and Sandra regulate their breathing so that they could alleviate symptoms on their own before an attack occured. Before ending, Sandra asked to sing "Firework", and both girls sang in clear, full, audible tones. The group also sang the goodbye song together in order to close the session with the common group ritual of

goodbye. Student voices were rated at a five for tone quality and at a four for volume because of their vocal strength and presence throughout the session. These ratings show a gradual increase in vocal and breath awareness. Students also showed an ability to vary their breathing patterns during each vocal interventions and showed awareness in the use of their breath in order to support a full and clear vocal tone.

B. Assent Form

MONTCLAIR
STATE
UNIVERSITY

JOHN J. CALI SCHOOL OF MUSIC
COLLEGE OF THE ARTS
1 Normal Ave.
Montclair, NJ 07043
973-655-7212

ASSENT FORM

Please read below with care. You can ask questions at any time, now or later. You can talk to other people before you fill in this form.

Who am I?

My name is Susanne Kobb. I am a student who studies music therapy at Montclair State University in New Jersey.

Why is this study being done?

I want to see how you breathe and try to use music to help you with your asthma. We will try to make your lungs as healthy as possible, and make your breathing more comfortable.

What will happen while you are in the study?

If you decide to be in this study, you will play and listen to music and have fun with your classmates. You will answer questions about your asthma, what kinds of music you like, and whether you would like to use music to help treat asthma. I will videotape the music groups so I can see how your breathing changes. They will be kept in a locked drawer and I will destroy them when the music group ends.

Time:

The music group will meet every week for 12 weeks. Each week, the class will be 45 minutes long.

Risks:

You may have trouble breathing during this study, but it will not be any different than how you feel every day.

Benefits:

Being part of the group may help you breathe more deeply and comfortably. You will also learn some new fun and creative ways to treat your asthma. Others may also benefit from what we learn about new ways to treat asthma.

Who will know that you might be in this study?

You and your parent will know that you are in this study. I will know that you are here, but we won't tell anyone else.

Do you have to be in the study?

You do not have to be in this study. We won't get mad with you if you say no. It is okay if you change your mind at any time and leave the study. You do not have to answer any questions you do not want to answer. If you do want to be in a music group, but do not want to be in the research, other music groups will be offered.

Do you have any questions about this study? Call or email Susanne Kobb at 732-598-4835, or kobbs1@mail.montclair.edu

Do you have any questions about your rights? Call or email the IRB Chair, Debra Zellner at 973-655-4327 or reviewboard@mail.montclair.edu.

I would like to get a summary of this study:
Please initial: _____ Yes _____ No

It is okay to videotape me while I am in this study:
Please initial: _____ Yes _____ No

Name of Research Participant	Signature	Date
Name of Witness	Signature	Date
Name of Principal Investigator	Signature	Date
(if applicable) Name of Faculty Sponsor	Signature	Date

C. Parent/Guardian Consent Form

MONTCLAIR STATE UNIVERSITY

JOHN J. CALI SCHOOL OF MUSIC
COLLEGE OF THE ARTS
1 Normal Ave.
Montclair, NJ 07043
973-655-7212

PARENT/GUARDIAN CONSENT FORM

Please read below with care. You can ask questions at any time, now or later. You can talk to other people before you fill in this form.

Study's Title: *The Role of Voice and Breath in the Treatment and Prevention of Asthma: A Case Study in Music Therapy Focusing on A Group of 6 School-Aged Children Diagnosed with Asthma*

Why is this study being done?

This study is being done to help learn how music therapy could help your child control his or her asthma symptoms. Your child will be able to focus on healthy lungs and comfortable breathing through guided relaxation and singing.

What will happen while your child or dependent is in the study?

Your child will be asked to answer some questions about his or her asthma symptoms, what type of music your child likes, and how interested he or she is in using music to treat asthma. All musical instruments will be washed before and after being used. Your child will join in musical activities such as drumming, singing, playing music, listening to music, deep breathing, and relaxation. He or she will be challenged to sing long notes and/or hold his/her breath which will be measured by counting musical beats. The music group's goal is to be fun and enjoyable for all children.
Sessions will be videotaped so that the researcher can observe any changes. These video files will be stored in a locked cabinet and kept strictly confidential. Their uses are only for the needs of this study.

Time:

This study will last 12 weeks. Each week, the group will meet once for 45 minutes during their school day. All sessions will take place during one of your child's elective classes such as library, science, computers, or art.

Risks:

Just as in day-to-day life, your child may have difficulty breathing during this research study. Your child will become more comfortable and take deeper breaths with the help of music and guided relaxation. There are no other expected risks for you or your child.

Benefits:

D.

Your child may benefit from this study by breathing more deeply and comfortably. Your child will also enjoy being with his or her classmates as he or she learns about music and finds creative and fun ways to relax during an asthma attack. Others throughout the world may benefit from the results of this study as they learn more about how alternative medicine can help asthma.

Who will know that your child or dependent is in this study?

Your child's name will not be used in the research material so that his or her information is kept anonymous. All results will be stored in a locked cabinet, and any computer information will be protected by a password. Only the study team will have access to any of this information, and all data and video recordings will be destroyed when the study is complete. *You should know that New Jersey requires that any person having reasonable cause to believe that a child has been subjected to child abuse or acts of child abuse shall report the same immediately to the Division of Youth and Family Services.*

Does your child or dependent have to be in the study?

No, your child does not need to be in this study if he or she does not want to be. If your child is interested in being part of a music group but does not want to be part of the study, other sessions will be offered. There is no cost to you for being in this research study.

Do you have any questions about this study? Call or email Susanne Kobb at 732-698-8598 or email at kobbs1@mail.montclair.edu.

Do you have any questions about your rights? Call or email the IRB Chair, Debra Zellner (reviewboard@mail.montclair.edu or 973-655-4327).

I would like to get a summary of this study:
Please initial: _____ Yes _____ No

It is okay to videotape my child while in this study:
Please initial: _____ Yes _____ No

If you choose to have your child in this study, please sign below:

Name of Parent/Guardian	Signature	Date
Name of Parent/Guardian	Signature	Date
Name of Principal Investigator	Signature	Date
Name of Faculty Sponsor	Signature	Date

E. Music and Asthma Questionnaire

Music and Asthma Questionnaire

1. My Asthma feels (circle one): OK – Bad – Terrible
   Explain:

2. What helps you feel better during or after an Asthma attack?
   a. Medicine
   b. Breathing
   c. Music
   d. Relaxation
   e. Other: (write below)
   _____

3. Are your asthma attacks seasonal, and if so, what time of year is worse?

4. How often do you have an Asthma attack?
   a. Once a year
   b. Two or three times a year
   c. once a month
   d. once a week

5. Do you like music, and if so, what kind of music do you like?

6. What do you think about a music group designed to help you with asthma?

F. Measurement Tools

Measurement Tools for Thesis Study:

Role of Voice and Breath in the Treatment and Prevention of Asthma: A Case Study in Music Therapy Focusing on A Group of 6 School-Aged Children Diagnosed with Asthma

Susanne N Kobb

I. Duration: Measures how long each student can sustain their breath support through sung tones in specific musical exercises. All vocal duration will be measured by counting musical beats in a common time signature with a metronome set to: quarter note = 60 beats per minute.

II. Tone Quality of Sung Voice: Measures integrity of voice quality based upon consistency of breath pressure. The following scale (1-5) will be used to rate the quality of voice:

(1) Voice quality is very weak and breathy
(2) Voice quality is reserved, with moderate breathiness
(3) Voice quality is moderately clear, with hints of breathiness
(4) Voice quality is clear and relatively full
(5) Voice quality is very clear and full

III. Volume of Sung Voice: Measures loudness of voice based upon strength of breath pressure. The following scale (1-5) will be used to rate the volume of voice:

(1) Voice is too soft and very difficult to hear during the volume peak within the song
(2) Voice is audible but difficult to hear during the volume peak within the song
(3) Voice is moderately loud at the volume peak within the song
(4) Voice is almost as loud as is appropriate at the volume peak within the song
(5) Voice is appropriately loud at the volume peak within the song

G. Music used in the Music and Asthma Group

1. "Firework" – Katy Perry
    i. Tabs.ultimate-guitar.com – Version 2
2. "You Are Not Alone" – Michael Jackson
    i. Tabs.untilate-guitar.com – Version 2
3. "Party in the USA" – Miley Cirus
    i. Tabs.ultimate-guirats.com – Version 6
4. "Not Afraid" – Eminem
    i. Tabs.ultimate-guitars.com – Version 2
5. "Grenade" – Bruno Mars
    i. Tabs.ultimate-guitars.com – Version 1

H. PS-142 Permission Letter

New York City Department of Education Joel I. Klein, Chancellor

THE AMALIA CASTRO SCHOOL
PS 142M

Rhonda Levy, Principal
James Buchman, Assistant Principal
Jaime Szymanski, Assistant Principal

To the Reviewers of the Montclair State University Institutional Review Board,

The Amalia Castro School, PS-142, has had a long-standing relationship with Beth Israel Medical Center and offers Music and Asthma groups to its students every year. Susanne Kobb, currently a music therapy intern at Beth Israel Medical Center, has been working at this facility since September and has developed a relationship with its staff members and those students enrolled in the fall semester asthma groups. I have reviewed Susanne's proposal for *The Role of Voice And Breath In The Treatment And Prevention Of Asthma: A Case Study In Music Therapy Focusing On A Group Of School-Age Children Diagnosed With Asthma* and authorize my school, PS-142, for use in her study during the Spring-2011 semester. If you have any questions, please do not hesitate to contact me.

Sincerely,

Rhonda Levy

Rhonda Levy
Principal, PS-142
RLevy4@schools.nyc.gov

100 Attorney Street • New York, New York 10002 • Telephone 212 598-3800 • FAX 212 598-3810

I. Beth Israel Permission Letter

Beth Israel
Continuum Health Partners, Inc.

University Hospital and
Manhattan Campus for
The Albert Einstein College
of Medicine

The Louis Armstrong Center
For Music and Medicine
Beth Israel Medical Center
First Avenue at 16th Street
6 Silver 21
New York, NY 10003
Tel (212) 420-2704
Fax (212) 420-2726

January 10th, 2011

To whom it may concern,

The Asthma Initiative Program developed by the Louis Armstrong Center for Music Therapy at Beth Israel Medical Center offers music groups in New York Public Schools for children diagnosed with asthma. This program uses woodwinds, breath, and relaxation in order to help treat and prevent the symptoms of asthma. Susanne Kobb, currently interning at Beth Israel Medical Center, is one of the primary therapists working with these asthma groups and has been granted permission to use these sessions as a foundation for her case study. Her group in the spring semester of 2011 will include new students that were enrolled into the asthma program for the current school year, and specifically focuses on the use of voice and breath in the treatment and prevention of asthma. None of the participating students have ever been a part of a music and asthma group, and students selected for Susanne's case study who decide not to participate in the research will be given the option to join the regular music and asthma groups as offered by the Asthma Initiative Program. If you have any questions or concerns, please do not hesitate to call.

Sincerely,

Joanne Loewy DA, LCAT, MT-BC
Director
(212) 420-3484 Fax (212) 420-2726
www.musicandmedicine.org

Melanie Po Acosta MA, MT-BC
Music Therapist
Asthma Initiative Program (AIP)
Phone: 212-420-2719
Fax: 212-420-2726
www.musicandmedicine.org