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# Music Therapy, Pain, and Anxiety in Short-Term Adult Inpatient Orthopedic Rehabilitation: a randomized controlled trial

John Marino

This research was completed as part of the degree requirements for the [Music Therapy](#) Department at Molloy College.

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MUSIC THERAPY, PAIN, AND ANXIETY IN SHORT-TERM  
ADULT INPATIENT ORTHOPEDIC REHABILITATION:  
A RANDOMIZED CONTROLLED TRIAL

A THESIS

Submitted in partial fulfillment of the requirements

For the degree of Master of Science

in Music Therapy

by

JOHN MARINO MT-BC, LCAT

Molloy College

Rockville Centre, NY

August 2013

MOLLOY COLLEGE

Music Therapy, Pain, and Anxiety in Short-Term Adult Inpatient Orthopedic

Rehabilitation: A Randomized Controlled Trial

by

John Marino MT-BC, LCAT

A Master's Thesis Submitted to the Faculty of

Molloy College

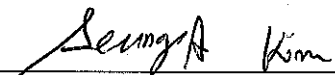
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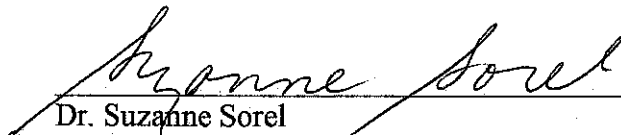
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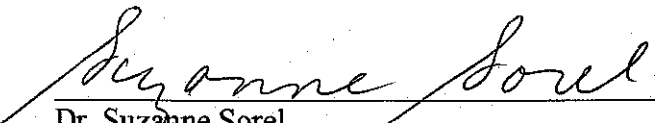
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### Abstract

The purpose of this study was to examine the effects of music therapy on pain and anxiety with older adult orthopedic patients in short-term inpatient rehabilitation. Pain and anxiety are common conditions faced by older adults that can hinder progress in therapy. Ten participants were randomly selected to music therapy or control group. Pain and anxiety levels were measured pre and post intervention, for eight sessions. A music therapy questionnaire addressing interventions for pain and anxiety management was administered to the experimental group following the last session. Music therapy interventions applied were consistent with current research and contained preferred, familiar and relaxing music, and improvisation. The writer's hypotheses was confirmed as music therapy was found to have lowered participants' self-reported levels of pain and anxiety as evidenced on pre and post-test VAS measurements (VAS Pain  $M = 44.35 - 23.62$ , VAS Anxiety  $M = 43.65 - 13.75$ ) and, a significant effect ( $\beta = -12.6$ ,  $P < .001$ ) was detected in the interaction between pre-post, experimental condition and time on STAI scores; however the effect was detected after music therapy with no changes in subsequent pre measures or recurring baselines. On music therapy questionnaires, all five participants reported that music therapy was effective in reducing their pain and anxiety, and claimed preferred, meaningful or familiar music was helpful in reducing their pain, while relaxing music was most effective in anxiety reduction. The use of these specific music therapy interventions appear to have been effective in pain and anxiety management for orthopedic patients who are recovering from surgery and engaged in the process of rehabilitation. Implications for music therapy and future research are discussed. *Keywords:* music therapy, pain, anxiety, orthopedic, adult rehabilitation

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## **Music Therapy, Pain, and Anxiety in Short-Term Adult Inpatient Orthopedic Rehabilitation**

Patients are often admitted to inpatient rehabilitation facilities following hospitalization for medical interventions or surgical procedures for various problems including cardiac, respiratory, orthopedic, neurologic, cancer and infectious diseases. Over one million adult patients annually in the United States undergoing inpatient orthopedic rehabilitation (Morrison, Flanagan, Fischberg, Clintron, & Siu, 2008) are exposed to unpleasant foreign situations and are preoccupied with the physically and psychologically stressful, painful and depressing effects of their illness and recovery (Clair, 1996; Morrison et al., 2008; Paul & Ramsey, 2000; Weller & Baker, 2011). In the U.S., over 200,000 hips, and 375,000 knees are replaced annually (Hip Replacement, n.d.). Orthopedic patients generally receive rehabilitation following orthopedic surgery for hip or knee replacements due to an advancement of Rheumatoid Arthritis that is characterized by worn and swollen joints, or Degenerative Joint Disease known as Osteoarthritis, that “is characterized by ulceration of articular cartilage that leaves the underlying bone exposed” (Nursing Care Plan, n.d., para. 1). Evidence of degenerative joint disease is seen in 80% to 90% of all persons over 65 years of age, and is generally related to problems in knees or hips (Nursing Care Plan, n.d.).

Post-operative pain and anxiety are common concerns among these patients (Lin, Ling, Huang, Hsu, & Lin, 2011). Pain interferes with a patient’s quality of sleep, ability to rest, emotions and daily activities (Lin et al., 2011). Pain has an impact on a patient’s psychological well-being and physical health, and often causes anxiety, depression and fear (Morrison et al., 2008). Post-operative rehabilitation patients often report high

levels of anxiety (Morrison et al., 2008). The need of daily progress in physical and occupational therapies often contribute to patients' stress and anxiety (Morrison et al., 2008).

Patients who are anxious, depressed or experience high levels of pain after surgeries often demonstrate extended lengths of stay in hospitals due to needed time for recuperation and rehabilitation (Nickinson, Board, & Kay, 2009). Many patients are on an analgesic regimen and receive pain medications, such as Percocet, Oxycoton and Oxycotin, in addition to anti-inflammatory medication (Nickinson, Board, & Kay, 2009). Pain management is often an interdisciplinary process involving nursing and rehabilitation services (medication, massages and ice packs) (Nickinson, Board, & Kay, 2009). Patients who report stress and anxiety are often prescribed anxiolytic medication, such as Xanax, in addition to medication to aid sleep if necessary. Among patients undergoing rehabilitation, pain and anxiety is a significant problem that warrants attention and management.

### **Definition of Terms**

Rehabilitation is defined as "a treatment or treatments designed to facilitate the process of recovery from injury, illness, or disease to as normal a condition as possible" (Rehabilitation, n.d., para. 1). Goals of rehabilitation include helping individuals restore, maintain or improve lost physical skills and functioning, and to regain maximum self-sufficiency (Rehabilitation Definition, n.d.).

Orthopedics is "the branch of medicine that deals with the prevention or correction of injuries or disorders of the skeletal system and associated muscles, joints, and ligaments" (Orthopedic, n.d., para. 1).

Pain is defined as an unpleasant sensation of suffering or distress occurring in different degrees of severity due to a result of a disease or a physical injury (McCaffrey, 2008). A correlation between pain and anxiety is common, and is often demonstrated by negative affect in patients.

In defining anxiety, Hanser (1985) stated, "Anxiety, stress, and tension are constructs which lack a standardized definition: as a result, they are subject to assessment by each experimenter's interpretation" (p.197). Anxiety is known as a negative emotional response to perceived threats that can produce feelings of tension, fear, worry and preoccupation (Elliot, Polman, & McGregor, 2011). Anxiety is described in much of the literature through physiological reactions and changes in the sympathetic and autonomic nervous systems, such as cortisol secretion, increased heart rate and increases in systolic or diastolic blood pressure, peripheral skin temperature measures and galvanic skin response (GSR) (Elliot, McGregor, & Polman, 2011; Hanser, 1985; Knight & Rickard, 2001; Yehuda, 2011). For the purpose of this study, the term "anxiety" is defined as stress, fear, threat, defense, and physical or emotional tension (Hanser, 1985; Pelletier, 2004; Yehuda, 2011).

### **Significance of the Study**

This writer has often questioned if music therapy interventions were applicable or indicated for use in reducing pain and anxiety among short-term sub acute patients. There is a significant amount of literature on the use of music as an adjunct in meeting rehabilitation goals, such as range of physical motor functioning and communication; however, there seems to be a deficit in research in the use of music therapy to meet other

needs, such as pain, stress, anxiety, and mood within this population (Imogen, 2012; Lim, Miller, & Fabian, 2011; Weller & Baker, 2011).

Dependent variables of pain and anxiety have been chosen because this population often presents these states most frequently. Pain and anxiety often can impede a patient's progress in his or her therapy (Nickinson, Board, & Kay, 2009). As a result of the physical exercises performed daily, older adult patients undergoing rehabilitation often experience increased pain, tension and anxiety (Nickinson, Board, & Kay, 2009).

Possible reasons for a prevalence of pain and anxiety among this group might be due to how long individuals are expected to be engaged in therapy at a rehabilitation facility and the recent nature of the surgery, accident or trauma sustained by those in this group. In addition to these motivating factors and questions, it is the belief of the writer that music therapy should be used for the short-term adult rehabilitation population as it provides assistance to alleviate many debilitating symptoms and needs, such as fatigue, mood, depression, fear, and isolation or loneliness that are often neglected and distinct from those that are addressed by other disciplines.

### **Need for the Study**

Outcomes of a controlled study focusing on interventions to decrease pain perception and manage anxiety would greatly benefit this population, music therapists, and health care practitioners. Music, pain and anxiety have been studied with various populations, and music has been shown to be effective in reducing perceived pain and anxiety in a number of situations; however, a deficit of documented studies exists with a focus on the rehabilitation of adult patients. There is an abundance of research and literature (Clair, 1996; Mohammadi, 2011; Sung & Watson, 2012) related to music therapy within long-

term populations in nursing homes and assisted day treatment centers, but a deficit of information on music therapy in short-term sub-acute rehabilitation. Although medical music psychotherapies have been widely studied in the hospital setting (Aldridge, 1993; Goldberg & Morrision 2007), the lack of generated research for the aforementioned population impresses a need to better understand the problems of this specific population with regards to the usefulness and role of music therapy. Music therapy's effectiveness is of great importance to study, in order to build on existing literature of the benefits of music within this group. In addition, pain and its management have been frequently studied in younger or middle-aged patients, however understudied in older adults and the elderly (Feeney, 2004). Feeney (2004) stated: "Just as pain in older adults has been understudied, there has been insufficient research on pain and anxiety, despite the fact that the anxious mood and other symptoms of anxiety have frequently been noted in pain patients" (Feeney, 2004, p.735). Music has played a role in addressing issues such as pain, stress, and anxiety that are often faced by patients undergoing rehabilitation (McCaffrey, 2008). However there are a limited number of studies conducted on this topic.

Databases searched included Psycinfo ESBCOhost and OVID. Searches of published journals include *Journal of Music Therapy*, *Nordic Journal of Music Therapy*, *Journal of Pain Management*, *Anxiety Disorders*, *Rehabilitation Psychology* and *Journal of Clinical Nursing*. Many studies have been done that provide important evidence regarding the efficacy of music in reducing pain and anxiety among the elderly, including randomized controlled trials (Gadberry, 2011; Hammer, 1996; Kenny & Faunce, 2004; Kim & Koh, 20005; Knight & Rickard, 2001; Schneider, Schedlowski, Schurmeyer, &

Becker, 2001; Sung, Lee, Li, & Watson, 2012; Walworth, 2003) one meta-analysis (Pelletier, 2004) and several studies that test specific music therapy interventions.

However, the specific population of short-term adult orthopedic rehabilitation has not been researched in relation to pain and anxiety.

### **North Shore University Hospital, Center for Rehabilitation**

The writer has taken an interest in addressing problems such as pain and anxiety due to a desire to more effectively serve and support patients in orthopedic rehabilitation. The writer has worked as a music therapist in various rehabilitation centers for 17 years, the last 9 years of which were spent at the North Shore University Hospital Center for Rehabilitation in Manhasset, N.Y. In the past, this 249 bed facility serviced only 20% short-term rehabilitation patients, and 80% long-term care residents (Center for Rehabilitation, 2000 Admission/Discharge report). However, over the past 7 years, the facility has shifted to service largely short-term rehabilitation (currently 90% short-term). Of the total number of short-term rehabilitation patients admitted in 2011, 73% were admitted for orthopedic rehabilitation related to knee or hip arthroplasty, or surgical reconstruction for hip fracture. Year to date totals show a steady increase in admissions for short-term rehabilitation from 1,133 patients in 2005, to 2,746 patients in 2011 (Center for Rehabilitation, 2005 & 2011 Admission/Discharge Report). Likewise, there has been a steady decrease in admissions for long-term care from 66 patients in 2005, to 0 patients in 2011 (Center for Rehabilitation, 2005 & 2011 Admission/Discharge Report). This change has been reflected in the role, purpose and function of the music therapist in rehabilitation, as well as changes in planning appropriate goals and interventions.



**Problem Statement.**

Adult patients in orthopedic rehabilitation experience many challenges, distresses and painful experiences that require attention. The purpose of this study is to generate research data on the efficacy of music therapy in short-term orthopedic rehabilitation, apart from assisting goals that are addressed in physical, occupational and speech therapies. This writer hypothesizes that music therapy will significantly lower pain and anxiety among this population. This research study seeks to determine the effectiveness of traditional music therapy interventions in reducing specific dependent variables of pain and anxiety. This study will be a true experimental randomized controlled design that will examine music and its effects on pain and anxiety with a short-term adult rehabilitation population.

**Related Literature**

This review describes the characteristics of orthopedic rehabilitation, and presents literature that supports the use of music as a treatment for pain and anxiety among the adult orthopedic inpatient rehabilitation population. It presents evidence and findings that would support a study of the effects of music on pain and anxiety levels specifically with the short-term orthopedic adult rehabilitation population.

**Demographics of Orthopedic Patients**

Over 16 million people in the United States are affected by the most common articular disease known as osteoarthritis (Berry, Cuckler, Elliot, Hartley, & Vance, 2008). Some evidence of osteoarthritis is diagnosed in 70% of older adults (Berry et al.). Approximately 650,000 patients a year consult with a general practitioner with serious issues related to arthritis (Berry et al., 2008). Of these patients, about 450,000 are 65

years of age or older (Berry et al.). This disease is the most common form of arthritis and often leads to a degeneration of the hips and knees and, as a result of this damage, individuals are faced with decreased mobility, chronic pain, compromised quality of life, and severe pain and anxiety over the advancement of this disease process (Moser, Korstjens, Weijden, & Tange, 2010). Furthermore, the recommended procedure of total knee and hip replacements in orthopedic surgery is known to be one of the most painful surgeries (Pulido, Hardwick, Munro, May, & Dupes Rosa, 2010). This is due to the significant tissue and muscle repair and reconstruction. Patients who undergo total joint arthroplasty usually have a preexisting history of chronic pain, which further complicates pain management objectives. In the United States, about half a million total joint replacements are implemented annually (Berry et al., 2008).

Orthopedic adult patients undergoing rehabilitation for knee and hip arthroplasty or fractures were found to have been older and with a high body mass index (BMI) (Berry et al., 2008; Orbel, Johnson, Rowley, Espley, & Davey, 1998). Women were found to have undergone more knee replacements, whereas by way of comparison, men were found to have had more hip replacements (Berry et al., 2008). No differences were found between type of joint arthroplasty and education or race (Berry et al., 2008); however, there were differences found between gender and age: Women reported higher levels of pain and depression than men, and were found to be older. African-American patients were found to have had higher incidences of post-surgical depression than Caucasian participants (Berry et al., 2008).

Of the Orthopedic patients who have undergone successful knee and hip arthroplasty (more than one million annually in the United States), a significant number of patients

have reported chronic pain following surgeries for orthopedic problems: 28.1% for hip arthroplasty, 26% following hip fracture repair, and 18.4% after knee arthroplasty (Morrison et al., 2009). In a study by Morrison, Flanigan, Fischberg, Cintron and Siu (2009), chronic pain was observed to be correlated with anxiety and longer hospital and rehabilitation stays. Post operative pain management (Morrison et al., 2009) was found to have improved functional outcomes, reduced incidences of chronic pain and length of rehabilitation stay in orthopedic patients.

### **Characteristics of Inpatient Short-Term Rehabilitation Settings**

Following accidents or surgeries for orthopedic conditions, therapeutic exercises, such as physical and occupational therapy, are recommended approaches to successful rehabilitation (Reuter, Ziegelman, Lippke & Schwarzer, 2009). Patients who require rehabilitation services are generally transferred to an extended care facility after discharge from a hospital and usually assessed and evaluated by multiple disciplines, such as nursing, social work, dietary, rehabilitation services and therapeutic recreation. A plan of care is generated based on the patient's tolerance level and general health. Physical activity is needed to reduce pain and inflammation, improve health, restore patients to functional capacity and preserve rehabilitation outcomes (Ziegelman, Lippke, & Schwarzer, 2006).

### **Physical and Psychological Symptoms**

Patients present physical symptoms, such as pain, stiffness, pressure and swelling, most common in hip and knee replacements or fractures, in addition to a restricted range of motion. In many cases following surgeries, patients often complain of fatigue and physical exhaustion (Lin et al, 2011). Psychological symptoms experienced by patients

undergoing rehabilitation include a loss of independence, anxiety, depression and a decline in self-esteem (Lin et al.). Newly admitted rehabilitation patients who received orthopedic surgery often experience symptoms, such as periods of confusion, disorientation, delirium, a decline in activities of daily living, and a decrease in executive functioning (McCaffrey & Locsin, 2006).

### **Treatments and Services**

Prior to surgeries for orthopedic conditions, patients generally receive pharmacologic treatments for osteoarthritis, such as nonsteroidal anti-inflammatory drugs, and nonpharmacologic methods, such as exercise and outpatient physical therapy (Berry et al., 2008). Often when these treatments are ineffective, a total joint replacement is the suggested procedure.

Patients who are admitted to short-term rehabilitation facilities (three months maximum) are involved in physical and/or occupational therapy at least five days of the week and are often involved in receiving treatments in their rooms when not actively engaged in therapies, such as ice and heat applications, medications, and a treatment known as Continuous Passive Motion (CPM), in which patients are on a knee stretching machine while reclining in bed for two hours in the morning, and two hours in the evening.

Patients, particularly older adults and elderly, often report fatigue and increased pain and inflammation following engagement in intense therapeutic exercises, such as stretching, floor ambulation, stair climbing and weight bearing in standing positions (Ziegelman, Lippke, & Schwarzer, 2006). Studies have found that despite the positive potential benefits of regular physical activity, just 30% of older adults have reported

exercising regularly, and 50% of older adults who are not exercising regularly, do not have any intent to start a consistent exercise program in order to increase their physical activity (Ziegelman et al., 2006). The resulting fatigue, pain and anxiety experienced by many patients can complicate rehabilitation goals and processes. However, the recommended approach to rehabilitation is regular exercise and stretching with regular increases according to acquired strength and tolerance (Reuter, Ziegelmann, Lippke, & Schwarzer, 2009). In addition to motivating patients to perform difficult exercises, orthopedic rehabilitation also encourages patients to maintain safe physical activity after discharge.

Rehabilitation goals for patients who have had total joint replacements or reconstructive surgery for hip fractures include controlling pain and improving physical functioning and quality of life (Moser, Korstjens, Weijden, & Tange, 2010), reducing the impact of impairments, and enhancing the ability to perform life tasks as independently as possible (Kortte & Stevenson, 2012). Psychological interventions aimed at enhancing emotional adjustment and functional abilities addressed by rehabilitation therapists include reducing barriers such as stress, anxiety, pain and depression that often can impact the rehabilitation process.

Successful pain and anxiety management are an interdisciplinary process that requires interventions from other services in addition to traditional nursing care, such as medication and treatments (Morrison et al., 2008; Pulido et al., 2010). A systematic review (Goldberg & Morrison, 2007) of interventions to improve pain management did not find a specific intervention or discipline that consistently and successfully improved a patient's pain. Additional treatments and interventions, such as relaxation techniques,

deep breathing and music are needed in order to assist with pain and anxiety management.

### **Music and Pain**

Music therapy research on the reduction and management of pain has found that music diminishes the activity of the amygdala, which is related to the affective-emotional processes of pain (Whitehead-Pleaux, Zebrowski, Baryza, & Sheridan, 2007). The gate control theory (GCT) (Whitehead-Pleaux et al., 2007) holds that pain is transmitted to the brain through a neurological mechanism that can be altered and reduced by a stimulation of sensory neurons. It is believed that depression, relaxation states and anxiety affect a gating mechanism that controls pain signals to the brain (Whitehead-Pleaux et al.). Positron emission topography, known as PET scans, have shown that the limbic system and the endocrine system are stimulated by music's ability to release dopamine that produces pleasure, and endorphins that act as natural pain killers into the body. Exposure to preferred music has been found to diminish levels of pain in various populations including pediatric (Whitehead-Pleaux et al), surgical procedures (Lin et al., 2010), post-operative patients (Weller & Baker, 2011) and in chronic pain sufferers (Kenny & Faunce, 2004).

### **Music and Anxiety**

Research on music's effect on anxiety has demonstrated that patients preferred music that is played in a slow and stable manner as it is effective in promoting relaxation states (Gadberry, 2011). Similarly, Hammer (1996) found music and relaxation (GIM) to be a useful intervention in reducing stress and anxiety and achieving homeostasis. The

anxiety reducing effects of soft music can be traced back to early infancy as to the soothing benefits of singing lullabies to babies (Yehuda, 2010). Research in music and anxiety has suggested that the emotional nature of psychophysical cues inherent in music (sudden loud or soft sound) are processed as “emotional” and can produce biological changes, such as in fight or flight or relaxation responses (Yehuda, 2010). Personal memories and cultural significance of preferred music or styles are also important influences in reducing anxiety (Yehuda, 2010). Studies (Hanser, 1985; Knight & Rickard, 2001; Smith, 2004) have demonstrated the ability of various types of music to increase or decrease anxiety in individuals. However, it has been suggested that selecting music that is familiar to patients and relates to the patient’s subjective view e.g., participant-centered approach, is more effective in reducing anxiety than prescribing specific music for anxiety control e.g., experimenter-centered approach (Elliot, Polman & McGregor, 2011).

Music and its effects on anxiety has been a focus of research for many years especially in relation to veterans experiencing “Battle Fatigue” during World War II (Pelletier, 2004). Since then, music and its function in reducing anxiety has been applied and researched in many settings, including medical (surgery, medical procedures, dentistry, anesthesia, neurology, gynecology, labor and delivery, cardiac care), geriatric nursing care, occupational and educational settings (Schneider, Schedlowski, Schurmeyer & Becker, 2001), but not in adult rehabilitation. The rehabilitation setting often occurs after prescribed surgeries or medical procedures and often involves new stressors and expectations on patients, such as active participation and developments in physical

therapy programs, extended time away from home and a pre-occupation with their compensated ambulatory and medical status.

### **Music Therapy and Pain**

Music therapy is a “systematic process of intervention wherein the therapist helps the client to achieve health, using musical experiences and the relationships that develop through them as dynamic forces of change” (Bruscia, 1989, p.47). Music therapy in physical rehabilitation seeks to assist the patient in improving, restoring, or maintaining aspects of his or her functioning (Clair, 1996).

Pain is a common problem encountered by rehabilitation patients that can severely limit effective participation in rehabilitation programs (McCaffrey, 2008). Music therapy was found to have lowered a participant’s perception of pain, by engaging in the creative process and achieving a sense of personal control involved in active music making, improvisation and song writing (Clair, 1996). Music therapy literature has presented evidence that supports its application as an effective treatment by decreasing pain perception and increasing pain tolerance, as well as serving as a distraction from the pain (Kim & Koh, 2005; Mitchell & MacDonald, 2006; McCaffrey, 2008; Lin, Lin, Huang, Hsu & Lin, 2011). Findings on these experimental quantitative studies (Kim & Koh, 2005; Mitchell & MacDonald, 2006; McCaffrey, 2008; Lin, Lin, Huang, Hsu & Lin, 2011) present evidence on the effects of music by use of various measurement scales, such as the Visual Analogue Scale and McGill Pain Questionnaires. In a study by Mitchell and MacDonald (2006), preferred music listening was found to have had a greater effect of control over pain perception and intensity as compared to relaxing music or control group. In another similar study by McCaffrey and Freeman with a large



sample of 66 adults with chronic osteoarthritis pain (McCaffrey, 2008), the music listening group reported less pain than the control group. A significant difference in pre and post test scores in repeated measures was detected in the music group, when compared to the non-music control group. On the contrary, a study conducted by Kim and Koh (2005) of the effects of music on pain perception of patients undergoing upper extremity joint exercises in rehabilitation, found no significant difference in levels of pain across three music conditions (songs that include vocal melodies, musical accompaniment with no vocal melodies, and no music control group); however, positive affects and verbal responses were noted while patients were engaged in physical therapy with both music conditions. In an exploratory experimental study that employed both qualitative and quantitative measures, music therapy was found to have significantly reduced pain and anxiety and enhanced relaxation in pediatric patients (Whitehead-Pleaux et al., 2007). Literature in related disciplines (e.g. psychology, physical and occupational therapy) has included findings that describe the nature of chronic pain and how it is often related to anxiety and depression (Simon, 2001; Lao et al., 2012). In summary, music therapy appears to be effective at addressing pain perception and tolerance that are a common need among this population.

### **Music Therapy and Anxiety**

Anxiety is often found among the adult inpatient rehabilitation population as a result of environmental conditions, medical procedures and therapy schedules. The literature includes experimental quantitative studies on the effectiveness of music therapy in reducing anxiety and presents findings that support the use of music therapy as a treatment modality. These findings also present effective interventions aimed at reducing

stress and anxiety symptoms. Measurement scales used in these studies include the Visual Analog Scale (VAS), State-Trait-Anxiety Inventory (STAI) (Spielberger) and physiological testing. In a meta-analysis of the effects of music on decreasing stress by Pelletier (2004), a statistically significant overall mean effect size was calculated for studies that used music combined with relaxation techniques. This study found individual sessions, music with slower tempos, absence of lyrics and stability of dynamics and tempos to be the most effective intervention. These specific interventions could be applied to rehabilitation patients. Another similar study of the effectiveness of relaxing music on anxiety control found music with slow tempos (80-100 beats per minute) to be the most effective in reducing anxiety (Elliott, McGregor & Polman 2011). Other important musical elements were studied in terms of their tendency to reduce anxiety, including harmony, melody, rhythm, dynamics, tempo, timber and beat. Gadberry (2011) conducted a study with 36 adults, and found that participants who listened to a steady beat reported significant less overall anxiety in post-test measures when compared to participants in a control group. Similarly, in a research study of the effects of guided imagery and music, relaxation states were found useful in reducing stress and anxiety (Hammer, 2012). Likewise, in a study of 63 adults by Smith and Joyce (2004), classical and new age music were found to be effective in reducing stress and producing relaxation states, as detected in post-test measures over three sessions. Smith and Joyce (2004) compared the effects of participants who either listened to a 28 minute recording of Mozart's *Eine Klein Nachtmusik*, or a 28 minute recording of Steven Halpern's *New Age Serenity Suite*, in addition to a third group who received no music. Results of this study by Smith and Joyce (2004) indicate that participants who listened to

Mozart displayed less stress and more psychological relaxation when compared to those who listened to the new age music or non music control group.

In a study by Walworth (2003), 90 participants were randomized to three groups, and preferred music genre and song selection were both found equally effective at reducing anxiety when compared to a non-music control group. Knight and Rickard (2001) studied music and relaxation and its related effects on physiological responses with 87 adults, and found that stress-induced increases were each prevented by exposure to music. These findings present evidence based support of music as a beneficial anxiolytic treatment for stress and anxiety. In a similar study, physiological measures were also used by Schneider, Schedlowski, Schurmeyer, and Becker (2001); physiological measures of stress hormones, blood pressure and heart rate were significantly affected by the exposure to music in addition to positive results on self-reported measures. In a RCT with 60 older adults conducted by Sung, Lee, Li and Watson (2011) regarding the effects of group music therapy at diminishing agitation and anxiety, older adults who had received music therapy showed a lower anxiety score in repeated measures when compared to those in a control group. Therefore, music therapy appears to be a beneficial anxiolytic treatment at reducing the damaging and negative effects of anxiety in a number of various settings and situations, especially those that are prevalent among the rehabilitation population.

### **Music Therapy and Rehabilitation**

Primary goals and interventions of music therapy in physical rehabilitation include increasing range of motion in upper and lower extremities, improving gait and balance, and increasing gross and fine motor control through movement to music, and instrumental play (Clair, 1996). Cardiac and respiratory patients benefit from the use of

music therapy in cardiovascular rehabilitation involving meditation, relaxation, toning and singing (Clair, 1996). Goals for speech rehabilitation involve the use of singing to promote speech rehabilitation, by applying various interventions, such as melodic intonation therapy (Clair, 1996).

Music therapy research studies conducted with rehabilitation patients support the use of music therapy as a valid intervention in assisting to meet goals addressed in physical therapy. Studies in the music therapy literature, (Paul & Ramsey, 2000; Lim, Miller, & Fabian, 2011; Weller & Baker, 2009; Lin et al., 2011) document findings of the use of music therapy in addressing issues, needs and problems that are specific for this population, such as pain, stress and anxiety. Weller and Baker (2011) presented findings that suggest the efficacy of music therapy in enhancing physical, cognitive, psychological and emotional functioning specific to common types of diagnoses encountered in rehabilitation (e.g. cardiac, orthopedic and neurologic). In another study, cardiac patients receiving music therapy demonstrated positive health related outcomes, such as a large decrease in systolic blood pressure and a reduction in perceived stress when compared to patients receiving only cardiac care (Mandel, Hanser, Secic, & Davis, 2007).

Research by Lim, Miller, and Fabian (2011) on the effects of a neurologic music therapy (NMT) sensory-motor rehabilitation technique called Therapeutic Instrumental Music Performance (TIMP), were compared to a Traditional Occupational Therapy group in terms of its ability to reduce fatigue levels and perceived exertion. This study found statistically significant differences with patients receiving music therapy as compared to a control group receiving only rehabilitation. Thirty five patients in this study were randomly assigned to a single individual session, and were diagnosed with a neurologic

disorder, or had recently received orthopedic surgery for total hip or knee replacement (Lim, Miller, & Fabian, 2011). However, a recent study of a neurologic music therapy sensorimotor intervention called Patterned Sensory Enhancement (PSE) and group exercise conducted by Imogen (2012), employed a moderately sized sample of 24 adult patients and showed no significant changes in mood or exercise participation outcomes when compared to a non-music therapy control group.

### **Medical Music Therapy**

Medical music therapy is known as “the use of music therapy strategies in the treatment of illness and the maintenance of health” (Coleman & King, 2008, para. 1). Medical music therapy is provided in medical settings, such as surgery, recovery, acute care, and inpatient rehabilitation (Aldridge, 1993). Goals addressed in medical music therapy often include using music to affect biomedical or psychosocial states, such as pain, stress, anxiety, immunity, heart rate and respiration (Coleman & King, 2008). Music is also used in medical settings to mask ambient noise, such as mechanical and electronic sounds, or to assist in auditory stimulation or biofeedback by providing music for progressive muscle relaxation (Coleman & King, 2008).

Medical music therapy literature has presented findings of the positive benefits of using music therapy to treat patients in medical and rehabilitation settings by addressing common specific problems, such as pain, stress and anxiety. Several studies have demonstrated music therapy’s effectiveness at reducing pain, anxiety and mood in interdisciplinary medical settings (Aldridge, 1993; Steckler, 1998; Schneider, Schedlowski, Schurmeyer, & Becker, 2001). Aldridge (1993) presented positive physiological outcomes of music therapy on blood pressure levels and heart rate in

patients with cardiac or respiratory illnesses, and its correlation to reducing anxiety and stress. A decrease in systolic blood pressure and a beneficial mood change from anxiety to a calm state was observed when sedative music was played (Aldridge, 1993).

Similarly, Steckler (1998) found a positive correlation between the therapeutic effects of music therapy in lowering blood pressure and a reduction in perceived stress and anxiety. Blood pressure and heart rate were seen to increase the least when participants engaged in stressful tasks while listening to music chosen and preferred by the participants (Steckler, 1998).

### **Summary**

As reviewed, there is a prevalence of pain and anxiety within the short-term orthopedic rehabilitation population. Pain and anxiety are significant issues faced by this group that can interfere with the ability to sleep, affect rehabilitation outcomes, and increase length of stay. Because research demonstrates the effectiveness of music therapy at diminishing pain and anxiety, especially with older adults and elderly patients, it is logical to assume that music therapy would be effective in addressing these issues with adult short-term inpatient orthopedic patients. This review demonstrates a need for this research due to a limited number of studies on this topic. It is important to address patients' pain and anxiety within an interdisciplinary team approach that aims to improve emotional and physical functioning, help a patient progress in therapy and minimize his or her length of stay. The findings presented in the aforementioned studies highlight the effectiveness of music therapy in reducing pain and anxiety in adult inpatient short-term orthopedic rehabilitation and support the need for further evidence-based research.

## **Method**

### **Participants and sampling**

This research study was a randomized controlled trial, experimental design that was naturally observed in a rehabilitation setting. Thirty individuals who met inclusion criteria were considered for this study. They were contacted, informed of the study and invited to participate. Out of those invited, 10 participants who agreed to participate were assigned to the study. The participants were 10 patients recruited from the Center for Extended Care and Rehabilitation, North Shore University Hospital in Manhasset, N.Y., and were assigned randomly to either the music therapy group or non-music therapy control group. Inclusion criteria requirements were as follows: age of 55 years or older, admitted to facility within seven days in order to secure patient availability throughout the study prior to discharge from facility, admitted with a diagnosis related to lower extremity orthopedic problems (e.g. hip fractures, unilateral total knee and hip arthroplasty), no other medical or psychiatric complications, they must be English speaking, possess competent cognitive ability, adequate hearing functioning and communicatory receptiveness, and have never received music therapy by researcher at North Shore LIJ. A total of 10 patients who met the inclusion criteria were invited to participate in the study. Participants provided informed consent and volunteered to participate in the study after receiving a verbal and written description of the nature, purpose and confidentiality of the study. Ethical approval was obtained from both the Molloy College Institutional Review Board (Appendix A) and the North Shore LIJ health system's IRB (Appendix B). A written description of the nature, purpose and confidentiality of the study was provided to the participants prior to obtaining written

consent (Appendix C). Participants were blindly and randomly assigned by draw to either individual music therapy or the rehabilitation treatment-as-usual control group in order to minimize potential bias, in addition to maintaining many consistent variables, such as similar settings, therapist and time of treatments, in order to control internal validity. In the experimental group, an intention to-treat analysis was considered to control attrition bias.

### **Sample Size and Power Estimations**

A power analysis for a one-tailed t-test revealed that the study will have .28 power to detect a large mean difference (Cohen's  $d = 1$ ) between groups, (experimental and control) with 5 participants each, and an alpha level of .05.

### **Traditional Music Therapy Interventions**

Participants ( $n = 5$ ) were seen at bedside or in their rooms for eight individual music therapy visits (30 minutes, two times a week for 3 weeks) in the late afternoon or evening, in order to secure availability from daily rehabilitation schedules and to maintain consistency. The same music therapist (primary investigator) provided a selection of melodic and percussive instruments for patient selection (chimes, bells, rain stick, ocean drum and shakers) in addition to a portable keyboard and guitar to be used by the therapist.

Music therapy individual sessions consisted of a combination of singing, instrumental play, improvisation, and movement to music. Sessions were structured in a consistent manner that included four steps: 1) greeting 2) preferred music experiences, i.e., singing, instrumental activity, improvisation, relaxation, 3) verbal processing (if relevant), and 4) closing. To address patients' anxiety, the use of instrumental music



with stable tempos and dynamics were used and played in slower tempos of 80-100 beats per minute (Pelletier, 2004). Patient preference in musical selection was applied as evidenced in studies of music in the reduction of pain and anxiety (Mitchell & MacDonald, 2006; Walworth, 2003).

### **Outcome Measurements**

All participants who participated in the study were asked to complete a demographics questionnaire (Appendix D), and were assessed at baseline and pre and post intervention for pain and anxiety as perceived by the patient using the Visual Analogue Scale (VAS) (Appendix E) (Gadberry, 2011; Lin et al., 2011; McCaffrey, 2008; Mitchell & MacDonald, 2006) and the State-Trait Anxiety Inventory (STAI) (Appendix F). The VAS has good validity, reliability and high internal consistency (Cronbach's  $\alpha=0.70$ ), and consists of a 100 mm long horizontal line that patients were asked to place a written mark at the level of their perceived pain and anxiety (Cuckler & Berry, 2008; McCaffrey, 2008; Williams, Morlock, & Feltner 2010). This instrument has been found to be easy and convenient to use (Lin et al., 2011), and has been used in many studies to evaluate subjective phenomena such as perceptions and sensations. The VAS test was used to evaluate patient's current subjective state anxiety and pain perception.

Participants were also assessed for anxiety with the state portion of the State-Trait Anxiety Inventory developed by Spielberger in 1970 (STAI) (Lin et al., 2011; Quek et al., 2004; Walworth, 2003). The State portion of the STAI is a 20 item scale that measured the frequency of occurrences of a variety of anxiety symptoms in different situations. State anxiety is known as an individual's transitory subjective anxiety; it

measured how individuals felt at a specific moment in time. Only the state measure of anxiety was used as this study was interested in the effects of music intervention on patients' current anxiety and not individual personality or anxiety traits. The response format is a four point Likert Scale from "almost never" to "always"; the total possible score is 20-80 depending on anxiety levels. The STAI is a highly valid and reliable measure of anxiety and has a Cronbach's alpha value of 0.86 (Quek et al., 2004).

After each music therapy session, participants in the experimental music group completed a short questionnaire (Appendix G), (administered by a separate individual who was blinded to the participants identity) in order to determine if music was helpful in decreasing their pain and anxiety.

### **Procedures and Data Collection**

Music therapy interventions consisted of traditional music therapy interventions in order to establish an independent variable (popular songs for ages of 55+) and were predetermined to create a stable experimental condition. The dependent variable of pain and anxiety was assessed by a separate individual that was blinded as to the assignment status and identity of the participants (numbers were assigned to identify each participant) and was not involved in implementing any aspect of the intervention (music or control group). Participants who were assigned to the control group (n = 5) only received usual nursing care and rehabilitation services and did not receive any music therapy services. Patients assigned to the experimental music group also received nursing and rehabilitation services. Both groups received similar care outside of music therapy. Data was collected (VAS pain, VAS anxiety, and STAI) pre and post interventions in both

groups by an assessor. All data was charted on a computer flow sheet by a volunteer (health care practitioner).

### **Statistical Methods**

Descriptive statistics were generated for variability of interest and sample characteristics in baseline demographics. Standard deviations (SD) and means were given to continuous variables. Calculations of numbers and percentages were displayed for variables. To compare the differences between two groups, (experimental and control), and in evaluating pre and post intervention test scores of pain and anxiety for repeated measures, a hierarchical linear mixed model was incorporated. The mixed model was utilized for simple descriptive calculations for the VAS instrument, and in more complex analysis for the STAI. The mixed model introduced random and fixed effects into the analysis that enabled multiple sources of variation such as within and between subject variations.

### **Results**

All of the individuals ( $N = 10$ ) who participated in this study completed all questionnaires within three weeks. Those randomly assigned to the experimental conditions, ( $n = 5$ ) participated in 8 music therapy sessions. There was no drop out among all the participants (see Figure 1 for participant flow diagram). These participants met inclusion criteria and were chosen from recent admissions in inpatient rehabilitation (see Table 1 for demographic information). All ten participants were admitted with a diagnosis of knee or hip replacement, and hip fracture, and each received physical therapy 6 days a week.

**Statistical Analysis**

All data obtained from STAI (anxiety) and VAS (pain and anxiety) were analyzed by a hierarchical linear mixed model that incorporated correlated errors within subjects. Repeated measures (pre-post variable nested within sessions) were modeled with a first order autoregressive covariance structure. A simple analysis was conducted for the VAS mean scores for pain and anxiety (see Table 2 for VAS and STAI Pain and Anxiety means); however, due to the complexity of the STAI questionnaire, the statistical analysis was more complex. For the STAI, the linear mixed model tested for the fixed effects of session, pre-post, experimental and control conditions, and all possible interactions between them.

Figure 1. Flow diagram of patient recruitment and allocation

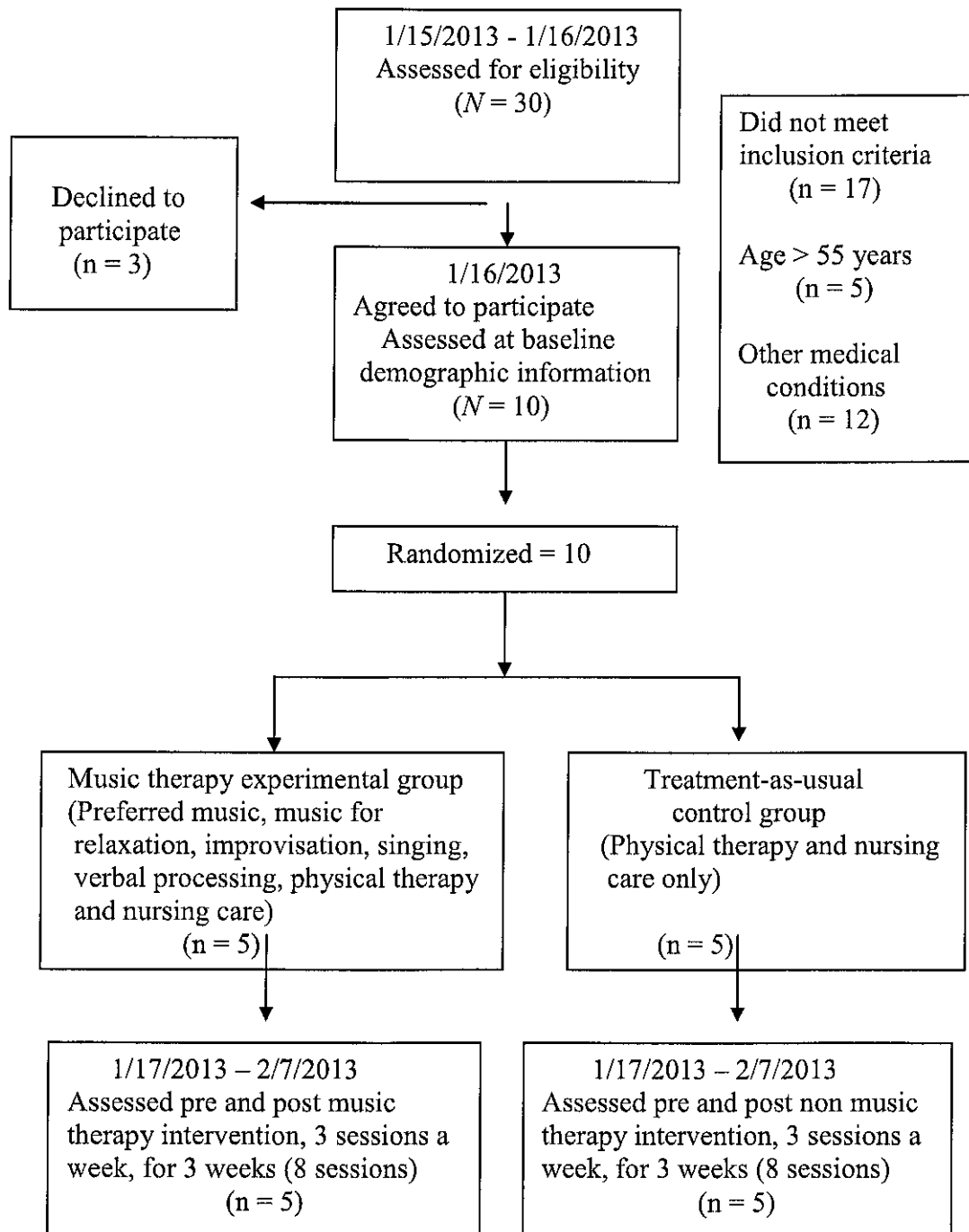


Table 1.  
Baseline demographic information

Variable	Experimental (n = 5)			Control (n = 5)		
	<i>F</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>M</i>	<i>SD</i>
Gender						
Male	1			2		
Female	4			3		
Age		70	14.61		62.4	4.87
Marital Status						
Married	1			4		
Never Married	2			1		
Widowed	2					
Separated				1		
Race/Ethnicity						
White	3			4		
African-American	2			1		
Religious Affiliation						
Roman Catholic	3			2		
Christian	2			1		
Jewish				1		
None				1		
Education						
High School	3			3		
Graduate						
Some College Credit	1					
College Graduate	1			2		
Employment Status						
Retired	3			2		
Full-Time	2			2		
Part-Time				1		
Employment Type						
Long Periods of Sitting	2			1		
Long Periods of Standing	1			1		
Long periods of Walking				1		
Primary Residence						
New York City	2			3		
Nassau County	3			1		
Suffolk County				1		
Musical Background						
Listened to Music						
Sometimes	2			4		
Listened to Music						
Often	3			1		
Received Musical						
Training	1			2		

Table 1.  
Baseline demographic information (Cont.)

Variable	Experimental (n = 5)		Control (n = 5)	
	F	%	F	%
Musical Background *				
Attended Broadway Musicals	3		3	
Attended Live Concerts	3		4	
Sang in Church Choir	3		2	
Played in a Musical Ensemble			1	
Used Music for Pain or Anxiety	5		4	
Diagnosis Information (Elective Surgical Procedure)				
Therapeutic Knee Replacement (TKR)	1	20	2	40
Both Knee Replacement (BKR)	1	20		
Therapeutic Hip Replacement (THR)	2	40	2	40
Diagnosis Information (Non-Elective Surgical Procedure)				
Hip Fracture and Reconstruction **	1	20	1	20

*F* = Frequency *M* = Mean *SD* = Standard Deviation % = Percentage

Note. \* In this category, participants selected all that apply.

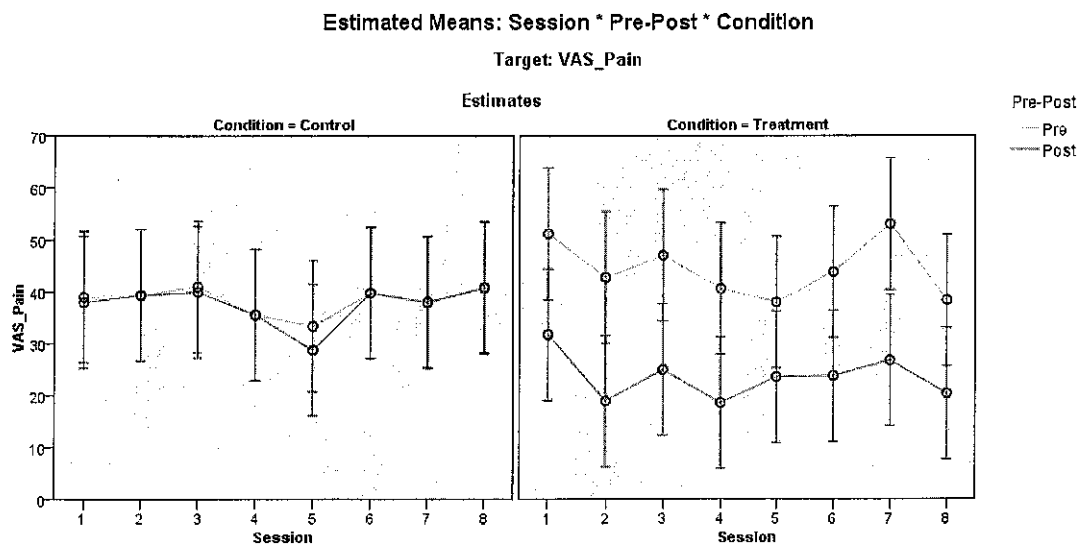
\*\* Non-elective surgical procedures were due to a fall or accident.

Table 2  
Mean scores for VAS Pain, VAS Anxiety, and STAI in pre and post measures

Instrument	Experimental		Control	
	Pre	Post	Pre	Post
VAS Pain	44.35	23.62	38.37	37.55
VAS Anxiety	43.65	13.75	35.45	35.38
STAI (Anxiety)	48.50	34.45	44.08	44.08

### Effects of Music Therapy on Patients' Pain

Figure 2  
Progression of VAS pain pre-post scores throughout course of study (three weeks).



Note. Treatment condition is the experimental group receiving music therapy.

Hypothesis 1. Participants who receive music therapy will demonstrate lower post-test pain levels than patients who do not receive music therapy.

The results of the analysis showed a greater difference between pre ( $M = 44.35$ ,  $SD = 15.04$ ) and post ( $M = 23.62$ ,  $SD = 12.43$ ) mean pain scores in the experimental group

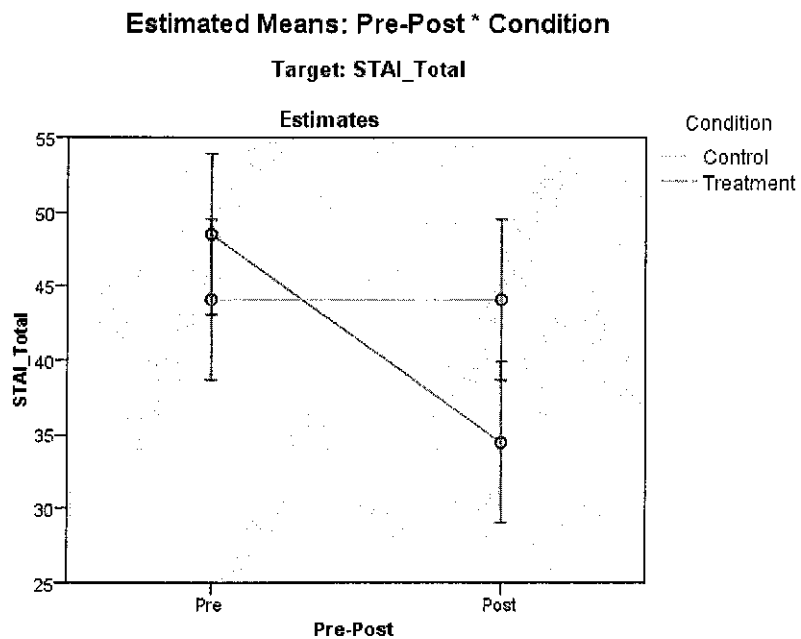


receiving music therapy when compared to the control group, pre ( $M = 38.37$ ,  $SD = 13.30$ ) and post ( $M = 37.55$ ,  $SD = 13.66$ ) mean pain scores. See Figure 2 for between subjects comparison of VAS pain pre-post scores throughout course of study.

### Effects of Music Therapy on Patients' Anxiety

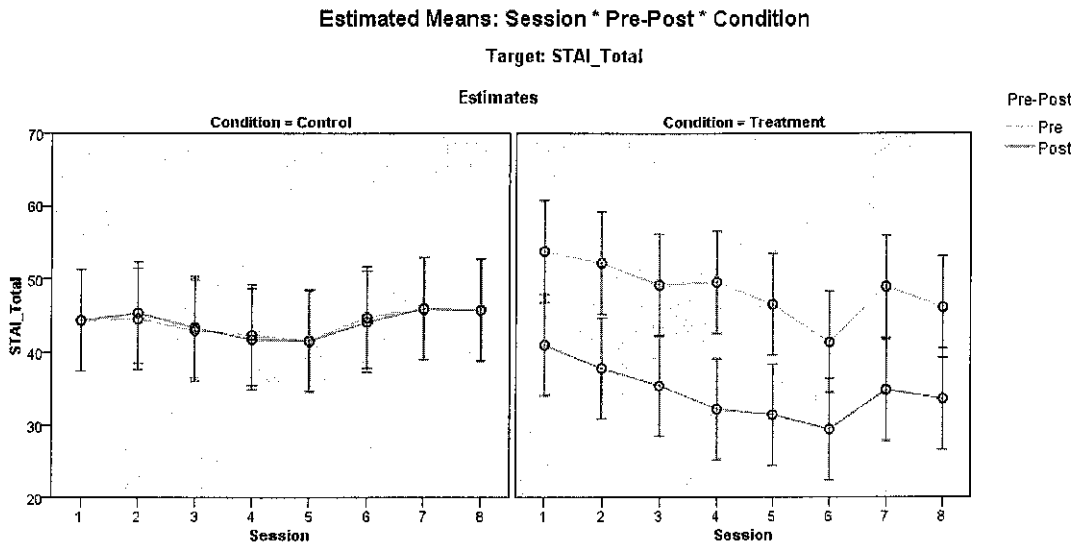
Figure 3

STAI means of pre to post comparison in experimental ( $M = 48-34$ ), and control ( $M = 44-44$ ) conditions



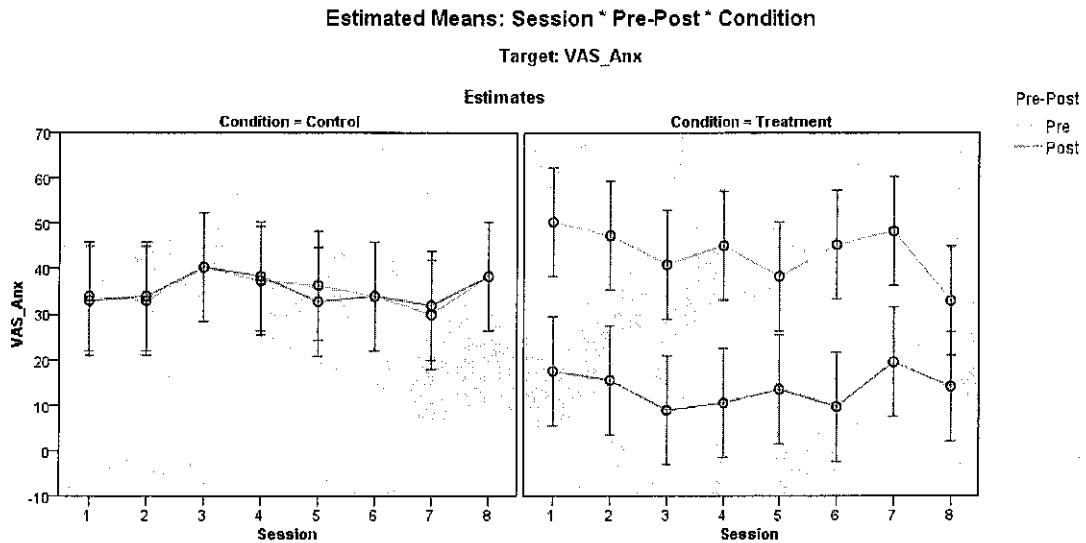
Note. Treatment condition is the experimental group receiving music therapy.

Figure 4  
 STAI conditional means displaying how participants changed over time in pre-post measures



Note. Treatment condition is the experimental group receiving music therapy

Figure 5  
VAS (Anxiety) conditional means displaying how participants changed over time in pre-post measures



Note. Treatment condition is the experimental group receiving music therapy.

Table 3  
STAI within and between subjects scores for experimental, pre-post and session

	Between subjects <u>Experimental</u>		Within Subjects <u>Pre-Post</u>		Within Subjects <u>Session</u>		Pre-post x <u>Experimental</u>	
	$\beta$	$P$	$\beta$	$P$	$\beta$	$P$	$\beta$	$P$
Beta								
Coefficients	12.2	.015	12.6	.000*	4.8	.038	-12.6	.000*

Note.  $\beta$  = Beta Coefficients  $P$  = Significance level  
\*  $P < .001$

Table 4  
STAI comparison of means in experimental and control groups

	Experimental			Control		
	<i>M</i>	<i>SD</i>	95% <i>CI</i>	<i>M</i>	<i>SD</i>	95% <i>CI</i>
Pre	48.50	2.74	43.08-53.92	44.08	2.74	38.66-49.50
Post	34.45	2.74	29.03-39.88	44.08	2.74	38.66-49.50

Note. *M* = Means *SD* = Standard Deviation *CI* = Confidence Interval

Table 5  
STAI pairwise contrasts of within subjects control condition and between subjects experimental condition variable in pre and post measures.

	Contrast Estimates		<i>F</i>	<i>df1</i>	<i>df2</i>	<i>p</i>
Pre	-4.425	4.25	1.30	1	128	0.256
Post	9.63	-9.63	6.17	1	128	0.014*

Note. *F* = Distribution Variable *df* = Distribution function *p* = Significance Level  
\*  $P < .05$

Hypothesis 2. Participants who receive music therapy will demonstrate lower post-test anxiety levels than patients who do not receive music therapy.

The linear mixed model tested for the fixed effects of session, pre-post, experimental condition and all possible interactions between them (see Table 3 for results). The analysis of STAI data revealed a significant interaction between pre-post and the experimental condition, (-12.6,  $p = .000$ ). Also, the pre vs. post, condition, and session variables all had a significant main effect on the STAI scores. On average, pre scores were 12.6 points higher than post STAI scores. Participants in the control group scored an average of 12.2 higher on the STAI than those in the experimental condition (beta effect size 12.2).

The results of the analysis of the VAS for Anxiety showed a greater difference between pre ( $M = 43.65$ ,  $SD = 16.02$ ) and post ( $M = 13.75$ ,  $SD = 7.40$ ) mean anxiety scores in the experimental group receiving music therapy when compared to the control group, pre ( $M = 35.45$ ,  $SD = 12.82$ ) and post ( $M = 35.38$ ,  $SD = 12.47$ ) mean anxiety scores.

The results of the analysis indicate that treatment has an effect on post, but not pre assessments. Figures three and four, and Tables four and five indicate how the means differ by pre-post and condition. In the post condition, participants in the experimental group receiving music therapy ( $M = 34.45$ ) had significantly lower STAI scores than those in the control condition ( $M = 44.08$ ),  $p = .01$ . Likewise, the results of the VAS on participants' anxiety revealed a lower score after the music therapy intervention when compared to the control condition (see Figure 5 for comparison of VAS scores for anxiety). Treatment is effective at changing symptoms right after the session; however, this effect does not seem to be sustained (e.g., subsequent sessions do not show significantly different rates of improvement or starting baselines).

### **Music Therapy Questionnaires**

Participants in the experimental group who received music therapy ( $N = 5$ ) completed an open ended subjective questionnaire after the eighth and final session.

### **Pain**

When asked if music therapy had an effect on pain, all five participants answered yes. When asked how, participant #1 claimed that it had a calming effect and gave her a good feeling overall. Participant #2 said it helped her to relax and take her mind off the pain. The pain was more tolerable with the music. Participant #3 claimed it took his

mind off the pain. Participant #4 said it helped her to focus on her strengths. Participant #5 expressed that the pain seemed less throbbing after the music, and was more able to tolerate the pain.

When asked which type of music or musical activity was most helpful with issues of pain, participant #1 stated that the music therapist asked what she wanted, and after discussing it, she thought she would like church music. She claimed that old familiar church music was most helpful. Participant #2 expressed that it was playing songs that were familiar to her, like Amazing Grace and Ave Maria. Participant #3 claimed that it was songs that were meaningful to him (Irish songs such as Danny Boy). Participant #4 reported that it was in listening to music that she loved, such as spiritual hymns and gospel music that helped to take away the pain. Participant #5 claimed that it was the familiar music that was personal to her, that seemed to have an effect.

When questioned about musical experiences that were not helpful with pain, Participant #2 stated that he disliked music that was too fast and loud. Participant #3 found Jazz music unhelpful in reducing her pain, and patient #5 did not enjoy over stimulating or loud music.

### **Anxiety**

In terms of types of music or musical activities that were helpful in reducing anxiety, Participant #1 reported old church music most comforting. Participant #2 felt that slow piano instrumental music helped her to relax. Participant #3 claimed the songs that relaxed her were slow and steady. Participant #4 reported the slow and soft spiritual worship songs effective in reducing her stress and anxiety, in addition to talking about the songs and lyrics afterwards, which she found comforting. Participant #5 stated it was the

soft relaxing music such as spirituals, gospel, and classical music that helped her find peace.

Musical experiences not helpful in reducing anxiety were playing instruments (participant #2), and Jazz music (participant #3).

### **Environment**

When asked for feedback on the environment where music therapy was conducted, participant #1 reported that listening in a comfortable position in her bed was the most helpful. Participant #2 claimed that the music helped her to relax in her room at a time that she needed it. She was able to sleep throughout the night as a result of the music therapy. Participant #3 stated that he felt more comfortable having music therapy in his room. Participant #4 reported that she enjoyed the music in her private room, as she felt more at home. Participant #5 shared that she was somehow able to enjoy the music in her room, even though as a double room it was small and cramped.

### **Suggestions**

Suggestions or comments were as follows: participant #1 stressed the importance of comfort and safety during the sessions. Participant #2 said the service of music therapy was helpful for people like her who were going through a difficult time. Participant #3 reported that he was glad that the therapist was persistent and found something that he loved (type of music). He stated that for him, music was the best medicine. Participant #4 claimed she felt a close connection to the music like she never experienced before. She stated that the music therapist and she became close in a very short time. Participant #5 felt that music therapy should be more available for patients going through rehabilitation.

### **Analysis of Music Therapy Questionnaires**

Of the five participants in the experimental group, five patients (100%) reported an effect on their pain as a result of receiving music therapy. Three participants (60%) reported that the music therapy affected their perception of pain, while two participants (40%) claimed that their pain became more tolerable. All five participants (100%) generally reported preferred music (i.e. songs that are meaningful, familiar or loved) as the most successful intervention in reducing their pain.

Of the five participants in the experimental group, five (100%) generally reported soft music (e.g. instrumental, spirituals, church music) played at a slow tempo the most effective in reducing their anxiety.

### **Discussion**

In this section, I will describe and compare baseline demographic information from the experimental and control conditions, and discuss how this may have affected the results. The results of this present study of music therapy on pain and anxiety will be compared and contrasted to recent similar RCT studies in terms of procedure, methodology, population, sample size findings, and length of study. Music therapy interventions used for pain and anxiety reduction will also be described and discussed in terms of responses from music therapy questionnaires, past research, specific interventions (songs, improvisations), and therapist style.

### **Demographic Characteristics**

Baseline demographic information was obtained from all participants in this present study. The average age of participants in the experimental group was 70, and 62.4 for the control group. Participants who received music therapy were on average 7.6 years older



than those in the control group. These sample characteristics might have affected the results in favor of music therapy as a pain and anxiety management intervention for older adults who have a tendency to experience more pain and anxiety and require longer time to heal (McCaffrey & Locsin, 2006; Ziegelman, Lippke, & Schwarzer, 2006). In addition, two participants were widowed, and only one participant in the experimental group reported being currently married, while four participants were married in the control group. This might have been a characteristic of the older experimental group, in terms of having less support from family members that may have contributed to an increase in pain and anxiety. All other sample characteristics, such as gender, race, religious affiliation, education, employment status, geographic residence and musical background were generally balanced between the experimental and control groups. For example, results of religious affiliation showed three Roman Catholic participants in the experimental group, and two in the control, two Christians in the experimental, and one in the control; and in the control group, one Jewish and one that claimed no religious affiliation. Results of education showed three participants graduated from high school in the experimental group, and three in the control. In the experimental group, one participant reported some college credit, and one a college graduate, and in the control, two participants were college graduates. In terms of musical backgrounds, three participants in the experimental group reported listening to music often and only one in the control. In the control group, four individuals reported listening to music sometimes, and two in the experimental. However, participants from both groups reported attending Broadway musicals, concerts and church related musical activities equally. Furthermore,

participants' orthopedic diagnoses were equal between both the experimental and control groups.

### **Music Therapy and Pain**

The results of the present study as measured by the VAS, showed that pain levels were lower in the experimental groups' comparison of pre-test and post-tests scores when compared to the control group. This result was sustained over time (8 sessions), and confirms the first hypothesis that post-test measures of pain will be lower in the group receiving music therapy, when compared to the control group. This is in agreement with results of previous studies related to the use of music therapy for pain that are specific to post-surgical patients and the adult medical population in general (Kwon, Kim, & Park, 2006; Lin, Lin, Huang, Hsu, & Lin, 2011; McCaffrey, 2008). In the study by Kwon, Kim, and Park, (2006), patients with leg fractures who received music therapy showed statistically significant differences in pain levels as revealed by the numeric pain score ( $p < 0.001$ ) when compared to the control condition. This RCT study by Kwon, Kim, and Park was similar to the present study due to the population of orthopedic problems, and the use of the numeric pain scale with three repeated measures, however, differences lie in the use of a large sample of 40 participants. Similarly, Lin et al. (2011) found VAS pain scores for pre and post-operative spinal surgery patients lower and statistically significant in the group receiving music therapy when compared to the control group ( $p < 0.05$ ). This RCT study by Lin et al. was similar to the present study in terms of the focus on orthopedic patients in a post-op setting, and the use of the VAS scale for pain; however, measurements were taken one time only as compared to the present study which measures eight times. In a randomized controlled trial by McCaffrey (2008) of

music and its effects on pain on older adults after knee and hip surgery, the experimental group showed lower pain scores when compared to the control condition ( $f = 96.00, p = .000$ ). Similarly, this study by McCaffrey was very similar to the present study in the specific population of hip and knee post-op orthopedic patients; however, a large sample of 124 patients was employed, and measurements were recorded one time only.

Although these studies presented here for comparison show similar significant effects of music therapy in reducing pain in post-op patients when compared to a control condition, they differ in terms of the rehabilitation setting, and the need for repeated measures throughout admission.

Participants in this study who received the music therapy intervention reported an increase in pain tolerance or a reduction in pain perception by the ability of music to distract one's attention or his or her mind off the pain. This supports studies of the Gate Control Theory (Kwon, Kim, & Park, 2006; Liu, Chang, & Chen, 2010; Whitehead-Pleaux, Zebrowski, Baryza, & Sheridan, 2007) that claims music can serve as a distraction from or a reduction of pain by decreasing the transfer of messages to the brain stems reticular activating system and to the thalamus. Pain discomfort is decreased due to a signal that is sent to the spinal chord, which results in a closing of the gateway. In addition to pain reduction, several related effects of music that were not tested in this present study, but previously researched, include the ability to help one focus, to distract, and to stimulate the pleasure response by the brain's release of pleasure producing dopamine and pain relieving endorphins (Whitehead-Pleaux et al., 2007).

### **Music Therapy Interventions for Pain Reduction**

Participants selected preferred music that was familiar as most helpful in reducing their pain. This supports previous studies (Lin, Lin, Huang, Hsu, & Lin, 2011; Mitchell & MacDonald, 2006; Weller & Baker, 2011) that found preferred and familiar music most effective in reducing pain. In the study conducted by Mitchell and MacDonald (2006), results of the VAS revealed that familiar preferred music was more effective in tolerating pain and achieving a sense of control over the pain when compared to relaxing music or control condition ( $p = .001$ ).

Several songs preferred and chosen by participants were used and discussed during the sessions with the therapist, such as “Amazing Grace” (Newton, 1779), “Ave Maria” (Schubert, 1825), “Precious Lord” (Allen, 1844), “It is Well With My Soul” (Bliss & Spafford, n.d.), “Let it Be” (The Beatles, 1970), “Danny Boy” (Weatherly, 1910), “Que Sera, Sera-Whatever Will Be, Will Be” (Evans & Livingston, 1956), and “What a Wonderful World” (Thiele & Weiss, 1967). Sixty percent of participants who received music therapy, and were in a medium to high degree of pain, disliked music that was played in a fast tempo or high volume. Particularly, jazz and overly stimulating music was not preferred, such as “In The Mood” (Miller, 1940), “Side by Side” (Kahn & Woods, 1927), and fast and energetic spirituals such as “O When the Saints Go Marching In” (unknown, n.d.), and “This Little Light of Mine” (Loes, 1920). Although participants claimed that they enjoyed these songs in the past, they were not able to tolerate them during music therapy due to their pain and discomfort. In addition, the therapist expanded the intervention of preferred and familiar music by including instrumental or vocal improvisation within the structure of some of the songs conducted during the

sessions. Verbal processing of lyrical meanings, themes and interpretations were also incorporated into the sessions. For example, one participant noted that the spiritual songs she chose during the sessions (e.g. Precious Lord, It is Well With My Soul) had a common theme of God's presence and support, especially during the difficult times she had encountered. Another participant who had a hip fracture from a fall, and who chose the songs Que Sera, Sera, Whatever Will Be-Will Be, and Let It Be, claimed the lyrics spoke of surrendering and accepting things as they are. And a participant who chose Danny Boy shared that the song reminded him of his wife who was Irish, and was very supportive in his care at the time. These combined interventions seemed to serve as a distraction from one's pain, and as a meditative, reflective and re-focusing tool in managing pain.

### **Music Therapy for Anxiety**

The results of this present study as measured by the VAS and STAI, showed that anxiety levels were lower in the experimental groups' comparison of pre-test and post-tests scores when compared to the control group. This result was sustained over time (8 sessions), and confirmed the second hypothesis that post-test measures of anxiety will be lower in the experimental group receiving music therapy, when compared to the control group.

These findings are consistent with previous studies of anxiety in patients receiving music therapy in a medical context (Knight & Rickard, 2001; Lin, Lin, Huang, Hsu, & Lin, 2011; Liu, Chang, & Chen, 2010; Schneider, Schedlowski, Schurmeyer, & Becker, 2001; Sung, Lee, Li, & Watson, 2011). In the study by Lin et al. (2011), VAS anxiety scores for pre and post-operative spinal surgery patients were lower and

statistically significant in the group receiving music therapy when compared to the control group ( $p < 0.05$ ); however, this study differs from the writers in that STAI scores for anxiety showed no statistical differences; in addition, this study differed in the use of a large sample of 60 patients, and VAS measures for anxiety were taken one time only. In a RCT study of 14 music therapy sessions in repeated measures by Sung, Lee, Li, and Watson (2011), a significant effect of reduced anxiety in the experimental condition receiving music therapy was detected when compared to the control group ( $P = .004$ ). This study by Sung et al. was similar to the present study due to the method of repeated measures (14), and procedure of 30 minute music therapy sessions, two times a week, for six weeks. The results of the research presented in this thesis is similar to studies compared above in the population of orthopedic post-op patients, and in results of lowered anxiety levels detected in the analysis; however, differences lie in the specific orthopedic diagnosis of hip and knee arthroscopy or fractures, and the use of repeated measures taken as participants were engaged in the process of rehabilitation.

The results of this study show that music therapy was effective in reducing the symptoms of pain and anxiety. This was detected in post-test measures of each of the eight sessions conducted. However there were no reductions detected in pre-test base line measures for each subsequent session. This could be attributed to the nature of the orthopedic condition and healing process that, depending on the condition of the patient, often takes many weeks for symptoms of pain (and possible related anxiety) to subside. The additional pain and physical tension that occurs from engaging in a continual and demanding physical therapy rehabilitation program can also add to recurring pain and anxiety.

### **Music Therapy Interventions for Anxiety Reduction**

On the music therapy questionnaire, all five participants in the experimental group reported slow and soft relaxing music as most effective in reducing stress or anxiety; particularly, instrumental music and music with a steady tempo, such as church music, spirituals and slow classical music. Songs chosen for their anxiologic benefits were “Can’t Help Falling in Love” (Creatore, Peretti, & Weiss, 1961), played on the keyboard in a slow tempo, in a 6/8 meter, with soft vocals; “Softly and Tenderly Jesus is Calling” (Thompson, 1880), on the guitar, in a slow 3/4 meter, with soft vocals; “Precious Lord, Take My Hand” (Allen, 1844), on the keyboard, 3/4 meter, melody played on the keyboard with periods of soft vocals; “May the Good Lord Bless and Keep You” (Willson, 1950), instrumental music on the keyboard; a simplified version of “Für Elise” (Beethoven, 1810), played slowly on the keyboard; “Nocturne” (Chopin, 1849), played slowly on the keyboard with no dynamic or tempo changes; a simplified version of “Pachelbel’s Canon in D” (Pachelbel, 1919), instrumental music played on the keyboard with a piano and strings timbre, 4/4 meter, with no changes in dynamics or tempo; “Counting My Blessings” (Berlin, 1954), instrumental music on the keyboard with lyric analysis and discussion afterwards; and “Be Not Afraid” (Dufford, 1975), 4/4 meter on the guitar, with soft vocals and no abrupt changes in tempo or dynamics.

Styles of music that were not helpful in addressing anxiety included fast jazz and dramatic music found in Broadway show tunes, or classical music with dissonances and dynamics; such as the jazz song “It Don’t Mean a Thing, if it Ain’t Got That Swing” (Elington, 1931); “O When the Saints Go Marching In” (unknown, n.d.); and the Broadway musical “West Side Story” (Bernstein & Sondheim, 1957). Although some

participants shared that they enjoyed these styles in the past, they were not incorporated in sessions due to their dramatic and stimulating musical elements which are contraindicated for anxiety management.

This supports previous studies of appropriate music therapy interventions for anxiety control that contain musical characteristics, such as non-vocal, slow, low pitched, quiet, with a simple repetitive rhythm, stable dynamics, and no rhythmic variation or abrupt tempo changes (Elliot, McGregor, & Poleman, 2011; Knight & Rickard, 2001; Pelletier, 2004). In addition, all participants were encouraged to choose familiar and preferred songs or musical styles for their potential anxiolytic benefits (anxiety reducing) as presented in past research (Elliot, McGregor, & Poleman, 2011; Walworth, 2003).

### **Instrumental vs. Singing**

The applied interventions were personalized and selected according to preferences and needs of the participants. Some participants responded well to invitations to improvise with instruments, and others enjoyed just listening and relaxing to their familiar and preferred music. Others enjoyed soft singing or verbal discussions and processing related to the music and the experience. The therapist tailored each situation in a client centered manner, according to what the music called for, in order to meet the participants.

Participants often chose instruments that were soothing, soft and legato, such as egg shakers, rain sticks, very small maracas, and chime bars. They tended to reject instruments, such as clavi, wood blocks, large maracas or drums. However, bongo drums were often chosen and played in a soft slow manner, and reported by participants as helpful in relaxation.



### **Therapist's Style**

The therapist used a warm approach when engaging with participants. Considering the participants' pain and anxiety, the therapist applied a soft tone of voice, non-threatening manner and relaxed posture, while pacing the sessions according to the participants' tolerance and ability.

Several participants responded to the therapist's empathetic and sensitive, non-threatening approach. Due to the prevalence of pain, anxiety, and participants' busy schedules, the therapist attempted to select interventions carefully and always asked the participants for feedback. In addition, the therapist incorporated clinical improvisational techniques, such as those employed in Creative Music Therapy (Aigen, 2005; Bruscia, K. E., 1987; Nordoff & Robbins, 2007), in order to better support and reflect the participants' free improvisational play and/or singing. The therapist sought to build a trusting relationship in a very short time by building rapport with the participants through the musical experience provided at eye level, and at bedside in the participants' room, and by being genuinely concerned about their recovery and rehabilitation.

In order to musically address pain and anxiety during the sessions, the therapist incorporated a musical style in his playing (keyboard, guitar) that was consistent with music that was used to allay anxiety. Even familiar and preferred music used for pain was played with a steady tempo, no abrupt dynamic changes, and with an accompaniment such as arpeggios or sustained chords, as opposed to a staccato rhythmic accompaniment, or jarring figured bass ostinato. Chords were also altered during songs and improvisations to contain suspensions (2nds, 6ths, and 9ths), and major 7ths were used to create a more open and relaxing effect.

**Environment**

Participants reported that they felt more comfortable and relaxed in the environment of their own rooms during music therapy. The music seemed to help most patients to relax, as they shared that they often felt more comfortable after the music therapy sessions. In addition, patients reported that they were able to fall asleep better. The external environment of medical centers in hallways and treatment rooms can often be a stressful and anxiety provoking trigger, in addition to internal stressors. This could be a consideration for further study focusing on music therapy, anxiety and the environment. A close connection to the therapist was also reported by two participants who felt having music therapy in their rooms enabled intimacy in the relationship, and looked forward to having repeated sessions with the therapist.

**Conclusion****Summary**

This study was conducted with participants who had undergone orthopedic surgeries and rehabilitation, and who had presented various levels of pain and anxiety that were present throughout a three-week duration. The purpose of this study was to examine the effectiveness of music therapy on reducing pain and anxiety in adults within the short-term rehabilitation population. The researcher's hypotheses were confirmed as music therapy was effective in lowering participants' self-reported subjective measures of pain and anxiety. Music therapy was found to have lowered participants' pain and anxiety as evidenced by pre and post intervention measurements, such as VAS and STAI; however, no reductions were detected in pre-test base line measures over the three-week duration of the study. Music therapy appears to produce an effect similar to pain and anxiety

medication that needs to be prescribed at regular intervals in order to be beneficial. In addition, participants described specific interventions and music therapy experiences on music therapy questionnaires that were helpful in reducing their pain and anxiety, such as preferred, familiar or relaxing music. Given this understanding, music therapy can be a useful analgesic and anxiolytic intervention and an additional treatment for orthopedic rehabilitation patients who are recovering from surgery.

### **Limitations of the Study**

This randomized controlled trial was a pilot study intended to generate data on the specific population of orthopedic inpatient rehabilitation that might eventually support a larger study. Although music therapy was able to decrease the pain level, and the findings for anxiety reduction were considered statistically significant through repeated measures, the small sample size ( $N = 10$ ) does not completely support external validity and generalizability to populations outside of the medical setting.

Due to limitations in availability, eight music therapy sessions were offered only two times a week, for 30 minutes, and this may have limited its effect in pre-test measures throughout the study. Perhaps providing more frequent sessions for a longer duration throughout the course of the participants' stay at the facility may have had a greater effect on pre-test measures of pain and anxiety.

The dual role of researcher and therapist may have had an effect on the results, given the participants were informed, invited to the study, and received music therapy by the same individual. The participants may have been consciously or unconsciously biased toward helping the researcher. In addition, the therapist might have had an unconscious

influence on selecting participants, or in administering the interventions that would benefit the results of the study.

Measurements on participants' self-perceived levels of pain and anxiety might have been limited in some way. Although internal validity was protected by use of a blind assessor who obtained the participants' self-perceived levels of pain and anxiety before and after each session, the participants were aware that the person administering the therapy was also the primary researcher and graduate student, and that the study was a required thesis research project.

### **Implications for Music Therapy**

Music therapy can help reduce levels of pain and anxiety, which can further reduce the need for medication and shorten hospital stays, in addition to potentially increasing rehabilitation outcomes and environmental comfort. Music therapy can be an effective pain and anxiety management tool for patients in a rehabilitation setting. The use of music therapy can provide patients with coping skills and strategies for pain management and stress or anxiety control during stays and even after discharge. Furthermore, this research supports the use of appropriate and effective music therapy interventions for pain and anxiety management that may be applied to training and practice, especially within the adult rehabilitation setting, such as preferred music experiences, familiar music, and relaxing music with a predictable chord structure, stable dynamics, tempo (80-100 beats per minute), and meter.

These findings can be shared by music therapy educators, in order to inform students of the effects of music interventions on clients' pain and anxiety, and the potential benefit of using appropriate music to address and meet these goals. Students and practicing

music therapists may gain an understanding and heightened sensitivity in choosing appropriate interventions for this population. Moreover, this benefit of using music therapy in rehabilitation centers can be expanded and integrated into internship sites, such as nursing homes and rehabilitation centers, in the hope of making music therapy more available and useful for this population.

### **Future Research**

This pilot study is the first known RCT in orthopedic inpatient short-term rehabilitation for pain and anxiety, and was intended to be conducted with a large sample within a short-term rehabilitation setting. Further research is needed with a larger sample and longer duration in order to be applicable to the general population. In addition, physiological measures, such as heart rate, systolic and diastolic blood pressure and cortisol testing, would greatly enhance an evidence-based approach of music therapy for anxiety control within the medical setting. Pain could be measured by additional pain questionnaires not used in this study that might generate insight into the type or frequency of pain. Using an additional pain questionnaire would support and further validate findings, as was discovered in this present study with the use of an additional questionnaire for anxiety, such as the STAI. Researching music therapy with additional variables of mood or depression would be a natural follow-up of this study. An expanded study of the benefits of patients receiving live music therapy compared to listening to pre-recorded music in pain and anxiety reduction within this population would be beneficial in supporting the need for music therapy interventions with this population. Another potential area of research that would necessitate the need for a large sample is the effectiveness of music therapy in decreasing the need for, or frequency of receiving pain

or anxiety medication. In addition, a study involving a large sample and a longer duration of research into music therapy's effectiveness in shortening a patient's stay would contribute to its many applications within this population.

### **Personal Reflections**

Throughout the process of this research project, I have personally experienced moderate to severe pain and anxiety due to knee surgery, and recently, a serious unanticipated back injury occurred that resulted in the need for outpatient physical therapy, daily therapeutic exercises and related medical services. I have gained insight and understanding into the physical and psychological factors of pain and anxiety, and how the process of physical therapy can be so exhausting and demanding of one's time attention and energy. However, I have personally experienced healing in the appropriate use and application of specific spiritual music and music therapy activities that are related to pain and anxiety management. It has been a rewarding experience in helping to alleviate pain and anxiety in my patients with the therapeutic application of music and the relationship that develops, and to receive important feedback from these patients that music therapy has been effective. I believe that music therapy is a viable strengthening and healing tool that can greatly enhance one's comfort level, reduce pain intensity, increase pain tolerance, diminish stress and anxiety, increase motivation and physical therapy outcomes, and improve the overall condition of adults who are in the process of orthopedic rehabilitation.

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## Appendix A



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Tel.516.678.5000 Ext 6871  
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Date: January 14, 2013  
To: John Marino/Seung-A-Kim  
From: Kathleen Maurer Smith, PhD  
Co-Chair, Molloy College Institutional Review Board  
Veronica D. Feeg, PhD, RN, FAAN  
Co-Chair, Molloy College Institutional Review Board  
**SUBJECT: MOLLOY IRB REVIEW AND DETERMINATION OF EXPEDITED STATUS**  
**Study Title: Music Therapy, Pain and Anxiety in Short-Term Adult Orthopedic Inpatient Orthopedic Rehabilitation**

**Approved: January 14, 2013**

Dear Mr. Marino:

The Institutional Review Board (IRB) of Molloy College has reviewed the above-mentioned research proposal and determined that this proposal is approved by the committee. It is considered an EXPEDITED review per the requirements of Department of Health and Human Services (DHHS) regulations for the protection of human subjects as defined in 45CFR46.101(b) and has met the conditions for conducting the research.

You may proceed with your research. Please submit a report to the committee at the conclusion of your project.

Changes to the Research: It is the responsibility of the Principal Investigator to inform the Molloy College IRB of any changes to this research. A change in the research may change the project from EXPEDITED status that would require communication with the IRB.

Sincerely,  
Kathleen Maurer Smith, PhD

Veronica D. Feeg, PhD, RN, FAAN

NOTE: Although the Long Island Jewish System has approved this study as EXEMPT, according to Molloy College policies, this study was reviewed and approved as EXPEDITED

## Appendix B



North Shore-Long Island Jewish Health System

**Institutional Review Board**

Office of the Institutional Review Board  
350 Community Drive, 4<sup>th</sup> Floor  
Manhasset, New York 11030  
Phone: 516-719-3100 or 516-562-3100  
Fax: 516-562-3105

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To: John Marino

330 Community Drive  
Manhasset, N.Y. 11030

From: Victor Fornari, MD  
Chair, Institutional Review Board

A handwritten signature in black ink that reads "Victor Fornari, MD".

Date: Friday, November 16, 2012

RE: **IRB #: 12-391A**  
**Protocol Title: Music, Pain and Anxiety in Short-Term Adult Inpatient Orthopedic Rehabilitation**

Dear Mr. Marino:

The above referenced project meets the criteria outlined in 45 CFR 46.101 for **EXEMPTION**. The following category applies to the project:

**45 CFR 46.101 (b) (2)** Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

You have been issued a waiver of authorization as per 45 CFR 164.512 for the use and disclosure of information for research purposes.

*This constitutes institutional approval of the data collection as being exempt from the requirement of IRB review, approval, and oversight. It is your responsibility to notify the IRB in writing of any changes or modifications made in the research study design, procedures, etc. which do not fall within one of the exempt categories. Such changes necessitate a new, complete IRB submission. If the IRB receives no correspondence on this study for three years, the file will be closed.*

The Institutional Review Board - Committee will be notified of this action at its meeting on 12/5/2012.

*Investigators are reminded that research must be conducted in accordance with all applicable Department of Health and Human Services regulations 45 CFR 46, Food and Drug Administration regulations 21CFR 56, 21CFR 312, 21 CFR 812, and the Health Insurance Portability and Accountability Act*

(HIPAA).

*All studies are subject to audits by the Office of Research Compliance and/or Institutional Review Board to confirm adherence to institutional, state, and federal regulations governing research. All research studies are expected to conform to Good Clinical Practice (GCP) guidelines.*

**NOTE: This approval is subject to recall if at any time the conditions and requirements as specified in the IRB Policies and Procedures are not followed. <http://www.northshorelij.com/body.cfm?ID=2804>**

The Office of the IRB no longer sends a hard copy of documents which have been electronically transmitted. These are the only copies of the regulatory documents you will receive.

**NOTE: All IRB Policies and Procedures must be followed, including the following:**

1. Using only IRB-approved consent forms, questionnaires, letters, advertisements, etc. in your research.
2. Submitting any modifications made to the study for IRB review prior to the initiation of changes except when necessary, to eliminate apparent, immediate hazards to the subject.
3. Reporting unanticipated problems involving risk to subjects or others.
4. Prior to implementation, any changes made to studies utilizing the TAP must have COPP, as well as IRB approval.

**IMPORTANT REMINDER:**

The International Committee of Medical Journal Editors (ICMJE) requires registration of clinical research studies meeting specific guidelines prior to publication. Please see ICMJE requirements for registration of clinical trials at <http://www.icmje.org>. To register your trial: <http://prsinformo.clinicaltrials.gov>. **You must register your trial PRIOR TO ENROLLING SUBJECTS.**



## Appendix C

### -----INFORMED CONSENT DOCUMENT-----

Study title: Music Therapy, Pain and Anxiety in Short-Term Adult Inpatient Orthopedic Rehabilitation

My name is John Marino. I am a Music Therapist from the North Shore-Long Island Jewish Health System, and a current graduate student from Molloy College. I am conducting a research study about music, pain and anxiety as part of my thesis. I would like to invite you to this present study that I am conducting. The purpose of this study is to examine the potential effects of music in reducing levels of perceived pain and anxiety among orthopedic patients undergoing rehabilitation. This study will involve ten participants who are informed verbally, and by written form such as this informed consent document, and who voluntarily agree to participate. If you choose to participate in this study, you will either be randomly chosen to receive music therapy or will not receive music therapy, but will be asked to rate your levels of pain and anxiety. The duration of the study is three weeks. Participants who are assigned to music therapy will receive music therapy for 30 minutes, two or three times a week, for a total of eight sessions. Music therapy will consist of the therapist's use of live music (piano, guitar and singing) to reduce pain and anxiety and increase relaxation, in addition to the use of participant preferred music, improvisation and singing.

I am contacting and have invited you to participate in this study because you have met the criteria of this research study: you are 55 years or older, orthopedic diagnosis such as hip fracture or knee or hip repair, receiving treatment for pain (medication), possess competent cognitive ability, with adequate hearing and vision, you are English speaking, have never received music therapy with music therapy researcher at North Shore LIJ, and have no other medical or psychiatric complications.

Participants in this study will initially be asked to complete a short demographic questionnaire one time only that will take 1-2 minutes to complete. Furthermore, all participants receiving music or not receiving music will be asked to complete two simple anonymous questionnaires related to pain and anxiety levels before and after, whether or not you have received music intervention. This will take 2-3 minutes to complete each time. Participants receiving music therapy will also be asked after the final session to complete a short questionnaire related to their music therapy experience that should take 1-2 minutes to complete. In addition to these questionnaires, I will examine your medical records for purposes of this study. All information gathered from your medical record (diagnosis, medical history, medications) will be viewed by the researcher only and will be used in the study report with no association to your personal identity. There are no foreseeable physical or psychological risks in participating in this study.

This study may benefit participants who receive music therapy, caretakers, family members and may contribute and support the use of music therapy in rehabilitation settings. There are no foreseeable risks or discomforts in participating in this, and participation in this study is completely voluntary. Participants may at any time refuse to participate, withdraw from the study, or discontinue agreement to participate in this study without any penalty. All information accessed from medical records by the researcher and that you provide on questionnaires or throughout the course of this study will remain confidential.

Participation is voluntary. If you would prefer not to participate, simply return this informed consent form. If you agree to participate, please sign this informed consent document. This information will be related verbally to all potential participants as well as provided in written form for participants to keep for their own records.

Thank you for your participation  
Sincerely,  
John Marino, LCAT, MT-BC

Researcher contact information:      Name: John Marino, LCAT, MT-BC  
Title: Music Therapist  
Dept: Rehabilitation Services/Therapeutic  
Recreation  
The North Shore-Long Island Jewish Health System  
CECR  
Phone: 516-562-8136  
Email: Jmarino2@nshs.edu

Faculty advisor information:      Name: Dr. Seung-A-Kim, PhD, AMT, LCAT, MT-BC  
Title: Thesis Faculty Advisor, Music Therapy  
School: Molloy College- Music Therapy Dept.  
Phone: 516-678-5000, ext. 6348  
Email: Skim@molloy.edu

This research has been reviewed and approved by the NSLIJ Institutional Review Board (IRB) and the Institutional Review Board of Molloy College. If you have any questions about your rights as a participant, or if you feel that your rights have been violated, please contact the NSLIJ (IRB) at 516-562-3101..

*Please keep this sheet for your reference*



**Appendix D****DEMOGRAPHICS QUESTIONNAIRE****Q. Gender**

What is your sex?

- Male
- Female

**Q. Age**

- 55-59
- 60-64
- 65-69
- 70-74
- 75-79
- 80-84
- 85-89
- 90-94
- 95-99
- 100+

**Q. Marital Status**

What is your marital status?

- Now married
- Widowed
- Divorced
- Separated
- Never married

**Q. Race/Ethnicity**

Please specify your race

- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or other Pacific Islander
- White
- Hispanic or Latino
- Middle Eastern
- Other
- Multiple Ethnicities/Races

**Q. Religious Affiliation**

What is your religious affiliation?

- Roman Catholic
- Christian
- Jewish
- Hindu
- Buddhist
- Other \_\_\_\_\_

**Q. Education**

What is the highest degree or level of school you have completed? If currently enrolled, mark the previous grade or highest degree received.

- Nursery school to 8th grade
- High school graduate - high school diploma or the equivalent (for example: GED)
- Some college credit
- College degree

**Q. Employment Status**

Are you currently...?

- Employed for wages
- Part-Time
- Full-Time
- Self-employed
- Out of work and looking for work
- Out of work but not currently looking for work
- A homemaker
- A student
- Retired
- Unable to work

**Q. Employment Type**

Please mark all that apply

- Office related work involving long periods of sitting
- Work involving long periods of standing
- Work involving great amount of walking
- Manual physical labor
- Work involving a need to be physically active
- Other

**Primary Residence**

Where do you live?

- New York City Resident
- New York State Resident
- Nassau County Resident
- Suffolk County Resident

Other \_\_\_\_\_

**Musical Background**

How often do you listen to music?

- Usually never
- Sometimes
- Often
- Daily

**Are you a musician?**

- Yes
- No

**Have you ever played a musical instrument?**

- Yes
- No

**Describe your history of musical experiences**

- Attend live concerts
- Attend Broadway musicals
- Listen to music
- Sung in church or community choir
- Played in a musical ensemble
- Other

**Were you exposed to music during hospitalization?**

- Yes
- No

**Have you ever used music to relax and/or as a distraction from pain?**

- Yes
- No

**Previous Hospitalization/Surgeries**

Indicate your support system during previous hospitalization by marking all that apply.

- Spouse
- Family
- Friends
- Caretaker/Companion
- Clergy/Religious/Spiritual Support
- Volunteers
- Staff
- Other

**Indicate previous length of hospital stay**

- 1-3 days
- 4-7 days
- 1-2 weeks
- 2-3 weeks
- 3-4 weeks
- 5 weeks+

**Indicate medications provided during previous hospitalization by marking all that apply**

- Pain killers
- Anti-inflammatory
- Sleep aids
- Anti-anxiety
- Blood pressure
- Blood thinner

**Indicate therapeutic services received during previous hospital stay**

- Physical therapy
- Occupational therapy
- Speech therapy
- Music therapy
- Therapeutic recreation

**Appendix E**  
**VAS QUESTIONARE**

Please make a mark with a pen to indicate the level of your current pain.

**100mm Visual Analog Scale – PAIN**



Please make a mark with a pen to indicate the level of your current anxiety.

**100mm Visual Analog Scale – ANXIETY**





**Appendix F****State-Trait Anxiety Inventory for Adults****Self-Evaluation Questionnaire**  
STAI Form Y-1 and Form Y-2**Developed by Charles D. Spielberger**

in collaboration with R.L. Gorsuch, R. Lushene, P.R. Vagg, and G.A. Jacobs

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**SELF-EVALUATION QUESTIONNAIRE STAI Form Y-1**

**Please provide the following information:**

Name \_\_\_\_\_ Date \_\_\_\_\_ S \_\_\_\_\_  
 Age \_\_\_\_\_ Gender (Circle) **M** **F** T \_\_\_\_\_

**DIRECTIONS:**

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel *right* now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

NOT AT ALL  
 SOMEWHAT  
 MODERATELY SO  
 VERY MUCH SO

- |  |   |   |   |   |
|--|---|---|---|---|
| 1. I feel calm.....  | 1 | 2 | 3 | 4 |
| 2. I feel secure .....                                     | 1 | 2 | 3 | 4 |
| 3. I am tense .....  | 1 | 2 | 3 | 4 |
| 4. I feel strained .....                                   | 1 | 2 | 3 | 4 |
| 5. I feel at ease .....                                    | 1 | 2 | 3 | 4 |
| 6. I feel upset .....                                      | 1 | 2 | 3 | 4 |
| 7. I am presently worrying over possible misfortunes ..... | 1 | 2 | 3 | 4 |
| 8. I feel satisfied .....                                  | 1 | 2 | 3 | 4 |
| 9. I feel frightened .....                                 | 1 | 2 | 3 | 4 |
| 10. I feel comfortable .....                               | 1 | 2 | 3 | 4 |
| 11. I feel self-confident.....                             | 1 | 2 | 3 | 4 |
| 12. I feel nervous .....                                   | 1 | 2 | 3 | 4 |
| 13. I am jittery .....                                     | 1 | 2 | 3 | 4 |
| 14. I feel indecisive.....                                 | 1 | 2 | 3 | 4 |
| 15. I am relaxed .....                                     | 1 | 2 | 3 | 4 |
| 16. I feel content .....                                   | 1 | 2 | 3 | 4 |
| 17. I am worried .....                                     | 1 | 2 | 3 | 4 |
| 18. I feel confused.....                                   | 1 | 2 | 3 | 4 |
| 19. I feel steady.....                                     | 1 | 2 | 3 | 4 |
| 20. I feel pleasant.....                                   | 1 | 2 | 3 | 4 |

**Appendix G**

**MUSIC THERAPY QUESTIONNAIRE**

All responses will remain confidential and personal identity will not be disclosed. Thank you for your participation in this research study.

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Please reply to the following questions

---

1). Did the music affect your pain during this music therapy session?

YES

NO

If yes, how?

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---

---

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2). What type of music/musical activity was helpful with your pain?

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3). What type of music/musical activity was not helpful with your pain?

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4). What type of music/musical activity was helpful with your anxiety?

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5). What type of music/musical activity was not helpful with your anxiety?

---

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6). Please share your feedback on the environment where music therapy was conducted.

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7). Any suggestions or comments? (e.g., music, musical activity, the music therapy session, and the music therapists)

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THANK YOU FOR YOUR PARTICIPATION