Music Therapy in the NICU: Interventions and Techniques in Current Practice and a Survey of Experience and Designation Implications

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MUSIC THERAPY IN THE NICU: INTERVENTIONS AND TECHNIQUES IN CURRENT PRACTICE AND A SURVEY OF EXPERIENCE AND DESIGNATION IMPLICATIONS

by

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A Thesis
Submitted to the
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School of Music
Advisor: Edward Roth, M.M.

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While researchers have documented the clinical use of music in medical settings, little is known about music therapists working in the Neonatal Intensive Care Unit (NICU). The purpose of the study was to examine the demographics, educational training (NICU-MT designation), employment conditions, and music therapy interventions/techniques used by professional music therapists in the NICU. A 15-item survey was designed and electronically mailed to music therapists (N = 318) identified by the American Music Therapy Association (AMTA), the Certification Board for Music Therapists (CBMT), and Infant and Child Medical Music Therapy Institute at Florida State University as potentially working with premature infants and having valid electronic mail addresses. A total of 41 responses (N= 41) were received—36 respondents (N=36) completed the survey entirely and 5 partially (N=5) via SurveyGizmo. Data collected indicated that although Gooding (2010) had summarized common protocols, NICU music therapists have noticed other additional perceived benefits. Results indicated differences with regard to the importance of the NICU-MT designation. The NICU-MT training, however, has educational benefits and promotes a high quality of care.
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While some days I never thought that I would be able to complete my thesis - here I am, acknowledging all the people I have gotten help from to complete this study! First, I thank God for his unfailing grace and mercy and for giving me the courage to complete this thesis. "I can do all things through Him who strengthens me"—Philippians 4:13.

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Suzanna Azaria Peczeniuk-Hoffman
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CHAPTER I

INTRODUCTION

Using music therapy to aid in the treatment of certain medical conditions is fast becoming a recognized and widespread practice (Robertson, 2009; Standley & Walworth, 2010). The utilization of music in medical treatment, however, is actually an ancient idea (Merriam & Merriam, 1964). Historically, music has often been associated with the treatment of disease (Standley, 2003; Standley & Walworth, 2010). The oldest written example is the Kahum papyrus, a document describing the use of incantations for healing (Light, Love, Benson, & Morch, 1954). Quite monumentally, this study demonstrated the beneficial effects of music on specific physiological processes such as cardiac output, respiratory rate, pulse rate, and blood pressure (Light et al., 1954). As a result of seminal findings like these, clinical music therapy programs have been developed for hospital units using research-based interventions (Brodsky, 1989). Medical music therapy research and practice has expanded beyond adult hospital patients to pediatric and neonatal intensive care units (Standley, 1998a; Standley, 2003; Standley & Walworth, 2010).

Research in the Neonatal Intensive Care Unit (NICU) suggests that music helps mask the noisy hospital environment (Brown, 2009; Standley & Walworth, 2010). Similarly, music assists in calming inconsolable infants and helps with pain management (Chapman, 1975; Standley, 1998b; Keith, Russell, & Weaver, 2009; Cignacco, Hamers, Stoffel, vanLingen, Gessler, McDougall, & Nelle, 2007; Bailey, Nguyen-Engel, & Walworth, 2010). Several studies have also examined the effect of music therapy on
weight gain (Chapman, 1975; Malloy, 1979; Caine, 1991; Standley, 2000; Standley, 2003; Cevasco & Grant, 2005; Standley & Walworth, 2010; Standley & Swedberg, 2011), length of stay (White-Traut & Tubeszewski, 1986; Caine, 1991; Standley, 1998b; Whipple, 2000; Standley, 2003; Standley & Walworth, 2010), and increased head circumference (Cassidy, 2009). Vast amounts of research has also focused on the effect of music on heart rate, oxygen saturation, respiratory rate, and behavioral state (Caine, 1991; Standley, 1998b; Standley, 2003; Wood, 2008; Keith, Russell, & Weaver, 2009; Standley & Walworth, 2010). Some studies also examined music therapy’s effects on maternal anxiety (Lai, Chen, Peng, Chang, Hsieh, Huang, & Chang, 2006) and parent-infant bonding (Whipple, 2000; Blumenfeld & Eisenfeld, 2006; Lai, Chen, Peng, Chang, Hsieh, Huang, & Chang, 2006; Bailey, Nguyen-Engel, & Walworth, 2010; Gooding, 2010).

Nevertheless, there is a paucity of research on common practices and observations of music therapists in the NICU. This study targeted professional music therapists currently working in the NICU. Its purpose was to determine the current trends and demographics of these music therapists. The research focused on examining the relationships between years of experience, salary earned, and interventions used in the neonatal intensive care unit. The survey also investigated the attitudes regarding the NICU-MT designation, a specialized designation from the National Institute for Infant & Child Medical Music Therapy housed at Florida State University. An 8-hour lecture (usually conducted in conjunction with American Music Therapy Association (AMTA) National Conference each November), a 16-hour supervised, intensive hospital training in NICU and pediatric MT procedures at Tallahassee Memorial HealthCare in Tallahassee,
Florida or Florida Hospital in Orlando, Florida, and a take-home test are required in order to receive the designation NICU-MT.

Definition of Terms

**Kangaroo care** is a method of holding an infant in an upright position that allows for skin-to-skin contact.

**Low birth-weight (LBW)** is a term used for infants weighing less than 2500 grams (5 lbs., 8 oz).

**Neonatal Abstinence Syndrome (NAS)** is a series of complications that occur in a newborn that was exposed to addictive illegal or prescription drugs while in the womb.

**NICU-MT** is a designation awarded through the National Institute for Infant & Child Medical Music Therapy to professional music therapists (MT-BC) who have successfully completed three components of NICU Music Therapy training—a lecture, clinical field-work (hands-on training), and a take-home exam. Lecture and Clinical Fieldwork can be completed with either occurring first. The Lecture component is held in conjunction with AMTA National Conference. Clinical Fieldwork is held several times throughout the year typically either in Tallahassee, FL or Orlando, FL. After completion of the Lecture and Clinical Fieldwork (Hands-on training) portions, a take home test is to be fulfilled. Outside readings (Standley, 2003; Standley, J.M., Gregory, D., Whipple, J., Walworth, D., Nguyen, J., Jarred, J., Adams, K., Procelli, D., & Cevasco, A., 2005) are recommended prior to taking the take-home exam. When all three components are complete, an MT-BC earns the title “NICU-MT”. Documentation of the NICU-MT designation implies competency to practice evidence-based clinical services in the NICU.
The National Institute for Infant & Child Medical Music Therapy maintains a list of individuals completing this training.

Non-nutritive Sucking (NNS) is a natural infant reflex to suck on an object not providing nourishment for comfort.

Multimodal stimulation with music (MMS) is a music therapy intervention provided to a neurologically immature infant for approximately 20 minutes and helps increase an infant’s tolerance to stimulation. It involves singing (auditory stimulation), cephalocaudal and proximodistal massage (tactile stimulation), rocking (vestibular stimulation), and eye contact (visual stimulation). This intervention can be performed by a music therapist and can also be taught to a parent by a music therapist.

Prematurity is defined as an infant being less than 37 weeks gestation.
CHAPTER II

LITERATURE REVIEW

Cost of Prematurity and Rationale for Music Therapy in the NICU

The neonatal intensive care unit (NICU) serves premature infants with low birth-weight. Prematurity is defined as less than 37 weeks gestation, and low birth-weight (LBW) indicates the infant weighs less than 2500 grams (5 lbs., 8 oz). Many risks and complications are frequently associated with premature births, such as asthma, cerebral palsy, cognitive functioning below the normal level, poor academic achievement, and behavioral problems. Some health impairments may even lead to an increased predisposition to early mortality in adulthood (Gooding, 2010). Strikingly, only 50% of infants born at 23 weeks gestation survive, and only a 44% survival rate exists for those weighing less than 1 pound. Notably, the incidence of infants born with LBW is increasing. In 2001, 7.6% of live births were considered LBW; by 2006, 9% of live births were LBW. Prematurity and LBW are the second leading cause of infant mortality (birth defects are the leading cause of infant death). Low birth-weight children are twice as likely to be hospitalized during early childhood and usually sustain longer hospital stays (Standley, 2003; Standley and Walworth, 2010).

The cost (medical, educational, and lost productivity) associated with preterm births in the United States was at least $26.2 billion in 2008 (March of Dimes, 2008). Infant hospital costs related to prematurity were $15.5 billion in 2002 (Green et al., 2005). The average first-year medical costs for a preterm infant is $32,325 compared to $3,325 for a term infant (March of Dimes, 2006). Moreover, approximately 20% of
premature infants have a higher rate of readmission than term infants two weeks after
discharge, attributed mainly to abnormal feeding and prolonged length of ventilation,
which requires breathing assistance (Gilbert, Nesbitt, & Danielsen, 2003). Aside from
these financial and readmission complications, LBW children are also 50% more likely to
be enrolled in special education (Hack, Klein, and Taylor, 1995).

The average length of an infant’s stay in the NICU is 90 days, with two billion
dollars spent each year in the US for these patients (Gilbert, Nesbitt, & Danielsen, 2003).
Approximately one-third of these births are to parents who qualify for Medicaid
assistance, resulting, ultimately, in taxpayer costs (Marbella, Chetty, & Layde, 1998).
Schwartz and Ritchie (1999) claimed that music therapy programs within the NICU are
relatively low-cost and can decrease patient length of stay by over 3 days, saving $2,000
to $6,000 per premature infant.

Many premature infants suffer from neurological complications including
Cerebral Palsy. There exists an indirect relationship between infant birth-weight and
incidence of CP (Hack, Klein, & Taylor 1995; Standley, 1998b; Standley & Walworth,
2010). Additional associated neurologic complications include specific learning
disabilities (SLD) and attention deficit hyperactivity disorder (ADHD). Asthma,
retrolental fibroplasic (visual impairment), respiratory distress/lung immaturity, and
organ immaturity correlate with LBW infants (Creasey, Jarvis, Myers, Markowitz, &
Kerkering, 1993; Whipple, 2000; Standley, 2002). Collins and Kuck (1991) observed that
infants in a neonatal intensive care unit are often exposed to similar stressors that
negatively affect anxious adult intensive care patients. It is well established that an
infant’s environment influences his or her neurological development. The dendritic
connections between individual neurons develop in the last trimester (Collins and Kuck, 1991); thus, brain development of premature infants could be compromised if they are exposed to chaotic NICU environments.

In the third trimester, a developing fetus generates 250,000 new neurons per minute. From this period to 2 years of age marks a child’s greatest neurological development. For a premature infant, necessary medical procedures impose high stress, leading to cortisol flooding the brain and resulting in damaged cellular networks. These consequences can leave an infant in a constant hyper alerted state. Up to eight years later, severely premature infants still show reduced brain volume (Standley, 2003) and damage that can be minimized by teaching infants to tolerate stimulation (Burns, Cunningham, White-Traut, Silvestri, & Nelson, 1994; Britt & Myers, 1994; Gomes-Pedro et al., 1995; Harrison, 1985; Oehler, 1993; White-Traut & Tubeszewski, 1986; Standley, 2003).

**Auditory Stimulation (Noise, Sound, and Music)**

Extensive research supports the need for early intervention with premature infants in the neonatal intensive care unit. The fetus receives and responds to auditory stimuli early in development (Cheour-Luhtanen et al, 1996). Ultrasound studies show that the fetus responds to outside sound as early as 16 weeks gestation (Hepper & Shahidullah, 1994; Shahidullah & Hepper 1992; Schwartz, 2007). Babies adapt to their mothers’ voices when she speaks or sings and during her movements and breaths. The fetus hears a mother’s heartbeat about 26 million times; this rhythm protects the fetus and is one of the most attractive components of music, symbolizing security and dependable return (Schwartz, 2007).
As early as 18 weeks gestation, loud sounds influence an increase in fetal heart rate. At 25-27 weeks gestation, most fetuses inconsistently respond to sounds by either kicking or moving. Most researchers agree that hearing develops by 29 weeks gestation. Auditory thresholds are quite high and diminish from weeks 26 to 35 weeks gestation. Between 30 and 35 weeks gestation, a fetus hears and responds to both maternal and proximal environmental sounds; by 35 weeks, auditory thresholds are close to adult levels and may be less sensitive. Several studies have shown that the fetus also responds to pitch and rhythm fluctuations (Lecanuet, Granier-Deferre, & Busnel, 1995; Standley, 2003).

It is established that, at birth, a term infant can distinguish a mother’s voice, prefers women’s over men’s voices, recognizes stories and songs heard during the final trimester, and discerns his or her native language (DeCasper & Fifer, 1980; DeCasper & Spence, 1986; Kolata, 1984; Moon, Cooper, & Fifer, 1993; Polverini-Rey, 1992). Polverini-Rey (1992) demonstrated that intrauterine lullaby exposure increased the calming response to the same lullaby postpartum. Collins and Kuck (1991) also found that oxygen saturation levels and behavioral states improved significantly with infant exposure to both recorded womb sounds and female singing.

Excessive auditory stimulation, however, can promote negative physiological responses like apnea, decreased oxygen saturation, heart rate fluctuations, and increased blood pressure. (Brown, 2009; Standley & Walworth, 2010). By reducing noise levels in the NICU, the physiologic stability of sick neonates was shown to improve and importantly, promote infant brain development (Brown, 2009). Wood (2008) examined the effects of a 15-minute live-music therapy intervention on levels of motor activity,
heart rate, oxygen saturation, and behavioral distress in premature infants in the NICU.

Although there were no significant physiological effects of the music therapy intervention shown, infants did experience an increased mean percentage time in active sleep. Wood (2008) also suggested that music therapy interventions required further individualization for personal, and thus cumulative beneficial effects. Afterall, with frequent changes in condition and each infant being unique, music may have different effects throughout the day.

Cassidy and Ditty (2001) determined male infants’ hearing to be less sensitive to frequency than female infants. In their post-hoc analysis of transient evoked otoacoustic emissions (TEOAE) scores, females showed consistent higher sensitivity to different properties of sound. In the protocols, the researchers included minimum gestational age, perceivable frequency spectrum, appropriate equipment, and appropriate decibel levels. They then concluded that a “standardization of protocols regarding administration of auditory stimuli to infants” was crucial. Thus, music therapists must take into consideration safe auditory stimulation.

Dureau (2005) examined gender differences of healthy, full term infants’ responses to music played at a range of decibel levels. Subjects (female, n=18; male, n=18) were 24-48 hours old, and listened to music for 21 minutes, with alternating 3-minute periods of silence. The music was played at three different loudness levels: 55-60dB, 65-70dB, and 75-80dB. Heart rate was measured with a pulse oximeter, and behavior state measured using the Neonatal Behavioral Assessment Scale. No significant difference between genders was found in both heart rate and behavior state at all loudness levels, suggesting uniformity in (infant) gender sensitivity to decibel level. It should be
noted, however, that auditory sensitivity (required for discrimination of decibel level) had not developed fully in one-day-old infants of this study.

Cassidy (2009) investigated the effects of decibel level of music stimuli and gender on head circumference and physiological responses of premature infants in the NICU. Her results add to those of Dureau (2005) in concluding that both male and female infants respond similarly to decibel level. A significant difference in head growth across time was observed, yet may be unrelated to music conditions and the control group. Results, however, did indicate a significant decrease in heart rate over the course of the data collection.

Chapman (1975) explored the effects of lullabies in the neonatal nursery on weight gain and pacification of newborns. She combined music with motion and found that the total time it took a premature infant to reach weight criterion for discharge actually decreased by 16%. Similar studies have shown that premature infants benefit from listening to music in their isolette (Katz, 1971). Moreover, premature neonates demonstrate more stable physiological measures (Lorch, Lorch, Diefendorf & Earl, 1994), show improved oxygen saturation levels (Burke, Walsh, Oehler, & Gingras, 1995; Cassidy & Standley, 1995; Coleman, Pratt, Stoddard, Gerstmann, & Abel, 1997; Collins & Kuck, 1991; Standley & Moore, 1995; Chou, Wang, Chen, & Pai, 2003; Standley, 2003), increase their weight gain (Malloy, 1979), and ultimately, are discharged sooner (Caine, 1991; Standley, 2003).

Keith, Russell, & Weaver (2009) examined the effects of music listening on the crying behaviors of critically ill infants classified as inconsolable. Twenty-four premature infants of 32-40 weeks gestation received a developmentally appropriate music listening
intervention alternating with days of no intervention. Results revealed a significant reduction in the duration and frequency of inconsolable crying through music intervention. Also, the music intervention improved physiological measures of heart rate, respiration rate, oxygen saturation, and mean arterial pressure.

**Pain Management and Feedings**

Cignacco et al. (2007) reviewed the efficacy of non-pharmacological interventions in procedural pain management in both preterm and term infants. Their literature review examined the use of music to address procedural pain, specifically with heel sticks. Music produced a positive effect on pain responses and was most effective when music was combined with non-nutritive sucking or applied with preterm infants from 30–31 weeks gestational age or older.

Standley (2000, 2003), Standley and Walworth (2010), and Cevasco and Grant (2005) all ascertained the effects of the PAL (Pacifier Activated Lullaby) on nonnutritive sucking, weight gain, and feeding rates. The PAL utilizes lullabies as contingent reinforcement for sucking, and a predetermined number of suck bursts of predetermined strength activates the music (Standley, 2000). Standley (2000, 2003) found that sucking rates were significantly greater with PAL use. Cevasco and Grant (2005) conducted a research study with 62 NICU infants over a two year span, and showed a trend of greater weight gain with PAL use. Moreover, Whipple (2008) used the PAL after painful medical procedures, comparing its effects to nonnutritive sucking (NNS) without music and to a control condition. The group using NNS with contingent music with PAL showed significantly reduced stress levels and achieved homeostasis quicker.
Blumenfeld and Eisenfeld (2006) studied the contingent effect of mothers’ singing during feedings. Mothers sang to their babies 2 of 4 feedings on two consecutive days. Each feeding was subjectively evaluated and songs sang were logged. Infants’ respiration, heart rate, duration of feeding, and volume of fluid taken orally were recorded. The speed of feeding and the percent of feeding goal were also calculated. No significant benefits or deterrents to the singing were noticed, but the researchers did experience difficulty in retaining subjects.

**Multimodal Stimulation and Parent-Infant Bonding with Music**

Lai et al. (2006) compared the influences of a no-music condition to a case incorporating recorded lullabies during kangaroo care (method of holding an infant in an upright position that allows for skin-to-skin contact and promotes parent-infant bonding, infant temperature control and maternal lactation) provided for one hour a day for three days. The study included 30 infants of less than 37 weeks gestation at birth, examining preterm infants’ responses including heart rate, oxygen saturation, respiratory rate, and behavioral state. Maternal anxiety was also monitored. Mothers chose music type from the following categories: western vocal, instrumental lullaby, and aboriginal Taiwanese lullaby. There were no significant differences found between the physiologic measures of infants in the experimental group and the control group. Notably, however, infants in the intervention group had more quiet sleep states and less crying. Music during kangaroo care also resulted in lower maternal anxiety.

Field (1980) summarized 23 studies of infant stimulation and found difficulty in comparing and contrasting the various techniques in order to compose an appropriate
stimulation protocol. A study by Barnard (1973) found that premature infants gained weight when they received auditory and kinesthetic stimulation. White and LaBarba (1976) combined tactile and kinesthetic stimulation and found differences in infant weight gain and caloric intake. Rice (1977), however, developed a more structured approach to stimulation, which involved auditory, tactile, visual, and vestibular (ATVV) stimulation. Mothers of infants less than 37 weeks were taught the stimulation sequence, which they performed 4 times a day for 30 days. The experimental group gained more weight, acquired selected neurologic reflexes, lost certain phylogenic reflexes, and showed higher mental development according to the Bayley Scales when measured at four months of age.

Barnard and Bee (1983) examined the impact of temporally patterned kinesthetic and auditory stimulation on the development of preterm infants. Experimental subjects showed decreased rates of activity while in the hospital, fewer abnormal reflexes, and better orienting responses. The results indicated that kinesthetic and auditory stimulation contribute positively to certain aspects of infant development.

Similarly, White-Traut and Tubeszewski (1986) studied 33 premature infants that were between 29 and 35 weeks gestational age. When infants reached 1750 grams, the subjects were assigned to either the treatment or control group. The experimental group received 5 to 10 days of tactile stimulation and weight gain and length of hospitalization were measured. Results suggested that infants may experience some improvement in weight gain and experience a shorter hospital stay after receiving stimulation.

A study by Caine (1991) examined the effects of music on selected stress behaviors, weight, caloric and formula intake, and length of stay (LOS). The subject pool
included 52 preterm and LBW infants in a neonatal intensive care unit. These infants were in a stable condition and restricted to isolettes. Subjects in the experimental and control groups were matched for equivalency based on sex, birth weight, and critical level. Eleven males and fifteen females were assigned to the control group and received routine auditory stimulation (everyday sounds heard while in the isolette). The experimental infant group received music stimulation consisting of 60 minutes of tape-recorded vocal music, including lullabies, children’s music, and routine auditory stimulation three times daily. Results showed that in exposed infants initial weight loss (50% less weight loss) was significantly reduced, daily average weight increased, formula and caloric intake increased, and length of stay in the NICU was reduced by an average of five days. Notably, stress behaviors were also reduced (Caine, 1991).

Standley (1998b) tested a music therapy protocol for pacification, stimulation, and reinforcement of infant acquisition of developmental behaviors. Adapting the protocol from an earlier study (Burns et al., 1994.), Standley used quiet singing as the initial stimulus to calmly contact and pacify infants prior to systematic addition of multiple stimuli. The subjects for this study were 40 infants who met the following criteria: (a) Adjusted Gestational Age (AGA) of at least 32 weeks, (b) birth age >10 days, and (c) weight >1700 grams. Experimental and no-contact control groups were matched on the basis of gender, birth weight, gestation age at birth, and severity of medical complications. Each group contained 10 females and 10 males. The multimodal stimulation sequence was provided for 15-30 minutes, one to two times per week, from the time of the referral by the nursing staff to discharge. Infants were cuddled and then sung to for 30 seconds without other stimulation. In the absence of distress responses,
stimulation continued with the sequential addition of cephalocaudal and proximodistal touching (head to toe, and from in to out), rocking, and eye contact. Any physiological changes or distress responses resulted in a 15-second pause followed by another trial of the stimulation. Overt pleasure responses such as snuggling, cooing, prolonged eye contact, and finger grasping were reinforced. Dependent variables were days until discharge and weight gain per day. For experimental infants, tolerance for stimulation was assessed using a scoring system: one point for tolerated stimulation to each of eleven body sites within 15 minutes, one point for intermittent infant responses of pleasure, and 2 points for constant infant responses of pleasure. Results showed that female multimodal stimulation with music subjects left the hospital significantly sooner, an average of 11.9 days earlier than the no-contact control females (p < .05). Multimodal stimulation may have assisted in maturation of stimuli tolerance of the experimental infants, leading to a sooner discharge. Male multimodal stimulation subjects were discharged 1 day earlier than the control group. Both the female and male experimental groups showed more weight gain than the control group. Females gained approximately 5.5 grams more a day and males gained 2.2 grams more a day than the control group exposed to no multimodal stimulation (Standley, 1998b; Standley, 2003; Standley & Walworth, 2010).

Whipple (2000) examined the effects of parent training in music and multimodal stimulation on the quantity and quality of parent-neonate interactions, weight gain, and length of hospitalization of premature and LBW infants in a NICU. Twenty sets of parents and premature LBW infants participated. Parents in the experimental group (n=10) received one hour of instruction in appropriate uses of music, multimodal stimulation including massage techniques, and signs of infant overstimulation and
techniques for its avoidance. Parent-neonate interactions, specifically parent actions and
responses, and infant stress and non-stress behaviors were observed. Infant stress
behaviors were significantly fewer and the appropriateness of parent actions and
responses were significantly greater for experimental infants and parents than for control
subjects. Parents in the experimental group also reported spending significantly more
time visiting the NICU than did parents of control infants. Additionally, length of stay in
the hospital was shorter and average daily weight gain was greater for infants whose
parents received training (Whipple, 2000).

In addition to multimodal stimulation with music being used to promote parent
bonding, it has been used to reduce the effects of Neonatal Abstinence Syndrome (NAS).
Effects from NAS may include extreme irritability, excessive high-pitched crying,
tremors, seizures, small head circumference, hyperactive reflexes, increased muscle tone,
poor feeding/weight gain, and inconsolability. Music therapy can assist in reducing
withdrawal symptoms and encourage positive parental interactions (Bailey, Nguyen-
Engel, & Walworth, 2010).

The benefits of music therapy in the NICU are continuously being researched.
According to a post-hoc analysis of a NICU-MT program by Standley and Swedberg
(2011), infants receiving music therapy in the NICU gained more weight per day than did
infants not referred for music therapy. Infants born between 24-28 weeks gestation were
discharged sooner than non-music infants of the same age. Infants 30 weeks gestation and
older receiving music therapy had a longer hospital stay, but were also diagnosed with
more serious illnesses. Notably, the smallest, lowest birth weight infants were most often
referred for music therapy (Standley & Swedberg, 2011). Parental counseling in music
therapy with premature infants encourages bonding and meaningful interaction, teaches
developmental skills and awareness of developmental delays, and provides emotional
support for parents when dealing with infant related issues (Gooding, 2010).

The purpose of this study was to determine the current trends and common
practices of professional music therapists currently working in the Neonatal Intensive
Care Unit (NICU). While the importance of music therapy in the NICU has been cited
and its benefits have been demonstrated, the following research questions will be
addressed:

1. Is there a correlation between years of experience in the NICU and
   hourly wage/salary earned?
2. Is there a difference between music therapists who have earned the
   NICU-MT designation and those who have not in relationship to
   hourly wage/salary earned?
3. Is there a difference between music therapists who have earned the
   NICU-MT designation and those who have not, in relationship to time
   spent in the NICU?
4. How many music therapists working in the NICU have the NICU-MT
   designation?
   a. What contributes to music therapists not completing all three
      parts of the NICU-MT designation?
5. What types of music therapy interventions are used often in the NICU?
   a) Multimodal Stimulation with Music
   b) Parent training in Multimodal Stimulation with Music
c) Live music with kangaroo care
d) Pacified Activated Lullaby (PAL)
e) Live Music with nonnutrivic sucking
f) Live Music with nutritive sucking (Bottle feeding)
g) Live Music with Breastfeeding/Breastfeeding Support Group
h) Creating recordings of parents’ voices (lullabies, stories, etc.)
i) Providing recordings for infants
j) Calming and soothing infants with neonatal abstinence syndrome
k) Checking noise measurements in the NICU
l) Other: ________________

6. Literature states that music therapy addresses a wide range of medical and developmental needs and produces the following results in the hospital. Do the responses received in response to this survey coincide with these cited perceived benefits in the following categories:

(a) reduced length of stay
(b) stabilized oxygen saturation levels
(c) increased stimulation tolerance
(d) reduced stress-related behaviors
(e) enhanced parent–infant bonding
(f) improved parent–child interactions.
7. Is recorded music being used in the NICU?

a. What types of recorded music are being used?

b. Is there a difference between music therapists who have more experience and those who have less experience, in relationship to the use of recorded music?

c. What are some common characteristics (voices/instrumentation) of recordings frequently used in the NICU?
CHAPTER III

METHOD

Participants

Individuals who listed on their American Music Therapy Association (AMTA) membership that they work with either “prenatal age range”, “infants/young children (birth-3) age range”, “general hospital setting”, or “children’s hospital or unit”, were solicited to participate in this survey. The email addresses were obtained through the online individual directory (AMTA Sourcebook, 2011). The researcher contacted the American Music Therapy Association to obtain permission and to inquire if an internal list were available that subcategorized members working in the NICU. No internal list existed, so the researcher utilized the 103 email addresses that were available in those four categories. The researcher contacted the Certification Board for Music Therapists (CBMT) office to obtain email addresses of music therapists that reported that they were currently working in the NICU. Because CBMT allows for individual reporting of work setting and populations, 36 individuals identified themselves as working in the NICU setting and their email addresses were purchased and obtained. In addition, professional music therapists who participated in the Infant and Child Medical Music Therapy Institute through Florida State University and who completed at least one portion of the training were also solicited to participate in this study. The Infant and Child Medical Music Therapy Institute (ICMMTI) at Florida State University requires three components (lecture, hands-on training, and take-home exam) in order to receive the designation in NICU Music Therapy (NICU-MT). Neither the AMTA nor the CBMT lists indicated
whether the individual had received training through the Infant and Child Medical Music
Therapy Institute through Florida State University. The researcher contacted and received
permission to use the e-mail addresses from Dr. Jayne Standley, Director of the ICMMTI,
who was able to provide 286 email addresses. Out of these 286 addresses, an estimated
239 individuals had potential of having the NICU-MT designation (e.g. either they had
completed the take-home exam or its equivalent according to ICMMTI faculty).

Once the three lists of names and contact information were acquired, they were
cross-checked for duplication. It was estimated that there were potentially 318 email
addresses that could qualify to participate in the study. This estimate included the number
of e-mail addresses from AMTA (n=103) and CBMT (n=36) as well as those obtained
from ICMMTI (n=286) after subtracting 107 duplicate e-mail addresses.

In order to be eligible to participate in the study, respondents had to meet the
following criteria: 1) Be a board-certified music therapist and 2) Be currently practicing
in the neonatal intensive care unit (NICU). A total of 51 responses were received. Of that
number, 36 respondents completed the entire survey, 5 completed part of the survey, and
10 attempted the survey but were not included in data analysis because they answered
that they did not currently work in the NICU. This resulted in a total of 41 surveys (n=41)
that met the eligibility requirements and were included in the data analysis.

Survey Instrument

The participants were asked to respond to a survey constructed by the author entitled
*Music Therapy in the NICU: Interventions and Techniques in Current Practice and a
Survey of Experience and Designation Implications.* (See Appendix B) The 15 question
web-based survey was created by the researcher and derived, in part, from the summary of current practice by Gooding (2010). The survey consisted of 15 multiple-choice questions with 5 of these having a box marked “other” that an individual could fill-in-the-blank.

The internet web site SurveyGizmo.com® was used as a web tool for this research study. SurveyGizmo.com® is a recognized web site that guarantees user confidentiality and security. The researcher examined the data obtained online and the printed data was shredded after being analyzed. The collected data was stored in the researcher’s account that requires a username and password to login electronically.

**Procedures**

The researcher consulted the thesis committee upon completion of a research proposal. After obtaining approval from the committee, the proposal was submitted to the Western Michigan University Human Subjects Institutional Review Board (HSIRB). After receiving approval from HSIRB, the researcher requested and obtained permission to use the e-mail addresses of music therapists who had completed at least one portion (lecture, hands-on training, or take-home exam) of the Infant and Child Medical Music Therapy Institute through Florida State University from Dr Jayne Standley, Director of the Infant and Child Medical Music Therapy Institute. The researcher also received permission from the American Music Therapy Association (AMTA) and from the Certification Board for Music Therapists (CBMT) to use members’ email addresses for research. The researcher piloted the survey to 2 participants and made necessary changes. Based on their feedback, minor changes were made to the survey instrument. The
changes included spelling and grammar issues, as well as adding an “other” box to question 15 and changing the survey option to allow music therapists to select more than one box for question 7.

Participants accessed the 15-question survey through SurveyGizmo, an online survey hosting company. An invitation and link to the survey (See Appendix A) were included in the e-mail invitation sent to all of the professional music therapists chosen for the study. Music therapists were chosen to participate in the study based on the notion that they may have met the following criteria: 1) Be a board-certified music therapist and 2) Be currently practicing in the neonatal intensive care unit (NICU). The participants were asked to complete the survey within two weeks after receiving the initial e-mail. A week after the initial e-mail was sent, the researcher sent a reminder e-mail to all potential participants. The survey remained open for three weeks to obtain as many data points as possible.
CHAPTER IV

RESULTS

Demographic information

Years of Experience

Forty-one respondents indicated that they worked in the NICU at the time they filled out the survey. When asked about the duration of practicing music therapy in the NICU, 40 participants responded to the question. Out of these 40 individuals, 16 answered that they have practiced music therapy in the NICU for 1-4 years (40%) and 11 respondents practiced for 5-10 years (27.5%). Seven respondents replied that they have practiced music therapy in the NICU for less than one year (17.5%), and four individuals practiced 11-15 years (10%). One individual indicated that he/she practiced 16-20 years (2.5%), and another individual responded that he/she practiced 26-30 years (2.5%) in the NICU. No one indicated that they practiced music therapy in the NICU for 21-25 or 30+ years (0%). The distribution of years practiced in the NICU is shown in Figure 1.
Thirty-nine individuals responded to the question regarding the number of hours spent in the NICU per week. Sixteen respondents (41%) indicated that they spend 1-4 hours in the NICU per week; fifteen respondents (38.5%) spend 5-9 hours in the NICU per week, and three respondents (7.7%) spend 15-19 hours in the NICU per week. Two respondents (5.1%) responded that they spend 10-14 hours in the NICU per week, and another two respondents expressed that they spend 20-24 hours in the NICU per week. One respondent (2.6%) spends 25+ hours a week in the NICU. The distribution of hours spent in the NICU per week is shown in Figure 2.
Salary Range Earned

The next question in the survey in this section was about salary earned as a music therapist practicing in the NICU. When asked about their current employment situation in the field of music therapy, 37 participants responded to the question “What is your approximate hourly wage/annual salary?” Out of these 37 subjects, twenty-one respondents (56.8%) indicated that they were paid hourly for working in the NICU, and sixteen respondents (43.2%) expressed that they were salary based. Of the twenty-one respondents who indicated that they were paid hourly, four individuals (11.1%) were paid $15-$19.99 per hour; eight individuals (22.2%) were paid $20-$24.99 per hour; four individuals (11.1%) were paid $25-$29.99 per hour; two individuals (5.6%) were paid $35-$39.99 per hour; one individual (2.8%) was paid $40-$44.99; one individual (2.8%) was paid $50-$54.99; one individual (2.8%) was paid $60-$64.99 per hour. Fifteen individuals (41.7%) were paid an annual salary. Two participants chose to skip this
question. Out of the sixteen respondents that indicated that they were salary-based, five respondents (31.3%) replied that they earned $40,000-$44,999 per year, while three respondents (18.8%) expressed that they earned $45,000-$49,000 per year. Salary earned by only one respondent included: $21,000-$24,999 per year (6.3%), $35,000-$39,999 per year (6.3%), $50,000-$54,999 per year (6.3%), $55,000-$59,999 per year (6.3%), $60,000-$64,999 per year (6.3%), $65,000-$69,999 per year (6.3%), $70,000-$74,999 per year (6.3%), and $100,000+ per year (6.3%). The distribution of salary earned hourly and annually as a music therapist practicing in the NICU is shown in Figure 3 and Figure 4 respectively.

Figure 3. Distribution of Salary Earned Hourly as a Music Therapist Practicing in the NICU
Compensation Packages

The last question in this section was about compensation packages other than salary. With thirty-eight individuals responding to this question, thirty-one respondents (81.6%) indicated that they have health insurance as part of their compensation package for practicing music therapy in the NICU. Thirty respondents (78.9%) expressed that they have retirement benefits as part of their compensation package, twenty-four respondents (63.2%) indicated that they have continuing education benefits as part of their compensation package twenty-three respondents (60.5%) expressed that they have conference expenses as part of their compensation package. Six respondents (15.8%) indicated that they have membership dues as part of their compensation package, and five respondents (13.2%) expressed that they do not have a compensation package other than
salary. Three respondents (7.9%) responded “other” as part of their compensation package, which included: CBMT fees (n=1), Parking, Pharmacy, Free X-Ray, Lab and Immunization Services (n=1), and Paid Time Off (n=1). Distribution of aspects to compensation package other than salary received by music therapists practicing in the NICU is shown in Figure 5.

Figure 5. Aspects of Compensation Package Other Than Salary Received by Music Therapists Practicing in the NICU

Data Analysis

Research questions were developed to assess the demographics, current trends in techniques and interventions used in NICU music therapy, and to investigate relationships between the NICU-MT designation and compensation. Following the closing of the survey, appropriate statistical analysis was completed for each survey question, as well as for comparisons between responses to some questions. Descriptive data was gathered to answer some of the research questions. In order to respond to the correlational research questions associated with this study, the Pearson Correlations Test was run to determine
correlations between variables. Where comparison analyses were performed, the alpha level for statistical significance was set at $p < 0.05$.

The statistic program, Statistical Product and Service Solutions (IBM SPSS v.20.0 for MacOS and Microsoft Windows), was used to analyze the data collected. Since there was not a scoring system built into some of the questions, the researcher created a scoring system for the purpose of this research and prior to analysis. A coding system (code and label) for each of the variables was established (example: "yes" = 0 and "no" = 1), where the number 1 was the value assigned, and Yes was the label or meaning of that value. Utilizing this scoring system, the researcher calculated the scores for each respondent when the Pearson Correlations Test or t-test was used.

Research question 1: Is there a correlation between years of experience in the NICU and hourly wage/salary earned?

Two analyses were conducted to determine the relationship between years of experience in the NICU and hourly wage and years of experience in the NICU and annual salary. The Pearson product-moment correlation coefficient was used to examine the association between years of experience in the NICU and hourly wage/annual salary earned. The first analysis indicated that there was a positive moderate (however, statistically insignificant) relationship between years of experience and hourly wage, $r = .34$, $p = .138$. The second analysis also showed that there was a positive moderate (statistically insignificant) relationship between participants who are salaried and their years of experience in the NICU, $r = .48$, $p = .063$. Regardless of whether an individual
earned an hourly wage or an annual salary, the more experienced the music therapist, the more she earned. The correlation calculations are shown in Table 1 and 2.

Table 1. Correlation Between Years of Experience in the NICU and Hourly Wage Earned

<table>
<thead>
<tr>
<th>Years of experience in the NICU</th>
<th>Hourly Wage</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>.335</td>
<td>.138</td>
<td>21</td>
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</tbody>
</table>

Table 2. Correlation Between Years of Experience in the NICU and Annual Salary Earned

<table>
<thead>
<tr>
<th>Years of experience in the NICU</th>
<th>Approximate annual salary</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
<th>N</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
<td>.475</td>
<td>.063</td>
<td>16</td>
</tr>
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</table>

Research question 2: Is there a difference between music therapists who have earned the NICU-MT designation and those who have not, in relationship to hourly wage/salary earned?

The researcher acknowledges that the question, as presented on the survey instrument, elicited responses organized in ordinal format. The decision to perform a t-test instead of a Mann-Whitney was based on the high number of potential responses, in effect, creating a continuous variable, and the ordinal data were coded for analyses. On
average, there was no difference in hourly wage based on possession of NICU-MT designation (M=4.14, SE=1.137) or not (M=4.14, SE=.969), t(19)=.000, p>.05. The mean 4.14 implied that participants earned approximately $25-$29.99 per hour. See tables 3 and 4 for coding system for hourly wage and annual salary. On average, there was no statistically significant difference in annual salary based on possession of NICU-MT designation (M=10.36, SE=1.984) or not (M=8.80, SE=1.819), t(14)=-.788, p>.05. The mean 10.36 implied that individuals with the NICU-MT designation earned $50,000-$54,999 annually and those without the designation earned $45,000-$49,999 annually (8.80 rounded to 9).

Table 3. Coding System for Hourly Wage

<table>
<thead>
<tr>
<th>Hourly Wage Range</th>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>$10-$14.99 per hour</td>
<td>1</td>
</tr>
<tr>
<td>$15-$19.99 per hour</td>
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<tr>
<td>$20-$24.99 per hour</td>
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<td>13</td>
</tr>
<tr>
<td>$75-$79.99 per hour</td>
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Table 3.—continued

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<thead>
<tr>
<th></th>
<th>Description</th>
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<tbody>
<tr>
<td>15</td>
<td>$80-$84.99 per hour</td>
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<tr>
<td>16</td>
<td>$85-$89.99 per hour</td>
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<td>$90-$94.99 per hour</td>
</tr>
<tr>
<td>18</td>
<td>$95-$99.99 per hour</td>
</tr>
<tr>
<td>19</td>
<td>$100+ per hour</td>
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Table 4. Coding System for Annual Salary

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<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Under $10,000 annually</td>
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<tr>
<td>2</td>
<td>$10,000-$14,999 annually</td>
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<td>3</td>
<td>$15,000-$19,999 annually</td>
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<tr>
<td>4</td>
<td>$20,000-$24,999 annually</td>
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<td>5</td>
<td>$25,000-$29,999 annually</td>
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<td>19</td>
<td>$95,000-$99,999 annually</td>
</tr>
<tr>
<td>20</td>
<td>$100,000+ annually</td>
</tr>
</tbody>
</table>
Research question 3: Is there a difference between music therapists who have earned the NICU-MT designation and those who have not, in relationship to time spent in the NICU?

On average, there was no statistically significant difference in hours spent in the NICU based on possession of NICU-MT designation (M=1.85, SE=.435) or not (M=2.46*, SE=.524), t(37)=1.415, p>.05.*The mean score of 2.46 would round upwards to ‘3’, indicating that the group without the NICU-MT designation, on average worked more hours per week in a NICU than those holding the NICU-MT designation. Table 5 lists the codes used for analysis.

Table 5. Coding System for Hours Spent in the NICU

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>1-4 hours spent in the NICU</td>
</tr>
<tr>
<td>2</td>
<td>5-9 hours spent in the NICU</td>
</tr>
<tr>
<td>3</td>
<td>10-14 hours spent in the NICU</td>
</tr>
<tr>
<td>4</td>
<td>15-19 hours spent in the NICU</td>
</tr>
<tr>
<td>5</td>
<td>20-24 hours spent in the NICU</td>
</tr>
<tr>
<td>6</td>
<td>25+ hours spent in the NICU</td>
</tr>
</tbody>
</table>

Research question(s) 4a and 4b: How many music therapists working in the NICU have the NICU-MT designation? What contributes to music therapists not completing all three parts of the NICU-MT designation?

Respondents were asked whether they had completed any of the components to earn the NICU-MT designation. Thirty-eight individuals responded to this question and were able to select more than one option. Five participants (13.2%) selected "I have not completed any portion of the National Institute for Infant & Child Medical Music Therapy through Florida State University to receive the NICU-MT designation"; thirty-
two individuals (84.2%) expressed that they had completed the lecture; twenty-nine participants (76.3%) responded that they had completed the hands-on training; and twenty-six respondents (68.4%) indicated that they had completed the take-home exam. When looking at the data individually, those individuals that completed the take-home exam also completed the other two segments. In other words, twenty-six participants (68.4%) had earned the NICU-MT designation and had completed all portions of the training. See Figure 6 for the distribution of components of the NICU-MT designation completed by music therapists in the NICU.

Figure 6. Components of the NICU-MT Designation Completed by Music Therapists in the NICU

Twelve responses were received when asked about what factors had contributed to respondents not completing all three parts of the NICU-MT training. Three subjects (25%) stated financial reasons for not completing all three parts of the NICU-MT training; six subjects (50%) expressed that they did not complete the training because the NICU-MT designation is not necessary for their current job; and six subjects (50%) answered "Other". Other responses included: "I am turning in the exam within the next week--was waiting to re-certify as an MT-BC"; " Traveling to Florida wasn't possible due
Research question 5: What types of music therapy interventions are used often in the NICU? (a) Multimodal Stimulation with Music (b) Parent training in Multimodal Stimulation with Music (c) Live music with kangaroo care (d) Pacifier Activated Lullaby (PAL) (e) Live Music with nonnutritive sucking (f) Live Music with nutritive sucking (Bottle feeding) (g) Live Music with Breastfeeding/Breastfeeding Support Group (h) Creating recordings of parents' voices (lullabies, stories, etc.) (i) Providing recordings for infants (j) Calming and soothing infants with neonatal abstinence syndrome (k) Checking noise measurements in the NICU (l) Other: __________

Thirty-seven respondents answered this question. Out of the thirty-seven subjects, 26 respondents (70.3%) indicated that they implement multimodal stimulation with music; 25 (67.6%) implement parent training in multimodal stimulation with music; 16 (43.2%) implement live music with kangaroo care; 6 (16.2%) utilize the Pacifier Activated Lullaby (PAL); 14 (37.8%) implement live music with non-nutritive sucking and 14 (37.8%) implement live music with nutritive sucking (bottle feeding). Six (16.2%) implement live music with breastfeeding/breastfeeding support group; 24 (64.9%) create recordings of parents' voices (lullabies, stories, etc.); 22 (59.5%) provide recordings for infants; 20 (54.1%) expressed that they calm and soothe infants with neonatal abstinence syndrome (NAS); 13 respondents (35.1%) check noise measurements in the NICU; and
17 (45.9%) responded "other". Other responses included: "contingent singing"; "developmental stimulation for long term care infants"; "parent training in developmental care, recognition of stress cues and environmental control"; "calming and soothing infants not related to specific diagnosis"; "calming infants"; "developmental music activities for term/post-term"; "end-of-life support, procedural support"; "environmental music therapy"; "live intervention with older palliative care babies, sibling support"; "live music for appropriate soothing/stimulation"; "music for ventilator assisted infants"; "NICU parent support group, infant directed singing"; "palliative care for baby and parents"; "sibling support and staff support"; procedural support, humming with soothing touch and comfort positioning, songwriting with parents and/or siblings"; "I have worked very closely with the neurobehavioral team to provide education about the sensory environment to staff and families. I also have recently helped research and implement a nurse-driven recorded music protocol in which RNs can implement recorded music for patients who meet very specific criteria and have provided extensive training to our nursing staff"; "sibling and family music therapy, end of life issues and bereavement-memory boxes, creating a song to say goodbye to infant, memorial service music provision" Figure 7 showed the distribution of music therapy interventions implemented in the NICU.
Research question 6: Literature states that music therapy addresses a wide range of medical and developmental needs and produces the following results in the hospital. Do the responses received to this survey coincide with the perceived benefits cited in the literature in the following categories: (a) reduced length of stay, (b) stabilized oxygen saturation levels, (c) increased stimulation tolerance, (d) reduced stress-related behaviors, (e) enhanced parent–infant bonding, (f) improved parent–child interactions.

Gooding (2010) summarized the current music therapy approaches to treatment protocols for premature infants and highlighted the research that supports use of the procedures listed above (a-f) to address medical and developmental goals and objectives. A check-list was derived from that research, and respondents were presented with a check-list to indicate perceived benefits of music therapy in the NICU. Thirty-six responses were received for this section. Of these responses, 32 participants (88.9%)
observed reduced stress-related behaviors; 30 subjects (83.3%) observed enhanced parent-infant bonding; 29 participants (80.6%) noticed stabilized oxygen saturation levels and another 29 individuals (80.6%) observed improved parent-child interactions (80.6%). 28 individuals (77.8%) reported that they noticed an increased in stimulation tolerance; 12 subjects (33.3%) observed a reduced length of stay and 8 individuals (22.2%) selected “Other”. Other observations included: “decreased stress and anxiety levels for families”; “calmer staff”; “decreased heart rate from accelerated levels”; “improved progress toward developmental milestones”; “improved sibling attachment”; “improvement of the sensory environment and staff awareness”; “recognition by medical staff of benefits”; and “mother self-care, coping strategies, relaxation training; continued use of music after leaving the unit”. The data collected for this study indicated that although Gooding (2010) had summarized common techniques, music therapists working in the NICU have also noticed additional benefits in addition to those she identified. Distribution of perceived benefits as a result of music therapy in the NICU is shown in Figure 8.
Research question 7: (a) Is recorded music being used in the NICU? (b) What types of recorded music are being used? (c) Is there a difference between music therapists who have more experience and those who have less experience, in relationship to the use of
recorded music? (d) What are some common characteristics (voices/instrumentation) of recordings frequently used in the NICU?

Thirty-seven responses were collected when asked whether recorded music was used in the NICU. Twenty participants (54.1%) answered yes and seventeen (45.9%) responded no. The respondents who replied “No” were directed to the end of the survey thanking them for their participation. Distribution of the use of recordings in the NICU is shown in Figure 9.

Figure 9. Use of Recordings in the NICU

When asked about the percentage of time that recorded music was used during each interaction in the NICU, sixteen participants (80%) of the twenty that indicated using music in the NICU stated that they used recorded music in 0-20% of each interaction; three participants (15%) stated recorded music was used 20-40% of each interaction, and one participant (5%) stated that they used recorded music in 60-80% of each interaction. The distribution of percentage of time that recorded music was used during each interaction in the NICU is shown in Figure 10.
Twenty responses were gathered for the question “Do you use commercially recorded music in the NICU?” Regarding the usage of commercially recorded music in the NICU, fifteen participants (75%) of the twenty that indicated using recordings responded that they used commercially recorded music, while five (25%) responded that they did not use them. Distribution of the responses regarding the use of commercially recorded music in the NICU is shown in Figure 11.
In terms of the selection of recordings used in the NICU, twenty respondents answered the question “Which of the following do you use in the recordings you select for the NICU? Check all that apply”. Out of these respondents, 10 (50%) of those indicating using recordings, use female vocals only; 18 (90%) use female vocals with light accompaniment; 5 (25%) use child vocals only; 6 (30%) use child vocals with light accompaniment; 3 (15%) use male vocals only; 2 (10%) use male vocals with light accompaniment; 9 (45%) use “classical” instrumental only (Baby Einstein style music); 3 (15%) use heartbeat/womb sound only. The distribution of recording selections used in the NICU is shown in Figure 12.
Eighteen respondents answered the question regarding the types (titles) of commercially recorded music used in the NICU: “Which of the following recordings do you use in the NICU? Check all that apply.” Out of these participants, 14 (77.8%) use Maternal Voice; 7 (38.9%) use Music for Dreaming, 5 (27.8%) use Sleep, Baby Sleep; 2 (11.1%) use Warm and Tender; 0 (0%) use Build Your Baby’s Brain; 1 (5.6%) uses Heartsong; 1 (5.6%) uses Baby Sleep; 4 (22.2%) use Disney Babies Lullaby; 1 (5.6%) uses Lullaby Magic; 2 (11.1%) use Lullaby Berceuse; 0 (0%) use Star Dreamer; 2 (11.1%) use A Child Celebration of Lullaby; 0 (0%) use Daddies Sing Goodnight; 0 (0%) use Mickie Dolenz Puts You to Sleep; 0 (0%) use Heartbeat Music Therapy; 3 (16.7%)
use Baby Einstein; 10 (55.6%) responded with “Other”. Other responses included:
“paternal voice”; “Rock-A-Bye Baby”; “Sing Me to Sleep, Sleep Tight, Lullaby by Jewel, Dream a Little, Lullabies for Sleepy Eyes”; “Single tracks downloaded from iTunes, compiled into suitable playlists”; “Transitions”; “Daniel Kobialka, Slumber Baby, Liquid Mind, Piano Lullabies”; “Numerous Others”; “Selections from : Latin Lullaby, Lullaby Favorites”; ”Single Instrument(guitar, voice, piano)”; “I create original specific recordings according to the needs of the infant which include family voice recordings—mother, father, grandparents, siblings, or significant others. As well, I choose recordings that will assist the infant developmentally—i.e. solo cello with long sustained notes, solo violin with andante lullabies that are recorded at a specific decibel level—not exceeding 60dB”. The distribution of types (titles) of commercially recorded music used in the NICU is shown in Figure 13.

Figure 13. Types (Titles) of Music Used in the NICU

On average, there was a statistically significant difference in whether recorded music was used (M=2.95, SE=.369) or not (M=1.94, SE=.347), $t(25)=2.90$, $p<.01$ based
on years of experience in the NICU. The mean 2.95 (rounded to 3) implied that participants who used recorded music had an average of 5-10 years of experience. The mean 1.94 (rounded to 2) implied that participants who did not use recorded music had an average of 1-4 years of experience. Table 6 identifies the coding system used for analysis.

Table 6. Coding System for Years of Experience

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Under 1 year of experience</td>
</tr>
<tr>
<td>2</td>
<td>1-4 years of experience</td>
</tr>
<tr>
<td>3</td>
<td>5-10 years of experience</td>
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<tr>
<td>4</td>
<td>11-15 years of experience</td>
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<tr>
<td>5</td>
<td>16-20 years of experience</td>
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<tr>
<td>6</td>
<td>21-25 years of experience</td>
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<tr>
<td>7</td>
<td>26-30 years of experience</td>
</tr>
<tr>
<td>8</td>
<td>30+ years of experience</td>
</tr>
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</table>
Evidence-based medical music therapy treatment in the NICU is centered on the needs of the infants, the medical and developmental goals of NICU care, and the protocols/interventions documented in the research literature. Reports in the extant literature indicate that music therapy addresses a wide range of needs and produces beneficial results in the hospital. Gooding (2010) summarized the current music therapy protocols for premature infants and highlighted the research that supports these interventions that address medical and developmental goals and objectives. Some perceived benefits of music therapy in the NICU can be classified into the following categories: reduced length of stay, stabilized oxygen saturation levels, increased stimulation tolerance, reduced stress-related behaviors, enhanced parent–infant bonding, and improved parent–child interactions. The purpose of the current study was to examine the demographics, educational training (NICU-MT designation), employment conditions, and music therapy interventions/techniques used by professional music therapists currently working in the NICU. Data collected in this study indicated that the majority of respondents completed at least one portion of NICU-MT training through Florida State University (lecture, hands-on, or take-home exam). Results from the current study indicate that many, if not most, employers do not require the possession of the NICU-MT designation as a condition of employment. However, a large number, if not a majority, of music therapists working in this area seem to value the training despite the lack of apparent current compensation-related factors. Results indicated that 50% of participants
deemed the NICU-MT designation not necessary for their current job. Nevertheless, 84.2% of participants attended the lecture component, 76.3% attended the hands-on training, and 68.4% completed the take-home exam (and completed the outside reading to assist with this exam). The individuals who completed the take-home exam had also completed the other two components (lecture and hands-on training), thus, earning the NICU-MT designation. So although half of participants determined that the designation was not necessary, there was a high percentage of people who completed at least one portion of the training (meaning they value it although not required by their employer). Seemingly, these participants found educational benefit in the NICU-MT training and potential professional benefit to the designation. Only 5 individuals (13.2%) in the current study answered that they did not complete any components of the NICU-MT training. Although it is not mandatory to have the NICU-MT designation, competency to practice evidence-based clinical services is important in this very critical and highly specialized environment.

Limitations

There is a poorly identified number of board-certified music therapists actively practicing in the neonatal intensive care unit (NICU) so the size of the population is unclear. Since the AMTA Sourcebook (2011) indicated that 103 professional members were employed in a general or children’s hospital or worked with prenatal/infants/young children, it was assumed that many would be eligible to participate in this study. However, the Sourcebook does not have a membership category specifically for “premature infants” or “NICU”.
It is also unclear if the same individual provided different contact information to the three databases (AMTA Sourcebook, CBMT membership database, or Infant and Child Medical Music Therapy Institute through Florida State University database), or if the contact information from the three databases was updated, the estimated number may not be an accurate representation. Also, while most potential participants were selected by where they declared they worked, it is possible that this information is not current, since not all music therapists are members of the American Music Therapy Association (AMTA) and not all music therapists report current work information to CBMT.

The researcher received emails from one eligible participant indicating they had technical difficulties completing the survey and that the link was not working. The researcher was not able to identify the cause of the problem. The researcher resent the participant a link to the survey, but it is unknown if the individual was able to complete the study. The researcher also received six emails from potential participants inquiring if their situations met the screening criteria for participating in the study. Specifically, these individuals were currently interns/finishing their music therapy internship and were not board-certified. The researcher discouraged these potential participants from completing the survey since they would not meet the screening criteria for the study. It is possible that some international music therapists may have completed the survey despite not being board-certified by CBMT.

Participant responses to several of the survey questions warrant further discussion. For example, 37.8% of the participant responses to Question 9 ("While working in the NICU, which of the following interventions, if any, do you implement?") indicated that they implemented music with both nutritive and non-nutritive sucking. For
many hospitals, it may be considered “risky” to use live music for nutritive feeding, given the high risk for aspiration if an infant should fall asleep during feeds. A PAL device involves a pacifier as opposed to a bottle. It includes a sensor that can detect if the nipple collapses while a baby is sucking, or if a baby has stopped sucking altogether. A music therapist performing live music may not be able to detect these changes and may not “stop” the music at the proper times. This survey was also conducted before the PAL was commercially available. More participants may be using the PAL now, which provides infants with a safer option, reducing the risk for aspiration.

Question 12 stated: “What percent of the time during each interaction do you use recorded music in the NICU?” This question could have been interpreted as the music therapist physically turning on a recording for the patient or it may have been interpreted as a nurse or parent being able to turn on a recording for an infant. This question could have been more specific and less ambiguous. Some participants may have answered “no” because they physically do not play the recorded music. Others may have answered yes that they provide recorded music but they do not physically turn on a machine that plays music (mobile, CD player, etc.)—another staff member may do so (RN, OT, etc.).

Question 13 stated: “Which of the following recordings do you use in the NICU?” This question is very specific but the researcher could have included the artist as well as the CD title. Some of the titles may have been used by multiple artists (example, “Sleep, Baby Sleep”) or were too generic (example, “Baby Einstein”). Moreover, music therapists may not have recognized the CD titles. Many music therapists identified additional titles/artists in the “other” comment box and some had stated that they make playlists with multiple tracks (it can be presumed the tracks combined songs from a
diverse group of CDs). The question could have been elaborated on and could have asked what elements of these CDs make them appropriate. Additionally, question 14 stated: “Which of the following do you use in the recordings you select for the NICU?” The term “only” in the selection options (examples: “female only” or “male only”) could have been misinterpreted by participants and could have been avoided.

It is important to note that some music therapists may not have taken a portion of the NICU-MT training, but are still actively researching and practicing a variety of techniques and interventions with this population. A larger comment box in the survey could have been beneficial in providing more insight into other interventions employed besides the ones listed in question 9. Similarly, a larger comment box in question 10 could have provided more insight into outcomes observed as a result of the work of music therapists.

According to some participants, the NICU-MT designation may carry less meaning outside of the field of music therapy. Yet, on average, participants with the NICU-MT designation tend to earn a slightly larger salary than those without the designation. Additionally, the more years of experience in the NICU, the greater the hourly wage/salary. Participants were not asked if they were part-time, full-time, contingent, contractual, or on-call. Nevertheless, this information could have been asked and compared in relation to compensation as well.
Recommendations for Further Research

The email database was limited and further research could include professional music therapists practicing internationally. Some music therapists who were eligible to participate practicing outside of the United States may have a different philosophy about the role of music therapy in the NICU. The survey could be repeated to include more than music therapists practicing in the United States. The researcher overlooked the fact that some music therapists responding to the survey may come from another country other than the United States.

It may be important to examine the role of the family in NICU music therapy. How important is it to involve other caregivers besides a biological mother? Do music therapists change their interventions when adoptive parents are involved or social situations change the infant's family structure? Do many music therapists treat parental/caregiver anxiety as this is likely to impact the infant? Do many music therapists encourage environmental music or are there musicians that provide music in the NICU for staff/parents? Do some music therapists find this over stimulating or even threatening to the infant?

With regard to recorded music, it could be beneficial to compare premature infants’ responses to mother’s voice, music therapist’s voice, a sibling’s voice, live instrumental music, and a variety of instrumental recordings. It is a possibility that certain instrumental qualities or certain types of music may be considered over stimulating. It could be researched as to what qualities (dynamics, instrumentation, complexity, chord structure, etc.) of music are most appropriate for the NICU and the mechanisms of facilitation. It would be beneficial to understand the elemental characteristics rendering a
recording appropriate or inappropriate. Additionally, certain recordings may be appropriate for certain gestational ages and not for others. “How does each music therapist decide what elements are important when deciding whether or not to use a recording?” could have been asked.

It may also be beneficial to examine areas less researched in the United States, but researched in countries such as Australia and Germany. One area that is less researched in the United States is recording individual maternal womb sounds to promote infant relaxation and increase parental bonding. (Shoemark, 2011; Haslbeck, 2012). Another area less researched, especially by music therapists in the United States, is the use of “breathing bears.” Breathing bears are placed in an isolette to breathe at the same rate as each infant during quiet sleep; they are adjusted weekly and the rhythmic stimulation allows an infant to self-regulate the intervention by moving towards and make contact with the bear, resulting in more and increased quiet sleep over time (Thoman & Ingersoll, 1993; Shoemark, 2011; Haslbeck, 2012).

Moreover, another area of further research could examine what types of live music are used in the NICU. A line of inquiry might be necessary to determine what songs or musical characteristics work best and why. Some examples of research questions can include: What type of live music is used during both nutritive and non-nutritive sucking? Can the rhythm of the music cue an infant to coordinate the pattern of suck, swallow, and breathe? Is music serving as positive reinforcement? Would “lullaby-style” music increase the risk of aspiration with bottle feeds? Can live music help an infant to better coordinate their pattern of suck, swallow, and breathe, during breastfeeding too? Can music therapy help with breast milk production? According to Friederike Barbara
Haslbeck (2012), “mild premature infants may be empowered to orientate by being synchronized with their individual biorhythm”. With that in mind, it may be beneficial for a researcher to conduct a study examining the influence of rhythm to entrain a baby to coordinate suck, swallow, and breathe.

Conclusion

The use of music therapy in the NICU is growing. Although research exists regarding its benefits, it is evident that not all music therapists use the same techniques. Despite the NICU-MT designation not being mandatory for practicing music therapy in the NICU, it seems to have educational benefits that can positively influence the perceived level of quality of care.
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Appendix A

Survey Invitation Letter
Dear Music Therapy Colleague,

You are invited to participate in a research study entitled, “Music Therapy in the NICU: Interventions and Techniques in Current Practice and a Survey of Experience and Designation Implications.” This research is being conducted as part of the Master of Music in Music Therapy degree requirements for Suzanna Peczeniuk. The purpose of this study is to explore the demographics of music therapists currently working in the NICU. Your participation in this study will aid in identifying information about common practices and interventions used by music therapists in this setting. Only music therapists who currently work in the Neonatal Intensive Care Unit are asked to participate in this study.

This survey will take approximately 10-15 minutes to complete. All of the information collected from you is confidential meaning that your e-mail and responses will be kept confidential. SurveyGizmo®, the company through which this survey was created, guarantees the security and confidentiality of responses and e-mail address. Submitting the survey indicates your consent to include your responses in the data analysis for this
research. Your participation is encouraged, but you may refuse to participate, stop participating at any time, or refuse to answer any question without prejudice or penalty.

Participation in this survey is completely voluntary.

The survey will remain open until March 16.

To participate, simply go to the following website (WEBSITE) to access the secure survey web page and follow the instructions to complete the survey.

If you have any questions or experience issues with the survey tool, please contact the student investigator, Suzanna Peczeniuk, MT-BC, Neurologic Music Therapist and NICU Music Therapist at suzanna.a.peczeniuk@wmich.edu or principal investigator, Edward Roth, MM, MT-BC, Neurologic Music Therapy Fellow at edward.roth@wmich.edu. You may also contact the Chair, Human Subjects Institutional Review Board (616-387-8293) or the Vice President for Research (616-387-8298) if questions or problems arise during the course of the study.

This consent document was approved by the Human Subjects Institutional Review Board (HSIRB) on February 22, 2012. Do not participate after February 14, 2013.

Thank you for your time in completing this survey.

Sincerely,

Suzanna Azaria Peczeniuk, MT-BC
Neurologic Music Therapist and Neonatal Intensive Care Unit Music Therapist
Appendix B

Survey
Music Therapy in the NICU: Interventions and Techniques in Current Practice and a Survey of Experience and Designation Implications

Demographic Information

1. Do you currently work in the Neonatal Intensive Care Unit (NICU)?
   - Yes (Go to question 2)
   - No (If this is selected, a screen will appear stating: “Thank you for your time but as this survey is designed to assess music therapists currently working in the Neonatal Intensive Care Unit (NICU), you are not eligible to complete this survey at this time. Have a wonderful day.”)

2. How long have you practiced as a professional music therapist in a Neonatal Intensive Care Unit (NICU)?)
   - Under 1 year
   - 1-4 years
   - 5-10 years
   - 11-15 years
   - 16-20 years
   - 21-25 years
   - 26-30 years
   - 30+ years
3. How many hours per week (approximately) do you spend in the NICU?

- 1-4 hours
- 5-9 hours
- 10-14 hours
- 15-19 hours
- 20-24 hours
- 25+ hours

4. What is your approximate hourly wage? If you are paid an annual salary rather than an hourly wage, please skip this question and answer question 5.

- $10-$14.99 per hour. (Skip to question 6.)
- $15-$19.99 per hour. (Skip to question 6.)
- $20-$24.99 per hour. (Skip to question 6.)
- $25-$29.99 per hour. (Skip to question 6.)
- $30-$34.99 per hour. (Skip to question 6.)
- $35-$39.99 per hour. (Skip to question 6.)
- $40-$44.99 per hour. (Skip to question 6.)
- $45-$49.99 per hour. (Skip to question 6.)
- $50-$54.99 per hour. (Skip to question 6.)
- $55-$59.99 per hour. (Skip to question 6.)
- $60-$64.99 per hour. (Skip to question 6.)
- $65-$69.99 per hour. (Skip to question 6.)
- $70-$74.99 per hour. (Skip to question 6.)
5. What is your approximate annual salary?

- Under $10,000 per year. (Proceed to question 6.)
- $10,000-$14,999 per year. (Proceed to question 6.)
- $15,000-$20,999 per year. (Proceed to question 6.)
- $21,000-$24,999 per year. (Proceed to question 6.)
- $25,000-$29,999 per year. (Proceed to question 6.)
- $30,000-$34,999 per year. (Proceed to question 6.)
- $35,000-$39,999 per year. (Proceed to question 6.)
- $40,000-$44,999 per year. (Proceed to question 6.)
- $45,000-$49,999 per year. (Proceed to question 6.)
- $50,000-$54,999 per year. (Proceed to question 6.)
- $55,000-$59,999 per year. (Proceed to question 6.)
- $60,000-$64,999 per year. (Proceed to question 6.)
- $65,000-$69,999 per year. (Proceed to question 6.)
- $70,000-$74,999 per year. (Proceed to question 6.)
$75,000-$79,999 per year. (Proceed to question 6.)

$80,000-$84,999 per year. (Proceed to question 6.)

$85,000-$89,999 per year. (Proceed to question 6.)

$90,000-$94,999 per year. (Proceed to question 6.)

$95,000-$99,999 per year. (Proceed to question 6.)

$100,000 + per year. (Proceed to question 6.)

6. Are there aspects to your compensation package other than salary? Check all that apply.

- Health insurance
- Retirement benefits
- Continuing education
- Membership dues
- Conference expenses
- None
- Other: _______________

**NICU-MT Designation**

7. Some music therapists who work in the NICU have completed some or all of the training to earn the NICU-MT designation. A lecture, hands-on training, and take home exam are required to receive the NICU-MT designation. Which components, if any, have you completed? Check all that apply.
o I have not completed any portion of the National Institute for Infant & Child Medical Music Therapy through Florida State University to receive the NICU-MT designation.

o Lecture

o Hands-on Training

o Take Home Exam (If all three: lecture, hands-on training, and take home exam are selected—skip question 8)

8. If you did not complete any or all three components to receive your NICU-MT designation, what contributed to you not completing all three parts? Check all that apply.

   o Financial reasons
   
   o Not necessary for current job
   
   o Not enough time off
   
   o Other __________

**Music Therapy Interventions**

9. While working in the NICU, which of the following interventions, if any, do you implement? Check all that apply.

   o Multimodal Stimulation with Music
   
   o Parent training in Multimodal Stimulation with Music
   
   o Live music with kangaroo care
   
   o Pacifier Activated Lullaby (PAL)
   
   o Live Music with non-nutritive sucking
   
   o Live Music with nutritive sucking (Bottle feeding)
o Live Music with Breastfeeding/Breastfeeding Support Group

o Creating recordings of parents’ voices (lullabies, stories, etc.)

o Providing recordings for infants

o Calming and soothing infants with neonatal abstinence syndrome

o Checking noise measurements in the NICU

o Other: ________________________________

10. Which of the following, if any, have you observed as a result of your work in the NICU? Check all that apply.

o reduced length of stay

o stabilized oxygen saturation levels

o increased stimulation tolerance

o reduced stress-related behaviors

o enhanced parent–infant bonding

o improved parent–child interactions

o Other: ________________________________

11. Do you use recordings in the NICU?

o Yes

o No, I do not use any recordings in the NICU (End survey: Thank you very much for your time and your help in completing the survey.)
12. What percent of the time during each interaction do you use recorded music in the NICU?
   - 0-20%
   - 20-40%
   - 40-60%
   - 60-80%
   - 80-100%

13. Do you use commercially recorded music in the NICU?
   - Yes
   - No

14. Which of the following do you use in the recordings you select for the NICU? Check all that apply.
   - Female vocals only
   - Female vocals with light accompaniment
   - Child vocals only
   - Child vocals with light accompaniment
   - Male vocals only
   - Male vocals with light accompaniment
   - “Classical” Instrumental only (Baby Einstein style music)
   - Heartbeat/Womb sound only
15. Which of the following recordings do you use in the NICU? Check all that apply.

- Maternal Voice
- Music for Dreaming
- Sleep, Baby Sleep
- Warm and Tender
- Build Your Baby’s Brain
- Heartsong
- Baby Sleep
- Disney Babies Lullaby
- Lullaby Magic
- Lullaby Berceuse
- Star Dreamer
- A Child Celebration of Lullaby
- Daddies Sing Goodnight
- Mickie Dolenz Puts You to Sleep
- Heartbeat Music Therapy
- Baby Einstein
- Other: __________________

End survey: Thank you very much for your time and your help in completing the survey.
Appendix C

Human Subject Committee Approval Letter
Date: February 14, 2012

To: Edward Roth, Principal Investigator
    Suzanna Peczeniuk, Student Investigator for thesis

From: Amy Naugle, Ph.D., Chair

Re: HSIRB Project Number 12-02-26

This letter will serve as confirmation that your research project titled "Music Therapy in the NICU: Interventions and Techniques in Current Practice and a Survey of Experience and Designation Implications" has been approved under the exempt category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: February 14, 2013
Appendix D

Human Subject Committee Changes Approval Letter
Date: February 27, 2012

To: Edward Roth, Principal Investigator
    Suzanna Peczeniuk, Student Investigator for thesis

From: Amy Naugle, Ph.D., Chair

Re: HSIRB Project Number 12-02-26

This letter will serve as confirmation that the change to your research project titled “Music Therapy in the NICU: Interventions and Techniques in Current Practice and a Survey of Experience and Designation Implications” requested in your memo dated February 22, 2012 (to correct semantic/spelling errors; to change NMT to Neurologic Music Therapist and NICU-MT to Neonatal Intensive Care Unit Music Therapist) has been approved by the Human Subjects Institutional Review Board.

The conditions and the duration of this approval are specified in the Policies of Western Michigan University.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: February 14, 2013