THE EFFECT OF MUSIC LISTENING ON RELAXATION LEVEL AND VOLUME OF BREAST MILK PUMPED BY MOTHERS OF INFANTS IN THE NEONATAL INTENSIVE CARE UNIT

Amber A. Colliver
University of Kentucky, colliveramber@yahoo.com

Right click to open a feedback form in a new tab to let us know how this document benefits you.

Recommended Citation
https://uknowledge.uky.edu/music_etds/39

This Master's Thesis is brought to you for free and open access by the Music at UKnowledge. It has been accepted for inclusion in Theses and Dissertations--Music by an authorized administrator of UKnowledge. For more information, please contact UKnowledge@lsv.uky.edu.
STUDENT AGREEMENT:

I represent that my thesis or dissertation and abstract are my original work. Proper attribution has been given to all outside sources. I understand that I am solely responsible for obtaining any needed copyright permissions. I have obtained needed written permission statement(s) from the owner(s) of each third-party copyrighted matter to be included in my work, allowing electronic distribution (if such use is not permitted by the fair use doctrine) which will be submitted to UKnowledge as Additional File.

I hereby grant to The University of Kentucky and its agents the irrevocable, non-exclusive, and royalty-free license to archive and make accessible my work in whole or in part in all forms of media, now or hereafter known. I agree that the document mentioned above may be made available immediately for worldwide access unless an embargo applies.

I retain all other ownership rights to the copyright of my work. I also retain the right to use in future works (such as articles or books) all or part of my work. I understand that I am free to register the copyright to my work.

REVIEW, APPROVAL AND ACCEPTANCE

The document mentioned above has been reviewed and accepted by the student’s advisor, on behalf of the advisory committee, and by the Director of Graduate Studies (DGS), on behalf of the program; we verify that this is the final, approved version of the student’s thesis including all changes required by the advisory committee. The undersigned agree to abide by the statements above.

Amber A. Colliver, Student
Dr. Lori Gooding, Major Professor
Dr. David Sogin, Director of Graduate Studies
THE EFFECT OF MUSIC LISTENING ON RELAXATION LEVEL AND VOLUME OF BREAST MILK PUMPED BY MOTHERS OF INFANTS IN THE NEONATAL INTENSIVE CARE UNIT

______________________________

THESIS

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Music in Music Therapy in the College of Fine Arts at the University of Kentucky

By

Amber Allen Colliver

Lexington, Kentucky

Director: Dr. Lori Gooding, Professor of Music Therapy

Lexington, Kentucky

2015

Copyright © Amber Allen Colliver 2015
ABSTRACT OF THESIS

THE EFFECT OF MUSIC LISTENING ON RELAXATION LEVEL AND VOLUME OF BREAST MILK PUMPED BY MOTHERS OF INFANTS IN THE NEONATAL INTENSIVE CARE UNIT

Breast milk is considered the gold standard for infant nutrition, but many factors can hinder milk production. Mothers of infants in the Neonatal Intensive Care Unit (NICU) are especially prone to stress, which can inhibit volume of breast milk. The purpose of this study was to determine if music listening had an effect on the volume of breast milk pumped and relaxation level of mothers of infants in a NICU.

A total of 28 participants, who were mothers of infants in the NICU, were included in the data analysis of this study, with 14 in the control group and 14 in the experimental group. Participants assigned to the experimental group listened to relaxing music during pumping sessions in the NICU, for the duration of their infant’s stay. Participants assigned to the control group pumped as they would normally without the music condition. Results indicated that there was a significant increase in relaxation scores in the music group, but no significant difference in volume of milk pumped. Further research should be done in this area to determine music’s effect on volume of milk pumped by mothers of infants in the NICU.

KEYWORDS: Music Listening, Relaxation, Breast Milk Pumping, NICU, Music Therapy

Amber A. Colliver

March 24, 2015
THE EFFECT OF MUSIC LISTENING ON RELAXATION LEVEL AND VOLUME OF BREAST MILK PUMPED BY MOTHERS OF INFANTS IN THE NEONATAL INTENSIVE CARE UNIT

By

Amber Allen Colliver

Dr. Lori Gooding
Director of Thesis

Dr. David Sogin
Director of Graduate Studies

March 24, 2015
Date
To my husband, Michael, for all that you do to support me.

Your compassion, selflessness, and determination inspires me every day. Thank you for helping me achieve my dreams.
Acknowledgements

To my family, I value your advice and support throughout my thesis and academic career. I thank you Mom and Dad for teaching me to love and inspiring me to go into a helping profession. I am so grateful to have had the support of so many loved ones, before anyone really understood my career choice. Michael, I could not have made it this far without your love and patience. Thank you for helping me find strength and motivation during the times I couldn’t and for being a listening ear when I needed it most.

I would like to thank my dearest friends and colleagues: I truly cherish your friendship, knowledge, and advice, whether near or far. Your words of encouragement were crucial throughout my thesis process. To all of the music teachers throughout my life, you inspired me to use my passion for music and to never give up on my dreams.

Many thanks to my committee members for your guidance. I thank my advisor, Dr. Gooding, for helping me through all of the hurdles and challenges. A huge thank you, to both Dr. Gooding and Dr. Yinger for your support and knowledge throughout my music therapy studies at University of Kentucky. To Regina Stoltz, thank you for taking a lead in the study and allowing me to work with your wonderful staff and mothers of the NICU. To the entire NICU staff at Baptist Health Lexington, I send my deepest thanks for your time and cooperation during the study. I would especially like to thank Jeri Hahn, Elizabeth Turcotte, Jessica Kleinjan, Rhonda Byrd, and Krista Moe for your help with my study. Finally, I would like to thank all of the moms in the NICU at Baptist for their willingness to participate in my study.
# TABLE OF CONTENTS

Acknowledgements ........................................................................................................ iii  
List of Tables ....................................................................................................................... vii  
List of Figures ...................................................................................................................... viii  
Chapter One: Introduction ................................................................................................. 1  
  Definition of Terms ......................................................................................................... 2  
  Purpose ............................................................................................................................. 2  
Chapter Two: Review of Literature .................................................................................. 3  
  Importance of Breast Milk .............................................................................................. 3  
  Benefits for Infants ........................................................................................................ 3  
  Benefits for Mothers ...................................................................................................... 4  
  Economical Advantage ................................................................................................. 5  
  Environmental Effects .................................................................................................. 5  
  Obstacles in Breastfeeding and Pumping .................................................................... 6  
  Issues in Initiating Breastfeeding ................................................................................ 6  
  Issues in Sustaining Breastfeeding .............................................................................. 7  
  Infant Complications ..................................................................................................... 8  
  Mother Complications .................................................................................................. 10  
  Additional Barriers for Mothers of Preterm Infants .................................................... 11  
    Stress .......................................................................................................................... 11  
  Effective Ways to Reduce Stress .................................................................................. 13  
    Commonly Used Relaxation Techniques ................................................................ 14  
    Music Relaxation ....................................................................................................... 15  
  Music Therapy versus Music Medicine ......................................................................... 17  
    Effects of Music Listening on Relaxation ................................................................ 18  
    Music Listening for Relaxation in Breast Milk Production ...................................... 19  
Chapter Three: Method .................................................................................................... 21  
  Participants ..................................................................................................................... 21  
  Instruments ..................................................................................................................... 21  
  Medical Information ...................................................................................................... 21  
  Survey ............................................................................................................................ 22  
  Pumping Log .................................................................................................................. 23
Curriculum Vitae
LIST OF TABLES

Table 1. Group Demographic Comparison.........................................................28
Table 2. Descriptive Statistics of Pumping Survey.............................................30
LIST OF FIGURES

Figure 1. Stress Response vs. Relaxation Response...........................................14
Figure 2. Age Ranges of Participants.................................................................27
Figure 3. Relaxing Music Elements.................................................................31
Figure 4. Initial CD chosen..................................................................................32
Figure 5. Repeated CD chosen............................................................................33
CHAPTER ONE

INTRODUCTION

Breastfeeding contributes to a number of benefits for infants, including reduced short-term infections and increased long-term health. Mothers who breastfeed their infants may also show improved physical and mental health (Baker, et al., 2008; Chung et al., 2007; Jacobsson, Jacobsson, Askling, & Knowler, 2003; Mezzacappa, 2004; Möller, Olsson, Ranstam, & Collaborative Group on Hormonal Factors in Breast Cancer, 2002; Rooney & Schauburger, 2002; Tung et al., 2003). The advantages of breastfeeding may reduce medical costs, for both hospitals and patients, as the health benefits of breast milk result in fewer medical needs (Bartick & Reinhold, 2010).

The World Health Organization (2011) recommends that infants should be exclusively breastfed for the first 6 months of life. However, in the year 2011 it was estimated that less than 20% of infants met this recommendation. Some mothers may have difficulty initiating breastfeeding while others may have issues in sustaining breastfeeding (Scott & Colin, 2002). In particular, many mothers of preterm infants struggle to produce a sufficient amount of breast milk due to stress, fatigue, and infrequent interactions with their infant (Hill, Aldag, Chatterton, & Zinaman, 2005a; Hill, Aldag, Chatterton, & Zinaman, 2005b).

Results of numerous studies in a meta-analysis show that music therapy can reduce stress (Pelletier, 2004); therefore, it is possible that music may help mothers of premature infants relax, resulting in an increased production of breast milk. A recent study showed that music-based interventions in which music was paired with (a) progressive muscle relaxation, (b) guided imagery, and (c) visual interventions were
effective in significantly increasing breast milk production in mothers of premature infants (Keith, Weaver, & Vogel, 2012).

**Definition of Terms**

*Exclusive breastfeeding* is defined as “the practice of only giving an infant breast-milk for the first 6 months of life (no other food or water)” (WHO/UNICEF, 2014, p. 1).

*Preterm* is defined as “babies born alive before 37 weeks of pregnancy are completed” (WHO, Preterm Birth, 2014).

**Purpose**

The purpose of this study was to determine if music has an effect on the volume of breast milk pumped and relaxation level of mothers of infants in a neonatal intensive care unit. The following research questions were addressed:

1. Does listening to relaxing music affect the volume of milk pumped by mothers of infants in the NICU?
2. Does listening to relaxing music affect the relaxation level of mothers of infants in the NICU pumping breast milk?
CHAPTER TWO
REVIEW OF LITERATURE

Importance of Breast Milk

Breast milk is thought of as the preferred method of nutrition for infants because of the many benefits it provides to both the infant and the mother (Walker, 2010). Numerous organizations support the use of breast milk, such as the American Academy of Pediatrics (Ketan & Ketan, 2005), American Public Health Association (2007), American Academy of Family Physicians (2012), and the American Dietetic Association (James & Lesson, 2009). The World Health Organization (2011) recommends exclusive breastfeeding for 6 months; other foods or drinks, including water, are discouraged during this time period. Breastfeeding not only offers positive health benefits, but an economical and environmental advantage.

Benefits for Infants

One important short-term benefit of breastfeeding is that drinking breast milk alone has been shown to reduce the number of infections in infants (Walker, 2010). For example, numerous studies have shown a reduced risk of urinary tract infections in premature infants who were fed breast milk (Levy et al., 2009; Mårild, Hansson, Jodal, Oden, & Svedberg, 2004). In one study, infants drinking breast milk exclusively for at least 4 months had lower instances of infections in (a) upper respiratory, (b) lower respiratory, and (c) gastrointestinal tracts (Duijts, Jaddoe, Hofman, & Moll, 2010). Multiple studies found that premature infants who were fed breast milk had decreased instances of necrotizing enterocolitis (Cristofallo et al., 2011; Sisk, Lovelady, Dillard,
Gruber, & O’Shea, 2007) and total parenteral nutrition (Cristofallo et al., 2011; Ghandehari, Lee, & Rechtman, 2012).

Research supports the long-term benefits of drinking breast milk as well. Postneonatal death rates were significantly lower for those infants who were fed breast milk (Chen & Rogan, 2004). Furthermore, Vohr et al. (2007) found that at 30 months corrected age, increased intake of breast milk was linked with higher cognitive, motor, and emotional regulation scores and fewer readmissions to the hospital for extremely low birth weight infants. Breastfeeding has even been shown to yield positive long-term benefits past the stage of infancy. The WHO examined past research studies, systematic reviews, and meta-analyses, compiling their own systematic review and meta-analysis, which suggested that breastfeeding can (a) lower systolic and diastolic blood pressure, (b) lower cholesterol levels in adulthood, (c) reduce likeliness to be obese or overweight, (d) reduce likeliness to develop type 2 diabetes, and (e) result in higher scores on intelligence tests (Horta, Bahl, Martines, & Victora, 2007).

Benefits for Mothers

Mothers can benefit from breastfeeding as well. Physical health benefits include (a) reduced risk of ovarian and breast cancers, (b) reduced risk of rheumatoid arthritis, and (c) postpartum weight loss (Baker, et al., 2008; Chung et al., 2007; Jacobsson, Jacobsson, Askling, & Knowler, 2003; Möller, Olsson, Ranstam, & Collaborative Group on Hormonal Factors in Breast Cancer, 2002; Rooney & Schauberg, 2002; Tung et al., 2003). Breastfeeding may also aid in decreasing depression and improving mental health for the postpartum mother (Chung et al., 2007; Mezzacappa, 2004). Another advantage for breastfeeding mothers is increased amenorrhea, which is the absence of menstruation;
this can act as a contraceptive. The lactational amenorrhea method (LAM) is a behavioral method of birth control that is practiced with contingencies based on (a) infant age, (b) menses, and (c) extent of breastfeeding (Labbok, 2001). This can be an economic advantage due to the potentially reduced cost of birth control.

**Economical Advantage**

The amount of money saved by not purchasing infant formula is seen as an economical advantage in comparison to the extra calorie consumption in breastfeeding mothers. Breastfeeding also produces possible savings in short-term and long-term health-care costs because of the healthy benefits of breast milk (Bartick & Reinhold, 2010). A study in 2007 showed that the U.S. could save $13 billion a year in direct medical costs (e.g., hospital procedural fees), indirect costs (e.g., parent loss of pay due to taking care of a sick infant), and the cost of premature death, if 90 percent of mothers in the U.S. followed the recommendations of exclusive breastfeeding for six months (Bartick & Reinhold, 2010).

**Environmental Effects**

Breastfeeding saves environmental resources because there are no packaging and transportation needs, in contrast to using formula. It is estimated that 150 million containers of formula are used for every one million babies who are fed formula, and many of these formula containers are thrown away, presenting a negative environmental impact (Le Leche League International, as cited in U.S. Department of Health and Human Services, 2011).
Obstacles in Breastfeeding and Pumping

Even with the wide-spread endorsement of breastfeeding by reputable organizations, many mothers are not breastfeeding (Centers for Disease Control and Prevention, 2014; James & Lesson, 2009; Ketan & Ketan, 2005). In the year 2011, approximately 79% of babies in the U.S. were breastfed with 27% still breastfeeding at 12 months; however only 41% were breastfed exclusively for 3 months and 19% were breastfed exclusively for 6 months (Centers for Disease Control and Prevention, 2014). Considering that the American Academy of Pediatrics (AAP) recommends exclusive breastfeeding for 6 months, it is concerning that over 80% of infants are not receiving the suggested method of feeding (Ketan & Ketan, 2005). In addition, approximately 24% of breastfed infants receive formula prior to day two of life (CDC, 2013a). The possible reasons for the failure to meet breastfeeding recommendations include: (a) desire to breastfeed, (b) employment difficulties, (c) infant complications, and (d) mother complications.

Issues in Initiating Breastfeeding

Many mothers of newborns do not initiate breastfeeding for many reasons. Mothers may have (a) experienced problems with breastfeeding previously, (b) desire husbands’ contribution in feeding through formula, or (c) perceive formula feeding as easier (Scott & Colin, 2002). Often times, mothers do not initiate breastfeeding due to the lack of awareness of the benefits of breast milk over formula (Gibson, 2005; Li, Rock, & Grummer-Strawn, 2007; McCann, Baydar, & Williams, 2007). In addition to the above factors, a mother’s intention to breastfeed prior to the infant’s birth is a high predictor of actual initiation and duration. For example, a study of over ten thousand
mothers in the United Kingdom found that mothers who intended to breastfeed had an
initiation rate of 96.6% compared with mothers who didn’t intend to breastfeed, who had
an initiation rate of 3.4% (Donath & Amir, 2003).

**Issues in Sustaining Breastfeeding**

Mothers are often anxious about the adequacy of their milk supply, discontinuing
breastfeeding if they feel their milk supply is insufficient (Scott & Colin, 2002). Hector,
King, Webb, and Heywood (2005) note that 50% of mothers think they are not producing
a sufficient amount of milk, when in reality it only occurs in approximately 5% of
mothers. A clinical trial in Brazil found that including fathers in a breastfeeding
education program significantly increased rates of exclusive breastfeeding (Susin &
Giugliani, 2008). Other family members may influence breastfeeding rates as well. One
study found that breastfeeding attitudes at home were significantly correlated with the
extent of time the mother anticipated breastfeeding (DiGirolamo, Thompson, Martorell,
Fein, & Grummer-Strawn, 2005).

Another reason mothers discontinue breastfeeding is due to returning to work. A
cohort study in Australia found that mothers were less likely to fully breastfeed their baby
at 6 months and provide any breastfeeding at 12 months if they returned to work before
their infant was one year old (Scott, Binns, Oddy, & Graham, 2006). Similarly, Taveras
et al. (2003) found that mothers were more likely to discontinue breastfeeding at 12
weeks if they returned to work during the first 12 weeks after birth. In a 2007 Cochrane
review, Abdulwadud and Snow found zero randomized control trials or quasi-randomized
control trials on the effects of workplace intervention on the continuation of
breastfeeding. Despite the lack of high quality research in this area, the CDC has a six
page guide to supporting breastfeeding in the workplace, which includes a rationale, program examples, and action steps (CDC, 2013b).

Mothers who pump breast milk are less likely to discontinue breastfeeding than mothers who do not express breast milk through pumping (Win, Binns, Zhao, Scott, & Oddy, 2006). However, mothers often report psychosocial and pumping concerns as reasons for discontinuing breastfeeding in the second month. Pumping concerns include the inability or choice not to pump at work and the amount of effort required to pump (Li et al., 2008).

**Infant Complications**

There are many complications in infants that could cause difficulty in breastfeeding. Rudolph and Thompson (2002) and the American Speech-Language-Hearing Association (n.d.) both summarize the causes of feeding and swallowing disorders in infants and children, which include the following: (a) anatomic/congenital abnormalities in the oropharynx, esophagus, larynx, and trachea; (b) disorders of the nervous system; (c) gastrointestinal conditions; (d) and prematurity/low birth weight. Rudolph and Thompson (2002) also note that prevalence of minor feeding problems ranges “between 25% and 35% in normal children and with more severe feeding problems observed in 40% to 70% of infants born prematurely or children with chronic medical conditions” (p. 97).

Infants who are born prematurely or present with complications may be hospitalized in the neonatal intensive care unit (NICU). It is estimated that close to 12% of infants born in the U.S. in 2011 were preterm (Martin, Hamilton, Ventura, Osterman, & Mathews, 2013). Infants in the NICU face many conditions such as (a) anemia, (b)
breathing problems, (c) heart defects, (d) jaundice, and (e) necrotizing enterocolitis (March of Dimes, 2014).

Infants who are born prematurely may also have difficulty with oral feeding; this can present an obstacle in breastfeeding. Sucking pressure, sucking frequency, and sucking duration develops as the infant matures, therefore preterm infants may not have the coordination to feed, depending on their age and development (Mizuno & Ueda, 2003). Generally, infants do not develop the suck, swallow, and breathe coordination needed to feed orally until 32-35 weeks gestation (Walker, 2002). Until the infant develops this ability to feed, they will be gavage fed either breast milk or formula through a tube leading from their nose into their stomach. Gavage feedings may also be necessary if the infant has other complications such as issues with their throat, esophagus, bowel, lung, or heart. As a result, if the infant is not able to breastfeed and instead is fed through gavage, the mother may need to provide breast milk through pumping (Jahnke, 2008).

Even though the American Academy of Pediatrics recommends that “all preterm infants should receive human milk,” mothers who give birth to a premature infant are less likely to breastfeed than those who give birth to a term infant (Eidelman, et al., 2012, p. e831; Lefebvre & Ducharme, 1989). One study looked at close to 70,000 births in Massachusetts during the year 2002 and found that “Breastfeeding initiation was 76.8% among term infants born at 37 to 42 weeks, 70.1% among infants born at 32 to 36 weeks, and 62.9% among infants born at 24 to 31 weeks” (Merewood, Brooks, Bauchner, MacAuley, & Mehta, 2006, p. e1049).
Mother Complications

There are some circumstances in which breastfeeding is not recommended. For example, if a mother has (a) human T-cell lymphotrophic virus type I or II, (b) active untreated tuberculosis, (c) is HIV positive, or (d) is undergoing chemotherapy or radiation therapy, breastfeeding is not recommended. Some narcotics may be acceptable during breastfeeding, but recreational drugs should not be used. Alcohol should be limited and smoking is discouraged while breastfeeding (Eidelman, et al., 2012). Other than these exceptions, breast milk is recommended to be the best option for infant feeding.

Even when a mother is able to breastfeed, she may have complications that discourage or terminate breastfeeding, such as (a) nipple soreness, (b) breast engorgement, (c) plugged milk duct, or (d) breast infection (Kaneshiro, 2013). A retrospective study by Hegney, Fallon, and O’Brien (2008) examined the characteristics of two groups of women experiencing breastfeeding difficulties. Groups were determined by whether the mom continued breastfeeding or discontinued breastfeeding. The study found that coping strategies, support of health care professional, and shared peer experiences helped women continue breastfeeding despite their challenges. According to Dewey, “Early lactation success is strongly influenced by parity, but may also be affected by potentially modifiable factors such as delivery mode, duration of labor, labor medications, use of nonbreast milk fluids and/or pacifiers, and maternal overweight” (2003, p. 607).

Studies have shown that increased frequency of pumping is associated with increased volume of milk (Hill, Aldag, & Chatterton, 1999). One study found that ideal
pumping volume was associated with at least 5 pumping sessions per day and greater than 100 minutes of total time spent pumping (Hopkinson, Schanler, & Garza, 1988).

**Additional Barriers for Mothers of Preterm Infants**

Many organizations such as La Leche League International and the becker (CDC) promote breastfeeding and provide many resources to assist and educate mothers; despite these supports, studies showed that mothers of premature infants have decreased lactation success compared with mothers of term infants (Jones & Spencer, 2007; Meier, 2003; Zanardo, 2011). This compromises the preferred method of food intake for premature infants. The challenges that could influence the decreased lactation include maintaining a milk supply through pumping and transitioning from gavage feeding to breastfeeding (Callen & Pinelli, 2005). Inadequate milk supply, bottle feeding before breastfeeding, and stress have all been reasons for preterm mothers’ discontinuation of breastfeeding (Callen & Pinelli, 2005). Studies have shown that mothers of preterm infants have increased stress as compared to mothers of term infants (Brandon et al., 2011; Zanardo, 2011).

**Stress**

Merriam-Webster defines stress as “a state resulting from a stress; especially: one of bodily or mental tension resulting from factors that tend to alter an existent equilibrium” (Stress, n.d.). There are many different types of stress, which include acute stress, episodic acute stress, and chronic stress. The most common form of stress is acute stress and although it is short term, it can cause multiple negative symptoms. Acute stress can cause emotional distress in the form of (a) anger, (b) irritability, (c) anxiety, or (d) depression. It can also cause muscle tension leading to headaches and muscle pains.
throughout the body. Stomach and bowel issues such as heartburn and irritable bowel syndrome can be a side effect of acute stress, along with negative psychological symptoms such as increased heart rate and elevated blood pressure (American Psychological Association, n.d).

Mothers of premature infants have an increased risk of psychological health issues, such as (a) stress, (b) anxiety, (c) depression, and (d) overall emotional distress when compared to mothers of term infants (Brandon et al., 2011; Zanardo, 2011). In a study of 130 parents of infants in the NICU, which was comprised of 86 mothers and 41 fathers, 35% of mothers met criteria for acute stress disorder (ASD) during the third to fifth day of infant admission to NICU. Overall, 62-70% of mothers and fathers experienced “at least one clinically significant symptom across ASD symptom categories (dissociation, re-experiencing, avoidance, and arousal)” and after 30 days, 15% of mothers met criteria for post-traumatic stress disorder (PTSD). In addition, 39% of mothers also met criteria for postpartum depression (Lefkowitz, Baxt, & Evans, 2010, p. 233). Theories behind decreased mental health for this specific population vary, but Brandon et al. (2011) suggest that it is the entire process, from the unexpected early birth, to the complications that may occur along the way.

**Impact of stress on lactation.** All of these psychological concerns may have an impact on lactation for mothers. Stress may delay or decrease hormones such as prolactin and oxytocin, which play an important role in milk synthesis and milk release, respectively (Lau, Hurst, Smith, & Schanler, 2007; Ueda, Yokoyama, Irahara, & Aono, 1994). Ueda et al. (1994) measured the physiological effects of mental induced stress and noise induced stress in mothers exclusively breastfeeding on the 5th day postpartum.
Compared to the control group, no significant differences were found in the plasma prolactin concentration, but the frequency of oxytocin pulses was significantly lower in the stress induced groups. Zanardo (2011) suggests that improving maternal mood states, along with lactation consultation and psychological support may help mothers of premature infants increase successful milk production.

**Effective Ways to Reduce Stress**

Relaxation can be seen as the opposite of stress, or a solution to remove stress (Relaxation, n.d.). According to the National Center for Complementary and Alternative Medicine (NCCAM, 2013), research has shown the positive effects of relaxation for at least 17 different illnesses or conditions, such as: (a) anxiety, (b) depression, (c) headache, (d) high blood pressure, (e) insomnia, and (f) pain. The difference in the body’s response to stress versus relaxation is shown in *Figure 1*. 
Commonly Used Relaxation Techniques

There are many different relaxation techniques that have been shown to be effective in reducing stress. The Mayo Clinic lists several main types of relaxation techniques: autogenic relaxation, progressive muscle relaxation, and visualization. Other relaxation techniques include (a) deep breathing, (b) meditation, (c) yoga, and (d) biofeedback (Mayo Clinic, 2014). The 2007 National Health Interview Survey studied Americans’ use of Complementary and Alternative Medicine (CAM) therapies and found significant increases in the percentage of people participating in (a) deep breathing, (b) meditation, (c) massage, and (d) yoga compared to the previous 5 years (Barnes, Bloom, & Nahin 2008).
A 2008 Cochrane review suggested relaxation techniques as a low cost measure to increase breast milk supply. Included in this review, Feher (1989) found that mothers listening to a relaxation/imagery audiotape had significantly higher volume of breast milk expression, 63% more than those not listening to the relaxation tape (Becker, McCormick, & Renfrew, 2008). Mothers whose infants were on ventilators and who listened to the relaxation tape showed an increase in breast milk supply of 121% compared to the control group. This group of mothers may have been under more stress due to severity of their infant’s complications. Feher (1989) also found that there was a “dose-response” effect, where the frequency of the relaxation intervention corresponded to the mean volume of breast milk expression. This suggests the more times the mom listens to the relaxation intervention, the higher the effectiveness.

Music Relaxation

Gaston (1951) first defined sedative music as a sustained melody with underlying simple, repetitive rhythm. He used lullabies as an example of sedative music, as a mother often pats or rocks an infant (the underlying repetitive rhythm) and sings a lullaby (a sustained melody). He noted that lullabies have the ability to create physical relaxation, along with other types of sedative music (Gaston, 1951).

Sedative music has been used in conjunction with many practices focusing on relaxation, such as yoga, meditation, and massage therapy. Sedative music tends to have relaxing effects such as decreased muscle tension, whereas stimulative music, arouses the listener, often increasing physiological signs such as heart rate (Radocy & Boyle 2003).

**Music listening.** Music listening can evoke the relaxation response through distracting and relaxing. In a study by Good et al. (2010) that included more than 500
patients undergoing abdominal surgery, 56% of the participants who listened to music after surgery \( (n=261) \) stated that they used the music as both relaxation and as a distraction from pain versus only one or none.

Not all types of music are necessarily relaxing. Leardi et al. (2007) randomly assigned participants to one of two groups. One group listened to new age music (selected by the researcher), whereas the other group was given a choice of four different styles of music, from a list compiled by the researcher. Cortisol levels measured after surgery were significantly lower in the group that chose their preferred style of music. Although patient preferred music has been shown to be most effective in music therapy (Standley, 2000; Walworth, 2003), there are certain musical parameters that need to be taken into consideration.

Tan, Yowler, Super, and Fratianne (2012) summarized the properties of relaxing music from studies with dates ranging anywhere from 1951 to 2007 as follows:

- Tempo: moderate to slow, repetitive or constant, at or below 72 beats per minute, between 60 to 80 beats per minute
- Dynamics: soft and quiet, restrained, predictable or constant
- Beat: lacked steady and pulsating beat
- Melodic Structure: Improvised or loosely structured, small step-wise intervals
- Rhythmic structure: Repetitive, simple, nonsyncopated, predictable, lack of strong rhythms
- Melodic line/contour: fluent, sustained, melodic, legato style with fluidity, gentle contours, homogeneous ascending and descending lines
Timbre: soft non-percussive; string instruments, flute, piano; absence of vocalization and lyrics (p. 153).

**Music Therapy versus Music Medicine**

Music listening interventions can be used by music therapists as well as by therapeutic music providers. According to the American Music Therapy Association (AMTA, 2014a) music therapy is defined as “the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program” (para.1). Music therapists must complete an AMTA approved music therapy degree program or equivalency program (at the bachelor’s level or higher) and earn 1200 clinical hours, including an internship. This allows them to sit for the board-certification exam, in which a successful score gives them the credential board-certified music therapist (AMTA, 2014b).

Music therapists work in a variety of different settings including hospitals, schools, rehabilitation facilities, mental health centers, and nursing homes. Music therapists work with clients of any age (from infant to geriatrics) and many different populations, such as those with developmental disabilities, mental health needs, behavioral disorders, medical conditions, and physical disabilities. The goals of a music therapy session depend on the specific needs of the patient and may be addressed through a number of interventions such as songwriting, receptive music listening, lyric analysis, and music and imagery (AMTA, 2014).

In comparison to music therapy, music medicine is “passive listening to pre-recorded music” which is offered by medical staff (Bradt, Dileo, & Shim, 2013, p. 6).
However, without a music therapist, there is a lack of therapeutic relationship and ability to assess progress toward individualized goals. AMTA notes that in some cases listening to music can result in harm (i.e., negative memories associated with music) and stresses the importance of consultation/supervision from a MT-BC for a music listening program (AMTA, 2014c).

Although live music has been shown to be more effective, recorded music is still effective in reaching some goals such as relaxation (Bailey, 1983; Walworth, 2010). The following section will discuss the effects of music listening on relaxation in both a music therapy and a music medicine setting.

**Effects of Music Listening on Relaxation**

According to a study conducted by Krout (2001), music therapy sessions increased relaxation in hospice patients using a variety of music therapy techniques including music listening. Pelletier (2004) also found that music relaxation techniques had a positive effect on reducing arousal due to stress. Again, music listening was one of the interventions that demonstrated positive effects.

Music listening has also been shown to improve negative physiological symptoms that often coincide with stress. A meta-analysis by Nilsson (2008) presented the effect of music interventions on relaxation in perioperative care, looking at 42 randomized control trials. Nilsson summarized the research, showing music interventions could significantly decrease (a) respiratory rate, (b) heart rate, and (c) blood pressure. It is important to note that the analysis was not limited to music therapy interventions and included any type of music intervention (Nilsson, 2008).
A randomized clinical trial (n=60) found that music listening decreased stress as measured by decreased plasma cortisol levels and decreased natural killer lymphocytes, both of which are linked with stress (Leardi et al., 2007). Nilsson (2009) studied the effect of listening to music in 40 patients post cardiovascular surgery. Results indicated a significant increase in oxytocin levels in the music condition compared to the control group, along with increased subjective relaxation levels. This finding has implications for breastfeeding mothers, since oxytocin aids in milk release in post-pregnant mothers. Research has shown that decreased levels of oxytocin result in lower volume of milk expressed by mothers of preterm infants (Chatterton et al., 2000).

**Music Listening for Relaxation in Breast Milk Production**

In addition to increasing levels of oxytocin, music listening may decrease self-perceived anxiety levels and increase self-reported relaxation levels (Chang & Chen, 2005; Nilsson, 2009; Wu & Chou, 2008). When the frequency of the music intervention is increased, it may have a greater impact on reducing a person’s stress, much like Feher’s (1989) “dose-response” effect mentioned previously (Clark et al., 2006).

Procelli (2005) studied the effects of music therapy prior to breastfeeding by randomly assigning first time mothers to an experimental or control group (N=60). Participants in the experimental group participated in a minimum of 10 minutes of music therapy, while participants in the control group received no music therapy. The music therapy treatment consisted of live preferred music (voice and guitar) and used active listening, relaxation techniques, and counseling techniques. Mothers receiving music therapy demonstrated significantly less anxiety-related behaviors and significantly higher levels of relaxation and comfort (Procelli, 2005).
A study by Keith, Weaver, and Vogel (2012) examined the effects of music-based listening on breast milk produced by mothers of premature and critically ill infants. Participants were randomly assigned to one of four groups, including a standard care control group and three experimental groups. All of the experimental groups were given mp3 players with a recorded verbal protocol of progressive muscle relaxation and guided imagery. The interventions for the experimental groups are as follows: (a) verbal protocol (b) verbal protocol with guitar lullaby music added to the guided imagery section, and (c) verbal protocol with guitar lullaby music added to the guided imagery section along paired with visual images of the mother’s infant. Results showed a significant increase in volume of breast milk in the three experimental groups, compared to the control group. During the first six days of the study, the fat content of the verbal protocol group and the verbal, music, and images group was significantly higher than the control group (Keith et al., 2012). Because music has been shown to reduce stress (Pelletier, 2004), which is a factor that can inhibit breast milk production (Lau et al., 2007; Ueda et al., 1994), it may be possible for music itself to increase the volume of breast milk. No known studies have examined the sole effect of music listening on volume of breast milk. The purpose of this study is to determine if music has an effect on the production of breast milk pumped by mothers of infants in the NICU.
CHAPTER THREE

METHOD

The Institutional Review Board (IRB) at the University of Kentucky deferred to Baptist Health Lexington’s IRB for this research study (Appendix A). Baptist Health Lexington’s IRB approved the procedures for this study and amendments to the original study protocol (Appendix B).

Participants

A purposive sample of mothers of infants in the NICU at Baptist Health Lexington who were pumping breast milk and were able to visit the hospital were recruited for this study. In order to participate, mothers had to be at least 18 years old and speak English. Mothers of infants requiring transport to a tertiary care center were excluded, along with mothers who were discharged four or more days past their delivery date. Participants who smoked, received medications that may alter breast milk production, had breast surgery in the past, or had a terminal illness were excluded as well.

Instruments

Demographic data on the mothers and their infants were collected by the principal investigator and members of the research team. A survey was used to gather data on participant’s perceptions of the use of music listening during pumping. Data on the volume of milk produced during pumping sessions across the duration of the infant’s stay in the NICU were also collected.

Medical Information

Medical information was collected on the participants and their infants through hospital medical records (Appendix E). Information on the participants included age,
gestation, number of infants in birth, number of previous births, and current medications. The following information on the participants’ infants was collected: (a) date of birth, (b) gestational age, (c) gender, (d) acuity level, (e) APGAR score, and (f) participation in kangaroo care. Acuity level was based on the average of acuity level on the survey completion date. If the infant and mother participated in kangaroo care for any part of their stay, they were considered to be “participating” in kangaroo care. If the mother and infant did not have any instances of kangaroo care, they were considered “not participating” in kangaroo care.

**Survey**

The principal investigator or members of the research team asked all participants to fill out a survey after their first pumping session (Appendix K and L). The survey included questions on whether or not the mother had previous experience using a pump or previous experience breastfeeding, along with doctor-, nurse-, or self-influence on decision to provide breast milk. Level of education was also included on the survey. Participants were asked to rank their agreement level with statements using a 4 point Likert-type scale: 1=strongly disagree, 2=disagree, 3=agree, and 4=strongly agree. N/A or neutral was also given as an option. All participants were asked to rate their agreement with two statements: “During this pumping experience, I felt comfortable,” and “I have previously been anxious about pumping.” The experimental group was asked an additional three questions regarding their music experience: “Compared to previous pumping experiences without music, this experience was more relaxing,” “I liked the music I listened to while pumping,” and “I would like to try listening to music again.
while pumping.” The experimental group was also asked to identify any elements that were relaxing in the music.

**Pumping Log**

All participants were instructed to fill out a pumping log (Appendix M and N) each time that they pumped in the NICU at Baptist Lexington. The pumping log consisted of the following: (a) participant’s name, (b) date, (c) time, (d) relaxation level before and after pumping, (e) volume of milk pumped, and (f) whether or not they breastfed their infant prior to the pumping session. The experimental group was also asked to circle the CD chosen for each pumping session.

**Procedure**

Mothers of premature infants in the NICU at Baptist Health Lexington were approached by the principle investigator or members of the research team to participate over the course of 7 months. A total of 38 mothers enrolled in the study, 17 in the control group and 21 in the music group. The first 17 mothers who agreed to participate in the study were assigned to the control group and the remaining mothers were assigned to the experimental group, until 14 complete sets of data were collected. For the purposes of data analysis, only participants with complete sets of data were analyzed (N=28). After providing consent, participants were given a folder with an instruction sheet (Appendix I and J), the survey with their enrollment number, and one pumping log. Participants were asked to complete the survey during their next pumping session in the NICU at Baptist Lexington. Participants were also asked to fill out a pumping log each time they pumped continuing until their infant was discharged from the hospital.
Participants were instructed to place their survey and pumping logs in a lock box located in the pumping room after each pumping session. Additional pumping logs were stored next to the lock box in the pumping room.

Participants in the control group completed the survey and pumping logs based on their normal pumping session, without any music. Participants enrolled in the experimental group listened to relaxing music through a CD player and headphones during all pumping sessions in the NICU. There were three pumping stations in the pumping room at Baptist Lexington’s NICU. Three small baskets were stored at the front desk in the NICU, each including a pair of over the ear headphones and 5 different CDs with the track number, song title, and song length listed. A CD player was stored in each of the three pumping areas with post-it flags indicating operating functions such as headphone jack location and operating buttons such as play and skip. Participants were instructed to pick up a basket from the front desk prior to pumping and to return it following their pumping session. The participants were able to choose between five CDs with different genres: (a) lullabies, (b) relaxing folk and light rock covers, (c) contemporary Christian/hymns, (d) new age/instrumental, and (e) relaxing pop covers. The principal investigator, a board-certified music therapist, chose music with relaxing qualities as defined in current research (Appendix O).

Data Analysis

Data analyses were performed using Statistics Program for the Social Sciences Version 22 (SPSS 22). Descriptive data were analyzed using mean, ranges, standard deviations, and percentages. A t-test was used to analyze group differences in volume of
milk and relaxation scores (obtained from the pumping log), with an alpha level of $p < 0.05$. 
CHAPTER FOUR
RESULTS

In this study, the volume of milk and relaxation levels of mothers of infants in the NICU were examined. Descriptive statistics were completed for demographic variables and survey responses. A total of 38 participants enrolled in the study; however, some participants did not complete all aspects of the study (i.e., they filled out the survey but not the pumping logs), therefore the researcher chose not to analyze this data in order to maintain a complete representation of information from each participant. The total number of participants included in the data analysis were 14 in the control group and 14 in the experimental group (N=28).

Sample Description

Participants varied in age ranging from 19 years to 38 (M=28.96, SD=4.53). See Figure 2 for the complete breakdown of age in this study. All participants held at least high school diploma or equivalent (100%, n=28) and a few held a master’s or doctoral degree (17.9%, n=5) A total of 22 (78.6%) mothers had a singleton gestation (one infant) and 6 (21.4%) mothers had a multiple gestation (e.g., twins). Sixteen (57.1%) participants were first time mothers, and 12 (42.9%) participants had at least one previous birth.
Figure 2. Age ranges of participants.

Infant gestational age in weeks ranged from 28.00 to 38.86 ($M=33.41, SD=2.75$) and infant age at the time of survey completion ranged from 1 to 22 days ($M=8.86, SD=5.54$). The majority of mothers participated in kangaroo care with their infants (75.0%, $n=21$). The control and experimental group appeared to be similar based on demographics collected (see Table 1).
Table 1

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Control Group</th>
<th></th>
<th>Experimental Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Age (days)</td>
<td>29.79</td>
<td>4.76</td>
<td>28.14</td>
<td>4.29</td>
</tr>
<tr>
<td>Previous births</td>
<td>0.71</td>
<td>1.07</td>
<td>0.64</td>
<td>0.93</td>
</tr>
<tr>
<td>Infant’s age at time of survey (days)</td>
<td>10.07</td>
<td>5.90</td>
<td>7.64</td>
<td>5.08</td>
</tr>
<tr>
<td>Infant’s gestational age (weeks)</td>
<td>33.68</td>
<td>2.38</td>
<td>33.14</td>
<td>3.14</td>
</tr>
</tbody>
</table>

Research Question 1

1. Does listening to relaxing music affect the volume of milk pumped by mothers of infants in the NICU?

An independent *t*-test was conducted to compare the average amount of milk pumped (ml) for women who listened to music and those who did not. Only the first eight pumping logs were included in this analysis for each participant. If a participant completed less than eight pumping logs, all logs completed were used in the analysis. There was no significant difference in average milk pumped for the music group (*M* = 94.10, *SD* = 46.07) and non-music group (*M* = 107.11, *SD* = 70.85); *t*(26) = 0.58, *p* = .57. The volume of milk pumped ranged from 20 to 175.25 ml for the music group and 7.59 to 233.33 ml for the non-music group.

Research Question 2

2. Does listening to relaxing music affect the relaxation level of mothers of infants in the NICU pumping breast milk?
Relaxation scores could range from 1 (*very unrelaxed*) to 4 (*very relaxed*), with the possibility of endorsing *N/A or neutral*. If a *N/A or neutral* relaxation level was selected on a pumping log, the data were not included in the analysis. Only the first three pumping logs were included in this analysis for each participant. If a participant completed less than three pumping logs, all logs completed were included in the analysis.

The average pre-test relaxation level in the non-music group ($M = 3.07$) was greater than the music group ($M = 2.54$). The average post-test relaxation level in the non-music group ($M = 3.29$) was similar to the music group ($M = 3.27$). An independent $t$-test was conducted to compare the mean change in relaxation scores for those who listened to music and those who did not. There was a significant difference in average change scores for the music group ($M = 0.72, SD = 0.52$) and non-music group ($M = 0.22, SD = 0.28$); $t(26) = -3.14, p = .004$. Women who listened to music showed a greater increase in relaxation scores than women who did not listen to music. For relaxation scores and milk volume raw data, see Appendix Q.

**Survey Responses**

Participants in both the control and experimental group were asked to rate their agreement with statements in a Likert-type scale (1=strongly disagree, 2=disagree, 3=agree, 4=strongly agree) with the possibility of selecting N/A or neutral. Most of the participants agreed that the pumping experience was comfortable (Control $M=3.57$, $SD=.85$ and Experimental $M=3.64$, $SD=.50$). Answers varied concerning previous anxiety about pumping ($M=2.42$). The participants in the experimental group were asked more specific questions related to the music condition. Most participants agreed that pumping with music was more relaxing than previous experiences pumping without
music ($M=3.46$) and the majority said they liked the music they listened to while pumping ($M=3.43$). The majority of participants also agreed that they would like to listen to music again while pumping ($M=3.46$). See Table 2 for the $M$ and $SD$ for these survey questions.

Table 2

<table>
<thead>
<tr>
<th>Descriptive Statistics of Pumping Survey</th>
<th>$M$</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>During this pumping experience, I felt comfortable</td>
<td>3.61</td>
<td>0.69</td>
</tr>
<tr>
<td>I have previously been anxious about pumping</td>
<td>2.42</td>
<td>0.95</td>
</tr>
<tr>
<td>Compared to previous pumping experiences without music, this experience was more relaxing*</td>
<td>3.46</td>
<td>0.52</td>
</tr>
<tr>
<td>I liked the music I listened to while pumping*</td>
<td>3.43</td>
<td>0.51</td>
</tr>
<tr>
<td>I would like to try listening to music again while pumping*</td>
<td>3.46</td>
<td>0.52</td>
</tr>
</tbody>
</table>

* denotes music group only questions/responses

Participants were asked whether or not they had previous experience using a pump or breastfeeding. The majority of the moms (71.4%, $n=20$) had no previous experience using a pump, while a small portion (28.6%, $n=8$) had previous experience using a pump with another infant. Similarly, 67.9% ($n=19$) of moms had no previous experience breastfeeding another infant, and 32.1% ($n=9$) had experience breastfeeding another infant. The majority of participants selected “my own desire” in response to their decision to provide breast milk (89.3%). Only 7.4% chose “a doctor’s recommendation” and 0% selected “a nurse’s recommendation” or “someone else’s recommendation”.

30
Music Selections

The participants in the experimental group were asked to select any of the elements of music that were relaxing. The most commonly selected answer was the “instruments used in the pieces” (12), with “familiarity” (10) and “tempo” (8) in second and third, respectively. See Figure 3 for a breakdown of relaxing music elements selected by participants.

![Bar Graph](image)

**Figure 3.** Relaxing Music Elements

Participant’s CD selections varied, as there were able to choose the same CD or a different CD each pumping session. The most commonly chosen CD for the initial pumping session with music was a tie between *Relaxing Pop Covers* (n=4) and *Contemporary Christian/Hymns* (n=4). See Figure 4 for a breakdown of initial CD chosen.
Figure 4. Initial CD chosen

When a participant revisited a previously listened to CD, it was most often

*Contemporary Christian/Hymns* (*n*=6), or *Relaxing Pop Covers* (*n*=4), while some did
not repeat a CD previously listened to (*n*=2). See Figure 5 for a complete picture of
repeated CD selection.
Participants in both the control and experimental group were given space to leave comments at the end of their survey. One mom wrote the following about her experience:

“The music tonight really helped me relax and for 20 minutes not stress or worry about my daughter. Made me feel happy.” Another mom described the following: “Enjoyed my first pumping to music experience, especially listening to songs that were familiar to me & the songs that I related to such as songs that were at my wedding.”
CHAPTER FIVE
DISCUSSION

Research Question 1

1. Does listening to relaxing music affect the volume of milk pumped by mothers of infants in the NICU?

No significant difference was found in volume of milk in the control versus experimental group. There was a wide range of milk volume, which could have been due to various factors. Milk volume is determined by many factors, especially the number of times milk is removed from the breasts each day (pumping or breastfeeding). One concept, the “Magic Number,” defines breast fullness and breast storage capacity as the two major factors in calculating the number of times a mother needs to empty her breasts to continue producing milk at the same or increased rate. Mothers may have a different “Magic Number” depending on these factors (Mohrbacher, 2010/2011). The mothers in this study did not report the number of times they pumped outside of the NICU, which could have influenced their volume of milk pumped. Additionally, some mothers breastfed their infant prior to pumping, while others did not. This is an additional uncontrolled variable that could influence the amount of breast milk pumped in a single session.

Research Question 2

2. Does listening to relaxing music affect the relaxation level of mothers of infants in the NICU pumping breast milk?

Participants in this study who listened to relaxing music reported significantly increased relaxation levels as compared to mothers who did not listen to music. This is
consistent with other research studies which demonstrate that music can increase relaxation or reduce stress (Pelletier, 2004; Krout, 2001). Increasing relaxation for mothers of infants in the NICU could have a multitude of effects, since increased relaxation often leads to a decrease in the following (a) heart rate, (b) blood pressure, (c) respiratory rate, (d) muscle tension, (e) cortisol levels (Benson, n.d.). Stress can inhibit milk production, and since relaxing music showed a significant increase in relaxation levels, it is possible that relaxing music could increase milk production. Further research is needed in this area.

It is important to note that the participants in the non-music group started at a higher relaxation level than the music group. On average, the non-music group reported being relaxed prior to pumping, whereas the music group reported a score approximately halfway between relaxed and unrelaxed. Both groups reached similar states during the post-test, showing that they were relaxed. This increase in relaxation for the music group to levels similar to the control group further highlights the potential effectiveness of music listening to increase relaxation during pumping.

This study also attempted to measure volume of milk from a population that normally exhibits stress, which can be an inhibiting factor in milk production. Based on pretest mean relaxation scores, the control group did not appear to exhibit this stress. This perhaps explains why there was no significant difference in volume of milk produced between the two groups. Other factors, like lack of randomization, may also explain the results. Regardless, the results may not reflect an accurate comparison of milk volumes with and without music listening for women who exhibit stress.
This participants in this study found that the instrumentation used in the pieces was the most relaxing element in the music. The following instrumentation was used in the song selections: (a) piano was used as the sole instrument in 12 of the songs; (b) a combination of instruments (mostly guitar, piano, and string instruments) was used in 9 songs; (c) a combination of instruments and voice was used in 9 songs; (d) guitar only was used for 7 songs; (e) and 1 song used harp. Because the participants most frequently cited instrumentation as the most relaxing element in the music they listened to, it may be important for future researchers to choose songs carefully based on instrumentation that appears relaxing. The instrumentation used in this study may be helpful in determining future song selections.

**Limitations**

There were numerous limitations connected to this study. The first limitation is regarding sample size. A larger sample size could have produced more accurate results by better representing the population. Use of a randomized control trial could also have been beneficial in controlling outside variables. In this study, all of the participants in the control group were enrolled in the summer/fall months of August through October. During the experimental group (November through February), the researcher had difficulty enrolling participants due to low census in the NICU. This could have negatively impacted study results.

As can be seen in the results from the current study, most of the mothers reported that they were comfortable with pumping, perhaps suggesting that the sample was skewed toward mothers who more relaxed prior to participation. This would seem to be supported by the fact that multiple participants declined participation or dropped out in
the last two weeks of December (around the holidays), expressing an overwhelming amount of stress. Since stress is a factor in breast milk inhibition, a randomized control study may need to be implemented.

Finally, another way to control for environmental stress may be a repeated measures design. Using the subjects as their own control would allow a comparison of a mom’s milk with and without music to determine if there is a difference. Furthermore, use of a repeated measures design could control for the varying milk volumes produced by mothers.

**Future Research**

It was important to be aware of the sensitivity of the mother’s emotions, as they had recently given birth to their infant prematurely. It was recommended by nurses to wait until the mom had been discharged from the hospital in order to give them time to process all of the new information and emotions after having their infant.

Future studies should attempt to control for the variables affecting milk volume. Determining each mother’s “Magic Number” as cited by Mohrbacher (2010) and asking the mothers to pump the recommended number of times would be rather difficult. Using subjects as their own control may be more feasible. This study excluded cases that may have caused an extensive amount of stress, such as those infants transferred to tertiary care. It is recommended that future research look at the differences of milk volume and relaxation scores with this at risk population.

Another consideration for future research would be the effect of live music (in a music therapy session) on relaxation levels and volume of milk pumped by mothers in the NICU. Since live music has been shown to be more effective than recorded music, this
would be an important study in determining the most effective way to reduce stress and/or increase volume of milk through music. The effect of music therapy with mothers in the NICU related to patient satisfaction scores could also be an area of interest, as hospitals strive to increase these scores for funding.

**Implications**

As healthcare becomes more focused on family-centered care, NICUs may be inclined to expand resources and interventions for parents of infants in the NICU. Mothers may benefit from listening to relaxing music to increase their relaxation level, particularly those who have infants in the NICU.

Providing relaxing music choices to mothers pumping in the NICU could be a positive supplement in their treatment process. It is important that mothers are able to choose their preferred genre and that the music selections fall under the researched-based relaxing music parameters. Instrumentation is an important element of relaxing music that should be considered when identifying relaxing music selections. A board-certified music therapist can be an excellent resource in setting up a music listening station or program to support relaxation through music.
Appendix A: Letter of Deferral from UK IRB

Institutional Review Board (IRB)/Independent Ethics Committee (IEC)
Authorization Agreement

Name of Institution or Organization Providing IRB Review (Institution/Organization A):
Baptist Healthcare Systems, Inc. dba Baptist Health Lexington

IRB Registration #: 00003501 Federalwide Assurance (FWA) #, if any: 00002954

Name of Institution Relying on the Designated IRB (Institution B):
University of Kentucky (UK)

FWA #: 00003195

The Officials signing below agree that UK may rely on the designated IRB for review and continuing oversight of its human subjects research described below:

☐) This agreement applies to all human subjects’ research covered by Institution B’s FWA.

☐) This agreement is limited to the following specific protocol(s):

Name of Research Project: An Exploratory Study on Music Listening and Breast Milk Production in Mothers of Infants in the Neonatal Intensive Care Unit

Name of Principal Investigator: Amber Collier

Sponsor or Funding Agency: N/A Award Number, if any:

☐) Other (describe):

The review performed by the designated IRB will meet the human subject protection requirements of Institution B’s OHRP-approved FWA. The IRB at Institution/Organization A will follow written procedures for reporting its findings and actions to appropriate officials at Institution B. Relevant minutes of IRB meetings will be made available to Institution B upon request. Institution B remains responsible for ensuring compliance with the IRB’s determinations and with the terms of its OHRP-approved FWA. This document must be kept on file by both parties and provided to OHRP upon request.

Signature of Official (Institution/Organization A):

Print Full Name: [Redacted] Institutional Title: [Redacted]

Date: 2/27/14

Signature of Official (Institution B):

Print Full Name: James W. Tracy, Ph.D. Institutional Title: Vice President for Research

Date: 3/1/15
June 27, 2014

Amber Allen Collier, MT-BC
740 Duram redes Drive
Lexington, KY 40503

RE: BHL 11176 (Reference#069-005) - The Effect of Music Listening on Breast Milk Production in Mothers of Infants in the Neonatal Intensive Care Unit

Dear Ms. Collier,

Your new protocol listed above was approved under the expedited review process on 06/27/2014 and was reported at the 06/19/2014 meeting of the Baptist Health Lexington Institutional Review Board. This protocol meets the criteria for expedited review under research category 45 CFR 46.110(b)(1). Please be advised that the BHL IRB office reviewed the format of the informed consent form associated with this study. No other changes were made to this document.

The IRB approval for this protocol will expire on 06/30/2015. Please submit your continuation request by 07/29/2015 in order to avoid lapses in approval of your research.

As principal investigator, you are responsible for complying with IRB decisions, conditions, and requirements. The protocol procedures should be implemented as approved by the IRB and any other changes in this protocol, including amendments, must be reported promptly to the IRB through IRIS, the IRB submission system. No changes may be initiated without review by the IRB, except when necessary to eliminate apparent immediate hazard to the participant. In addition, any unanticipated problem involving risk to the participants or others must be reported immediately to the IRB.

If you have any questions, please contact the IRB office at 260-6074.

Sincerely,

[Signature]

Signature applied by Dea Bechman on 06/27/2014 11:14:58 AM EDT

Dea Bechman, MBA, BSN, RN, NE-BC
IRB Chairperson

BaptistHealthLexington.com
July 21, 2014

Amber Allen Colliver, MT-BC
740 Dardanelle Drive
Lexington, KY 40503

RE: #BIL-14-1176 (Reference #00587) The Effect of Music Listening on Breast Milk Production in Mothers of Infants in the Neonatal Intensive Care Unit

Dear Ms. Colliver,

The following amendments for the protocol listed above were approved under expedited review on 7/21/2014. “The pumping logs will no longer be stored at the nurses’ station and will be instead located in the pumping room. The survey will be given to the participant after the consent form is signed along with the other materials (instructions, extra pumping logs). The survey will now have a number pre-written on it, which will be the participant’s assigned study ID number. A label with that same study ID number will be in a folder with the materials and will be placed on the enrollment log (in NICU director’s office) along with the patient sticker.”

Included in this submission approval are revised forms to include new instructions as listed above, a new instruction sheet for staff, revised pumping log, and a revised medical information sheet. This will be reported at the Baptist Health Lexington Institutional Review Board meeting on 08/21/2014. With this submission, you have continued approval until 06/03/2015.

As you are aware, any change in this protocol must be reported promptly to the IRB. No change may be initiated without review by the IRB, except where necessary to eliminate apparent immediate hazard to the participant. In addition, any unanticipated problem involving risk to the participant or others must be reported immediately to the IRB.

If you have any questions, please contact the IRB office at 260-8074.

Sincerely,

[Signature]

Signature applied by Dee Beckman on 07/21/2014 12:28:04 PM EDT

Dee Beckman, MBA, BSN, RN, NE-BC
IRB Chairperson
August 25, 2014

Amber Allen Colliver, MT-BC
740 Dardanelles Drive
Lexington, KY 40503

RE: BHL-14-1176 (Reference#009823) - The Effect of Music Listening on Breast Milk Production in Mothers of Infants in the Neonatal Intensive Care Unit

Dear Ms. Colliver,

Your amendment for the protocol listed above, update study script to potential participants and increase the number of participants from combined groups from 30 to 60, was approved under expedited review on 08/25/2014. This will be reported at the Baptist Health Lexington Institutional Review Board meeting on 09/18/2014. With this submission, you have continued approval until 09/30/2015.

As you are aware, any change in this protocol must be reported promptly to the IRB. No change may be initiated without review by the IRB, except where necessary to eliminate apparent immediate hazard to the participant. In addition, any unanticipated problem involving risk to the participant or others must be reported immediately to the IRB.

If you have any questions, please contact the IRB office at 260-6074.

Sincerely,

Signature applied by Dee Beckman on 08/25/2014 12:02:40 PM EDT

Dee Beckman, MBA, BSN, RN, NE-BC
IRB Chairperson
Appendix D: Informed Consent to Participate

CONSENT TO TAKE PART IN A RESEARCH STUDY

The Effect of Music Listening on Breast Milk Production in Mothers of Infants in the Neonatal Intensive Care Unit

Principal Investigator:
Amber Colliver, MT-BC, NICU-MT
University of Kentucky Masters Student
amber.colliver@uky.edu
859.392.8804

Sub-Investigator:
Lori Gooding, PhD, MT-BC, NICU-MT
103 Fine Arts Building
Lexington, KY 40506-0022
lori.gooding@uky.edu
859.257.4900

Regina Stultz, MSN, APRN, PPCNP-BC
Director of NICU
Baptist Health Lexington
1740 Nicholasville Rd
Lexington, KY 40503
regina.stultz@BHFY.com
859.260.8579

Purpose
This is a research study. Research studies involve only those who choose to take part. This consent form may contain words that you do not understand. Please ask the study researchers or the research staff to explain any words or information that you do not clearly understand. Before you decide to take part in this study, you need to understand why the research is being done, what it will involve, any risks to you, and what is expected of you. If you choose to take part, you must sign this form before you can be enrolled in the study. This process is known as informed consent. You may take home an unsigned copy of this consent form to think about or discuss with family or friends before making your decision.
You are being asked to take part in this research study because you are a mother of an infant in
the NICU at Baptist Health Lexington who will be pumping breast milk.

The purpose of this study is to determine if listening to music has an effect on the production of
breast milk pumped and the relaxation level of mothers of infants in a neonatal intensive care
unit.

This research study will be performed at one Baptist Healthcare System, Inc. facility:
Baptist Health Lexington in Lexington, Kentucky.

A total of approximately 60 patients are expected to enroll in this clinical study at one research
institute (Baptist Health Lexington).

You are being asked to participate in this study until your infant is discharged from the hospital.
The study will add approximately 5 minutes to your regular pumping time.

Procedure(s)
If you agree to take part in this research study, the following procedures will be performed. To
help you understand which parts of the procedure are parts of the research study, these steps are
in italics. In other words, the steps presented in italics are additional to steps that usually would
be performed before, during, and after your normal treatment for pumping breast milk. Separate
steps for the experimental group (listening to music) and control group (not listening to music)
are described below.

Experimental Group (listening to music)
- Check out CD and headphones from nurse’s station
- Grab a pumping log (on the counter in the pumping room)
- Fill out first part of pumping log, (name, date, time, CD selected, and relaxation level)
- Begin listening to music when in pumping room
- Begin pumping as you would normally, while listening to the music
• Record volume of milk produced on the pumping log, relaxation level after pumping and whether you breastfed prior to this pumping session.
• Fill out survey questions (after first pumping session with music only)
• Place survey (first time only) and pumping log in locked drop box, located in the pumping room
• Return CD and headphones to nursing station
• You agree to use music during each pumping session while at Baptist by checking out the CD/headphones at the nursing station prior to pumping and filling out a pumping log

Control Group (not listening to music)
• Fill out first part of pumping log (name, date, time, and relaxation level)
• Begin pumping as you would normally
• Record volume of milk produced on the pumping log, relaxation level after pumping and whether you breastfed prior to this pumping session.
• Fill out survey questions (after first pumping session in study)
• Place survey and pumping log in locked drop box, located in the pumping room
• Continue to fill out a pumping log during each pumping session while at Baptist

Risks/Discomforts
There are only minimal risks associated with participation in this research study. The records of this study will be kept confidential and information will be stored in a locked filing cabinet. After data collection period, names will be removed from medical information. However, there is always a risk of the loss of confidentiality.

New Findings
You will be informed of any important new findings that may affect your health, welfare or willingness to continue in this study.
Benefits

There are no medical benefits that can be guaranteed to you for your taking part in this research study. Information gained from this study may benefit others. No guarantees have been made to you as to the results of this research study.

Alternatives

You may choose not to take part in this study. If you do not wish to take part in this study, the other choices may include listening to music on your personal music player while pumping breast milk.

Patient Costs/Payment

There are no costs to participate in this study. You will not receive any compensation (payment) for taking part in this study.

Illness/Injury Resulting from the Research Study

In the event an injury or illness occurs as a direct result from taking part in this research study, no form of compensation (i.e. payment) is available from Baptist. Medical treatment of the illness or injury will be available to assist your recovery at your own expense, or at the expense of your insurance company, which may or may not provide coverage. If you have questions, you should contact your insurance company.

If you are injured as a result of taking part in this study, no other arrangements will be made for financial payments or other forms of compensation (such as lost wages, lost time or discomfort) which may be related to such injuries.
Withdrawal from the Research Study

Your decision to take part in this study is voluntary. You are free to withdraw at any time.

Even though you have given your consent, the researchers have the right to take you out of the study should it be decided that continuing to take part in this study would be harmful to you in any way.

Confidentiality

Taking part in this study may result in a loss of privacy, since persons other than the principal investigator might view your study / medical records.

Records kept for this study that identify you will be kept confidential (private) as required by law. Your records may be inspected by:

- Government agencies such as the U.S. Food and Drug Administration (FDA), the U.S. Department of Health and Human Services (DHHS),
- Authorized representatives of the study sponsor (the sponsor’s staff that has permission to review this information), including agents and/or contractors (other persons/companies hired by the sponsor to help with the study),
- The central laboratory for the study (if one is used to perform tests), and
- The Baptist Health Lexington Institutional Review Board (IRB) (a formal panel of people who initially review and continue to monitor all research studies and registries as required by FDA and DHHS regulations).

They may inspect or review study / medical records about you, but will keep these records private as required by law.

Also, parts of your medical records that contain information important to this study may be copied and sent to a central location for medical review. When this happens, your records will be assigned a number, and your name or other means of identifying you will be removed.
Whenever possible, information about you sent to the sponsor of this study, a lab or other organization involved with this study will not include your name, social security number or other means of identifying you. Instead, a code number assigned to your records will be used to keep your identity private. You will not be identified by name in any reports or presentations of data obtained from this study.

Authorization to Use and Disclose Health Information for Research Purposes

Introduction

Federal regulations give you certain rights related to your health information. This includes the right to know who will be able to get the information and why they may be able to get it. The Investigators must get your authorization (permission) to use or give out any health information that might identify you.

This form may contain words that you do not understand. Please ask the Investigators or research staff to explain any words or information that you do not understand. You may take home an unsigned copy of this authorization form to think about or discuss with family or friends before making your decision.

By signing this Authorization, you agree to permit Baptist and its staff, and other health care providers (together “Providers”), and Amber Collier and the research staff (together “Researchers”), to use and disclose health information about you, including health information in your medical records to conduct this clinical study, as described below.

1. The health information that may be used and disclosed includes:

   • All information collected during the research described in the Informed Consent Form for the Music Listening and Breast Milk Production study.
Health information in your medical records and in the medical record of your baby that is important and related to the research. This may include information from your medical history used to find out whether you meet the requirements to take part in this study, information obtained during the study including information about your response to any study treatments you receive, information about physical exams, blood and urine tests, x-rays, and other tests and procedures that may be performed, and other information related to your taking part in this study.

2. The Providers may disclose health information in your medical records:
   - To the Researchers.
     The Office for Human Research Protections in the U.S. Department of Health and Human Services.

3. The Researchers may:
   - Use and share your health information among themselves and with other researchers involved with the research; and

4. The Providers, Researchers and Sponsor may:
   - Disclose your health information as required by law and to representatives of government organizations, review boards (such as the Food and Drug Administration [FDA] or similar government agencies in other countries, and the Baptist Health Lexington Institutional Review Board), and other persons who are required to watch over the safety and effectiveness of medical products (drugs and devices), treatments and how the research is conducted.

5. Once information that could be used to identify you has been removed:
   - The information that remains is no longer subject to this Authorization and may be used and disclosed by the Researchers and Sponsors as permitted by law, including other research purposes.

6. Once your health information has been disclosed to a third party:
• It may be subject to further disclosure by recipients, and federal privacy laws may no longer protect it from further disclosure.
• The Researchers and the Sponsor agree to protect your health information by using and disclosing it only as permitted by you in this Authorization and the Informed Consent form.
• No publication about the research will reveal your identity without your specific written permission.
• These limitations to protect information about you continue even if you revoke (take back) this Authorization.

8. Please note that:
• You do not have to sign this Authorization, but if you do not, you will not be allowed to take part in the research.
• You may change your mind and revoke (take back) this authorization at any time. However, if you revoke this Authorization, you will no longer be allowed to take part in the research study. Also, even if you revoke this Authorization, the information already obtained by the Researchers and Sponsor may be used and disclosed as permitted by this Authorization and the Informed Consent. To revoke this Authorization, you must do so in writing by sending a letter to Attm
  NICU, Regina Stolte, Baptist Health Lexington, 1740 Nicholasville Road, Lexington, KY 40503.
  If you have a complaint or concerns about the privacy of your health information, you may also write to the Baptist Health Lexington’s Privacy Officer at the same address.
• While the research is in progress, you will not be allowed to see your health information that is created or collected during the research. After the research is finished, however, you may see this information as described in Baptist’s Notice of Information practices.

9. This Authorization does not have an expiration (ending) date.

10. You will be given a copy of this Authorization after you have signed it.
Study Related Communication

Questions

If you have questions regarding this study, you may call Amber Collier, principal investigator, or Lori Gooding and Regina Stoltz, sub-investigators, as listed on the first page of this informed consent. If you have questions regarding your rights and welfare as a research volunteer, you may call the Baptist Health Lexington Institutional Review Board (a group of people who initially review and continue to monitor all research studies) at (859) 260-6074.

_I have read this informed consent. I have been informed of the risks and benefits involved and all of my questions have been answered to my satisfaction. I understand that if I have any questions at any time, they will be answered. I will receive a copy of this consent form. I voluntarily consent to take part in this study. I am free to withdraw consent and stop taking part in this study at any time. By signing this form, I have not given up any legal rights._

---

**Signature of Volunteer or Volunteer’s Legal Representative**

---

Volunteer’s Printed Name

---

**Person Explaining Consent to Volunteer**

---

INVESTIGATOR ONLY:

_I verify that voluntary consent was obtained by one or more members of the research staff from this patient (or parent/legal representative, if necessary) for participation in this study._
Investigator’s Signature

Investigator’s Printed Name
Appendix E: Medical Information Sheet

Music Listening and Breast Milk Production Study: Medical Information Sheet

Study ID Number __________________
1) Mother’s Age: _____
2) Gestation: □ singleton □ multiple (list number) _____
3) Number of previous births, not including current infant (multiples count as one birth) ______
4) Mother’s medications ______________________________________________________________________

Infant 1:
5) Infant DOB_________ 6) Infant gestational age: ____________
7) Infant Gender: □ Male □ Female 8) Infant Acuity Level: □ 1 □ 2 □ 3 □ 3*
9) Infant APGAR score _______ 10) Is the infant participating in Kangaroo Care? □ Yes □ No
11) Infant age on date survey completed _________

Additional Infants (attach this sheet to the first page)
Study ID number ____________

Infant 2:
5) Infant DOB_________ 6) Infant gestational age: ____________
7) Infant Gender: □ Male □ Female 8) Infant Acuity Level: □ 1 □ 2 □ 3 □ 3*
9) Infant APGAR score _______ 10) Is the infant participating in Kangaroo Care? □ Yes □ No
11) Infant age on date survey completed _________

Infant 3:
5) Infant DOB_________ 6) Infant gestational age: ____________
7) Infant Gender: □ Male □ Female 8) Infant Acuity Level: □ 1 □ 2 □ 3 □ 3*
9) Infant APGAR score _______ 10) Is the infant participating in Kangaroo Care? □ Yes □ No
11) Infant age on date survey completed _________
Appendix F: Script for Informed Consent

Script for Informed Consent for Music and Breast Milk Study

Introduction: Hello, I am _________________ and I am helping conduct a research study about music listening and breast milk production during pumping. Would you be interested in participating?

If so, I need to have your signed permission to participate. If you agree to participate in this study, information about your baby, such as gestational age at birth, date of birth, gender, apgar scores, participation in kangaroo care, and seriousness of illness, will be collected from your baby’s chart along with information about your age, previous childbirth, and medications. You will be assigned to one of two groups: music or no music. If you are assigned to the “music group,” you will be asked to listen to music via headphones in the pumping room. You will be asked to continue listening to music each time you pump breast milk during your infant’s stay in the NICU at Baptist. If you are in the “no music” group you continue pumping as usual without music. Both groups will be asked to fill out a survey after the first pumping session in the study. Both groups will also record the amount of milk pumped and relaxation level before/after pumping. This information will be gathered on 60 mothers of babies in the NICU who are pumping and willing to participate in the study. If you need time to discuss with your family, I can come back _____________. If you would like to participate, you can sign the consent form now and I will enroll you in the study. I will return shortly with your instruction sheet, based on your assigned group.

If you have any questions you may ask them at any time.

Thank you for participating in this study. We hope to learn if music has an effect on the volume of breast milk produced and relaxation level during pumping.
Appendix G: Staff Instruction Sheet

Staff Instructions

1. Grab a black folder (labeled *Music and Breast Milk Study*) at the resource desk.
2. Read the informed consent script to interested participant (see referral criteria in folder).
   - If the mom *signs the consent* continue reading below, if she *doesn’t sign the consent*, skip to part B.

   **A) Agrees to sign the consent:**
   - 1. If the mom signs consent, you will also sign that you explained it and make a copy of the entire consent packet. Let mom know that you will be back to give her a copy (if she is not there, leave it in her chart).
   - 2. Grab two patient stickers from the bedside and the original consent form (which has a labeled number attached). Place one patient sticker on the top of the original consent form (our copy, not the mom’s) and the other on the patient enrollment log, found in the light blue binder in Regina’s office (labeled *Music and Breast Milk Study*). Place the labeled number next to the patient sticker, under the column “ID#”.
   - 3. Fill in the date consent signed.

   **B) Does not agree to sign consent:**
   - 1. If the mom does not sign the consent form, pull one patient sticker from the bedside and place on the patient enrollment log, found in the light blue binder in Regina’s office (labeled *Music and Breast Milk Study*). This helps us keep track of who we’ve approached.
   - 2. Put an “X” under date consent signed.
   - 3. If mom decides later to participate in the study, simply follow directions in part A above.
Appendix H: Study Guidelines

For Nurses

Music & Breast Milk Study Guidelines

Inclusion Criteria

- Mothers of infants in the NICU at Baptist Health Lexington
- Speak English
- 18 years or older

Exclusion Criteria

- Mothers or babies requiring transport to tertiary care center
- Mothers who receive a discharge date exceeding 4 days post-delivery
- Smokers
- Have had breast surgery in the past
- Have a terminal illness

Materials

- CDs and headphone can be checked out from the nurse’s station.
- CD players will be kept on the windowsill.
- Black Folders labeled Music and Breast Milk Study may only be given out by those involved in the study (Jeri Hahn, Jessica Kleinjan, Rhonda Byrd, Elizabeth Turcotte, and Amber Colliver).
- Completed pumping logs and surveys will be placed in a locked drop box in the pumping room (Amber will collect these once a week).

Reminders

ดน  Infants with a music note sticker on their bedside have a mother participating in the experimental group in the study. Please remind these mothers to pick up a CD/headphones from the nurse’s station and fill out a pumping log each time they pump (and survey if it’s their first time pumping with music).

★  Infants with a star sticker on their bedside have a mother participating in the control group. Please remind these mothers to fill out a pumping log each time they pump (and survey if it’s their first time pumping during the study).

Questions?

Contact Amber Colliver (principal investigator)

colliveramber@yahoo.com

859-806-8804 (cell phone: call or text)
Appendix I: Control Group Pumping Instruction Sheet

Pumping Instruction Sheet (no music)

Thank you for agreeing to participate in the music therapy study at Baptist Health! Please follow each step outlined below and feel free to ask questions if you have them.

Materials

- You should receive a survey when you sign the consent form to be in the study, along with pumping logs.
- Take these sheets with you to the pumping room.

Pumping Room

- Before you begin pumping, record your name, the date/time, whether you breastfed prior to this pumping session, and your “relaxation level before pumping” found on the pumping log (extra pumping logs can be found in the pumping room, on the counter next to the sink).
- Continue to pump as you would normally.

After pumping

- Fill out the remainder of the pumping log (relaxation level after pumping, volume of milk, and breastfeeding question).
- Fill out the survey (first time only).

Submitting Materials

- Please return the survey (first time only) and pumping log in the locked drop box, located next to the sink in the pumping room.

Thank you for your participation! Please continue to fill out a pumping log each time you pump at Baptist.
Appendix J: Experimental Group Instruction Sheet

Music & Pumping Instruction Sheet

Thank you for agreeing to participate in the music therapy study at Baptist Health! Please follow each step outlined below and feel free to ask questions if you have them.

Collect Materials

- On your way to your next pumping session, take the folder with handouts with you. Stop by the nurse's station and tell them you need to check out a CD and headphones.
- Choose your CD preference
  - CD 1: Lullabies
  - CD 2: Folk
  - CD 3: Hymns/Gospel
  - CD 4: New Age/Instrumental
  - CD 5: Pop
- Take your CD and handouts with you to the pumping room.

Pumping Room

- Place your CD in the CD player located on the windowsill in the back of the room.
- Plug the CD player into the outlet and press the power button.
- Make sure headphones are plugged into CD player and placed on your ears.
- Before you begin pumping, record your name, the date/time, CD chosen, and your “relaxation level before pumping” found on the pumping log.

Pumping while listening

- Press the play button on the CD player and begin listening to music.
- Begin pumping as normal.
- Listen to the CD during the entire pumping session, repeating the CD if necessary (the CD will last 20-30 minutes).

After pumping

- Please put glasses on and wipe down headphones and CD player with Seni Wipes provided.
- Fill out the remainder of the pumping log (relaxation level after pumping, volume of milk, and breastfeeding questions).
- Fill out the survey (first time only).
- Place the survey (first time only) and pumping log in the locked drop box in the pumping room, located on the counter next to the sink.
- Remove CD from CD player and place in CD case provided.

Returning Materials

- Please return the CD and headphones to the nurse's station.

Thank you for your participation! Please check out a CD/Headphones each time you pump while at Baptist. You have the option to choose a different CD next time or you may pick the same CD.
Appendix K: Control Group Pumping Survey

Pumping Survey (no music)

Date __________________

Please fill out this survey after the FIRST time you pump while enrolled in this study.

1) During this pumping experience, I felt comfortable.
   1 strongly disagree  2 disagree  3 agree  4 strongly agree  N/A or neutral
   □ □ □ □ □

2) I have previously been anxious about pumping.
   □ Yes □ No

3) Have you had previous experience using a pump prior to your infant’s birth (i.e., pumping for another infant?)
   □ Yes □ No

4) Have you had previous experience breast feeding with another infant?
   □ Yes □ No

5) My decision to provide breast milk for my infant was based on... (Please select ONE answer that describes the main influence on your decision)
   □ My own desire □ A doctor’s recommendation □ A nurse’s recommendation
   □ Someone else’s recommendation □ Other ____________________

6) Please check the highest level of education you have completed. If currently enrolled, check highest degree received.
   □ Less than High School (no diploma) □ High School Diploma or equivalent □ Associate’s Degree
   □ Bachelor’s Degree □ Master’s Degree □ Doctoral Degree
   □ Other ____________________

7) Please write any additional comments in the box below:

________________________________________________________________________________________________________________________________________________________

59
Appendix L: Experimental Group Pumping Survey

Music & Pumping Survey
Date ____________

Please fill out this survey after the FIRST time you listen to music while pumping.

<table>
<thead>
<tr>
<th></th>
<th>1 strongly disagree</th>
<th>2 disagree</th>
<th>3 agree</th>
<th>4 strongly agree</th>
<th>N/A or neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) During this pumping experience, I felt comfortable.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2) I have previously been anxious about pumping.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3) Compared to previous pumping experiences without music, this experience was more relaxing.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4) I liked the music I listened to while pumping.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>5) I would like to try listening to music again while pumping.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>6) Have you had previous experience using a pump prior to your infant’s birth (i.e., pumping for another infant)?</td>
<td>☐ Yes ☐ No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7) Have you had previous experience breast feeding with another infant?</td>
<td>☐ Yes ☐ No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8) Please check all of the elements that you found relaxing in the music that you listened to.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Instruments used in the piece</td>
<td>☐ words</td>
<td>☐ tempo (speed of the music)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Familiarity (recognition of the song)</td>
<td>☐ other: ___________________</td>
<td>☐ other: ___________________</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9) My decision to provide breast milk for my infant was based on... (please select ONE answer that describes the main influence on your decision)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ My own desire</td>
<td>☐ A doctor’s recommendation</td>
<td>☐ A nurse’s recommendation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Someone else’s recommendation</td>
<td>☐ Other: ___________________</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10) Please check the highest level of education you have received</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Less than High School (no diploma)</td>
<td>☐ High School Diploma</td>
<td>☐ Associate’s Degree</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Bachelor’s Degree</td>
<td>☐ Master’s Degree</td>
<td>☐ Doctoral Degree</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Other: ___________________</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11) Please write any additional comments in the box below:

__________
Appendix M: Control Group Pumping Log

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Time _____:_____ AM/PM (circle one)

Rate your relaxation level below:

<table>
<thead>
<tr>
<th>Relaxation Level BEFORE pumping:</th>
<th>1 very unrelaxed</th>
<th>2 unrelaxed</th>
<th>3 relaxed</th>
<th>4 very relaxed</th>
<th>N/A or neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relaxation Level AFTER pumping:</th>
<th>1 very unrelaxed</th>
<th>2 unrelaxed</th>
<th>3 relaxed</th>
<th>4 very relaxed</th>
<th>N/A or neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Volume of milk (mLs): ____________

Did you breastfeed your infant before this pumping session? ☐ Yes ☐ No
Appendix N: Experimental Group Pumping Log

Music & Pumping Log

Name: ___________________________ Date: ____________

Time _____:______ AM/PM (circle one)  
CD # (circle one) 1 2 3 4 5

Rate your relaxation level below:

<table>
<thead>
<tr>
<th></th>
<th>1 very unrelaxed</th>
<th>2 unrelaxed</th>
<th>3 relaxed</th>
<th>4 very relaxed</th>
<th>N/A or neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relaxation Level BEFORE pumping with music:</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Relaxation Level AFTER pumping with music:</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

Volume of milk (mL): ____________ Did you breastfeed your infant before this pumping session?  □ Yes  □ No
Appendix O: CD Playlist

CD 1: Lullabies
1. Are You Sleeping?—Jim Brickman 4:17
2. Over the Rainbow—Eva Cassidy 5:01
3. Hush Little Baby—Bruce Watson 2:47
4. Rock a Bye Baby—Jim Brickman 3:24
5. Twinkle Twinkle Little Star—Dave Koz; Jeff Koz 4:06
6. You Are My Sunshine—George Skaroulis 5:01
7. Itsy Bitsy Spider—The O’Neill Brothers 1:40
8. Brahms Lullaby—Nick Lachey 4:01

CD 2: Relaxing Folk and Light Rock Covers
1. Here Comes the Sun—Daddy Plays 3:00
2. Morningbird—Forest Sun 3:41
3. Moon Shadow—Daddy Plays 2:32
4. Homeward, These Shoes—Iron & Wine 1:34
5. Rest Nice—Mike Sobel 3:07
6. You Really Got a Hold on Me—She & Him 3:58
7. Danny Boy—Piano Music Players 3:08
8. Your Song—Ellie Goulding 3:09
9. Landslide—Daddy Plays 2:27
10. When You Went Away—Mike Sobel 2:57
CD 3: Contemporary Christian/Hymns
1. The Mission/How Great Thou Art—The Piano Guys  3:55
2. Amazing Love—Thomas and Timothy  4:36
3. How Great is Our God—Eric Nordhoff  6:58
4. It is Well with My Soul—Daniel Martin Moore  2:46
5. Here I am to Worship—Worship Ensemble  3:45
6. Amazing Grace—Olivia Ong  4:08
7. This is My Father’s World—Dan Gibson  6:21

CD 4: New Age/Instrumental
1. Watermark—Enya  2:29
2. When Leaves Fall—Thad Fiscella  6:56
3. Summer of 300 Years—2002  5:26
4. The Night Season—David Nevue  4:10
5. Sea of Dreams—2002  5:52
6. Bach Prelude—Michael Dulin  5:12
7. The Gift—David Nevue  3:01

CD 5: Relaxing Pop Covers
1. Just the Way You Are—The Piano Guys  4:22
2. All of Me—oOrwellino  4:33
3. Home—The Piano Guys  4:38
4. Hallelujah—Brian Crain  4:32
5. A Thousand Years—Rosanna Chiu  3:27
## Appendix P: Enrollment Log

### Patient Enrollment Log

<table>
<thead>
<tr>
<th>IOM</th>
<th>Control/Experimental</th>
<th>Patient Sticker</th>
<th>Date consent signed</th>
<th>Date survey complete</th>
<th>Date pumping logs complete</th>
<th>Date data entry complete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix Q: Raw Data

<table>
<thead>
<tr>
<th>Participant</th>
<th>Log 1</th>
<th>Log 2</th>
<th>Log 3</th>
<th>Log 4</th>
<th>Log 5</th>
<th>Log 6</th>
<th>Log 7</th>
<th>Log 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>19</td>
<td>50</td>
<td>60</td>
<td>65</td>
<td>80</td>
<td>60</td>
<td>68</td>
<td>60</td>
</tr>
<tr>
<td>2</td>
<td>0.5</td>
<td>5</td>
<td>4</td>
<td>10.1</td>
<td>7</td>
<td>14</td>
<td>10</td>
<td>10.1</td>
</tr>
<tr>
<td>3</td>
<td>39</td>
<td>38</td>
<td>40</td>
<td>41</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>240</td>
<td>140</td>
<td>190</td>
<td>160</td>
<td>150</td>
<td>150</td>
<td>140</td>
<td>160</td>
</tr>
<tr>
<td>5</td>
<td>90</td>
<td>95</td>
<td>80</td>
<td>130</td>
<td>90</td>
<td>70</td>
<td>70</td>
<td>120</td>
</tr>
<tr>
<td>6</td>
<td>129</td>
<td>124</td>
<td>150</td>
<td>131</td>
<td>127</td>
<td>153</td>
<td>159</td>
<td>161</td>
</tr>
<tr>
<td>7</td>
<td>45</td>
<td>64</td>
<td>37</td>
<td>45</td>
<td>45</td>
<td>48</td>
<td>75</td>
<td>66</td>
</tr>
<tr>
<td>8</td>
<td>144</td>
<td>144</td>
<td>144</td>
<td>144</td>
<td>65</td>
<td>144</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>23</td>
<td>16</td>
<td>30</td>
<td>13</td>
<td>23</td>
<td>19</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>10</td>
<td>80</td>
<td>110</td>
<td>100</td>
<td>120</td>
<td>105</td>
<td>105</td>
<td>130</td>
<td>102</td>
</tr>
<tr>
<td>11</td>
<td>210</td>
<td>210</td>
<td>280</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>219</td>
<td>185</td>
<td>208</td>
<td>290</td>
<td>225</td>
<td>300</td>
<td>240</td>
<td>135</td>
</tr>
<tr>
<td>13</td>
<td>135</td>
<td>110</td>
<td>140</td>
<td>160</td>
<td>160</td>
<td>160</td>
<td>160</td>
<td>160</td>
</tr>
<tr>
<td>14</td>
<td>74.5</td>
<td>80</td>
<td>80.5</td>
<td>90</td>
<td>90</td>
<td>67</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>180</td>
<td>120</td>
<td>120</td>
<td>100</td>
<td>175</td>
<td>230</td>
<td>200</td>
<td>120</td>
</tr>
<tr>
<td>16</td>
<td>203</td>
<td>153</td>
<td>164</td>
<td>160</td>
<td>164</td>
<td>154</td>
<td>240</td>
<td>164</td>
</tr>
<tr>
<td>17</td>
<td>35</td>
<td>60</td>
<td>55</td>
<td>120</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>90</td>
<td>110</td>
<td>130</td>
<td>130</td>
<td>180</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>40</td>
<td>90</td>
<td>110</td>
<td>106</td>
<td>80</td>
<td>60</td>
<td>100</td>
<td>90</td>
</tr>
<tr>
<td>20</td>
<td>9</td>
<td>9</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>30</td>
<td>40</td>
<td>80</td>
<td>195</td>
<td>115</td>
<td>70</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>74</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>130</td>
<td>137</td>
<td>210</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>60</td>
<td>50</td>
<td>60</td>
<td>40</td>
<td>40</td>
<td>35</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>10</td>
<td>15</td>
<td>19</td>
<td>80</td>
<td>33</td>
<td>75</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>65</td>
<td>80</td>
<td>106</td>
<td>85</td>
<td>141</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>80</td>
<td>95</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>60</td>
<td>80</td>
<td>160</td>
<td>65</td>
<td>70</td>
<td>80</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Participant</td>
<td>Pre</td>
<td>Post</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>-------</td>
<td>-------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Log 1</td>
<td>Log 2</td>
<td>Log 3</td>
<td>Log 1</td>
<td>Log 2</td>
<td>Log 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>4</td>
<td>99</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>3</td>
<td>99</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>2</td>
<td>3</td>
<td>99</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>4</td>
<td>3</td>
<td>99</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
References


Ghandehari, H., Lee, M. L., & Rechtman, D. J. (2012). An exclusive human milk-based diet in extremely premature infants reduces the probability of remaining on total parenteral nutrition: A reanalysis of the data. *BMC research notes, 5*, 188.


Krout, R. E. (2001). The effects of single-session music therapy interventions on the observed and self-reported levels of pain control, physical comfort, and relaxation of hospice patients. *American Journal of Hospice and Palliative Medicine, 18*(6), 383-390.


by histologic type: A multiethnic case-control study. *American Journal of Epidemiology, 158*(7), 629-638.


http://www.who.int/mediacentre/factsheets/fs363/en/


CURRICULUM VITAE
Amber Allen Colliver, MT-BC, NICU-MT

EDUCATION

UNIVERSITY OF KENTUCKY — Lexington, KY
Master of Music in Music Therapy, expected: May 2015

UNIVERSITY OF LOUISVILLE — Louisville, KY
Bachelor of Music in Music Therapy, December 2012

PROFESSIONAL EXPERIENCE

INDEPENDENT CONTRACTOR — Lexington, KY
Music Therapist. 08/2013 to present

PUBLICATIONS
