DEDICATION

This work is dedicated to those whose research informed this work, to Kerstin March and to the memory of her daughter, Lily March.
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ABSTRACT

The Uses of Music and Music Therapy to Decrease Stress and Anxiety During Pregnancy: A Systematic Categorization of the Literature

Elizabeth Collins Cook
Paul Nolan, MT-BC, LPC

The purpose of this literature-based study was to assemble the present uses of music and music therapy during pregnancy to decrease maternal emotional and physiological stress and anxiety. The assembling of extant literature in this study intends to serve the health profession by 1) providing a clear explanation of the effects of untreated maternal stress and anxiety on fetal brain and physical development, 2) demonstrate that music and music therapy interventions are a powerful, safe and affordable intervention that can be recommended to all pregnant women, 3) elevate this common yet usually unaddressed experience of prenatal stress and anxiety to the forefront of discussion among music therapists and 4) inspire more music therapists to specialize in treating this delicate population. Based on those findings it intended to make recommendations for informed strategic interventions.

Several studies have demonstrated the serious, negative, short and long term health effects of untreated prenatal stress, anxiety and depression on maternal and fetal, infant and child health. Other studies have demonstrated serious risks of traditional pharmaceutical interventions on both short and long term health of fetus, infant and child development. There is a dearth of research on non-traditional herbal interventions. Present medical recommendations are to avoid administering pharmaceuticals during pregnancy except under extreme and life threatening situations.

The rationale for this study was to assemble successful uses of music and music therapy interventions which seemingly pose no risk to these two vulnerable and inextricably linked populations. Several thorough
studies have demonstrated in the short term that listening to specific selections of recorded music positively affect both maternal stress hormone levels and individual reports of the experience of stress and anxiety.

Sundry applications of music therapy including but not limited to guided imagery and music (GIM), individual and group clinical music therapy and medical music resonance therapy have also been researched. In some studies, experiment groups were large enough and methods were thorough enough to demonstrate effectiveness. In smaller studies, findings give cause for an optimistic continuation of further research.

The results of this literature based study suggest that music listening and music therapy are useful tools when administered alone or when integrated with other interventions for the treatment of prenatal stress and anxiety. It also emerged in the literature that the therapeutic relationship between patient and music therapist is a crucial ingredient to the desired long term positive therapeutic effects.
CHAPTER 1: INTRODUCTION

The purpose of this literature-based study was to assemble and analyze the present uses of music and music therapy during pregnancy to decrease maternal emotional and physiological stress and anxiety. In this study, a background understanding was first gleaned through literature related to the issues of prenatal stress, anxiety and fetal outcomes. This research lead to further examination of the effects of stress and anxiety on gestation and premature birth, the causes of premature labor, the effect of prematurity on neonates, the effects of neonatal intensive care unit on development and bonding, the life-long health trajectory of those exposed to higher levels of stress hormones during the fetal stage and the additional financial strain on both the family and the health care system. Uses of music based interventions were then systematically categorized to include the following studies interventions: therapeutic music listening to recorded selections, Medical Music Resonance (MMR), Guided Imagery and Music (GIM) in relation to pregnancy, neuroscience reviews related to recorded, therapeutic music listening to live environmental music for medical patients, music psychotherapy, obstetrical music therapy in individual and group music therapy during pregnancy, and music therapy for stress and anxiety in general medical and hospital populations.

Pregnancy is considered by some health care professionals to be an inherent developmental crisis in the life cycle of women (Short, 2011). The physical and emotional strain of pregnancy on a woman can unearth otherwise latent or manageable tendencies to succumb to stress and anxiety. The experience of high levels of stress and anxiety during pregnancy is common for women. When left untreated, these can lead to depression and psychosis (Field, Diego, & Hernandez-Rief, 2010), put the physical health of the mother at risk by suppressing the immune system, put the health of the pregnancy at risk or at high risk, can negatively affect fetal development, lead to a need for hospitalized bed-rest during pregnancy, cause low APGAR scores and necessitate hospitalization in a neonatal intensive care unit for the infant and possibly lead to long term developmental, emotional and physical health complication throughout the life span. (Field, et al., 2003; Field, 2010; Pearlstein, 2008).
The assembling of extant literature in this study has the potential to provide prenatal health care practitioners with a better understanding of the importance of taking prenatal stress and anxiety complaints, even nonchalant ones, seriously. It will then present a rationale for a prescriptive protocol of referral to music based interventions as treatment of prenatal stress and anxiety.

Presently there is little that can be done safely to support women who are experiencing mild to moderate elevations of stress and anxiety. Women experiencing dangerous mood disorders during pregnancy do have the option of pharmaceutical treatments (Sadock & Sadock, 2007). Many candidates will not pursue or receive treatment for various reasons including but not limited to: lack of reporting to doctors due to stigma, a sense of shame for not rejoicing in what is culturally toted as the happiest moments in a woman’s life, lack a awareness on the part of obstetricians, a lack of mental health practitioners who specialize in pre-natal mental health, and a general reluctance of medical doctors to intervene pharmaceutically during pregnancy (Gossler, 2010).

Unfortunately, untreated prenatal stress and anxiety negatively affect maternal health, fetal development, health of the pregnancy, can trigger premature delivery, prolong labor and negatively impact the life-long mental and physical health trajectory of the newly born (Field, et al., 2003), (Schwartz F. J., 2000).

When left untreated, prenatal anxiety will frequently lead to prenatal and postpartum depression. Women with prenatal depression suffer weaker immune function and higher levels of the stress hormone, cortisol (Pearlstein, 2008). Health and duration of pregnancy are also negatively affected by raised levels of stress hormones (Janke, 1999). In addition to negatively impacting maternal health and potentially putting the pregnancy at risk, untreated prenatal stress and anxiety can also negatively impact physiologic measures of fetal development, neonatal and infant health. Infants exposed during pregnancy to high levels of the stress hormone cortisol may experience intrauterine growth restriction (IUGR) (Diego, Field, Hernandez-Rief, Schanberg, & Kuhn, 2008; Field, 2010). Infants of women with high stress levels during pregnancy tend to score lower on physical health assessment measure at birth (APGAR) or require resuscitation at birth (Urizar Jr., Milazzo, Le, Delucchi, Sotelo, & Munoz, 2003). In order to prolong a fragile pregnancy due to stress and anxiety, at-risk and high-risk pregnancies are traditionally treated with combined pharmaceutical and hospitalized bed-rest interventions (Frederico & Whitwell, 2001). According to Richter and colleagues’ 2007 phenomenological study, these
interventions seem ineffective and tend to exacerbate the very complications which put the pregnancy at risk in the first place; namely, increased experiences of stress, depression, boredom, isolation, anxiety and physical suffering (Richter, Parkes, & Chaw-Kant, 2007). When prenatal stress and anxiety do trigger premature delivery, health implications for infants are even more critical. Premature delivery is related to low birth weight (LBW), developmental delays, emotional and behavioral problems (Field, 2010). Premature birth displaces the fetus from an environment supportive of physical and neurologic development into one which inhibits growth (Standley, 2000). Early displacement robs the infant of the rhythmic stimulation of the womb environment which is responsible for developing physiologic organizations required for the rhythmic processes of breathing, nursing, and swallowing. The infant also loses time otherwise devoted to the absorption of calcium for bone strength, the production of fat for the regulation of body heat and the development of an effective immune system. Further, instead of spending the final fetal months devoting energy to the completion of lungs, liver, brain, and other organ development, the untimely neonate must direct energy toward survival (Mehl, 1988). Unequipped in the struggle to survive, most premature infants require hospitalization for significant amounts of time in Neonatal Intensive Care Units (NICU). Although the NICU is designed to save the life of premature infants, the necessary measures taken and the means by which they are accomplished unfortunately threaten the health of neonates if they are to survive. There exists already extensive research on the negative effects of premature displacement into the NICU environment. Much attention has been paid to the level of noise and light, the roughness of necessary yet invasive procedures, and a loss of opportunity to bond with mother (Abrams, Dassler, Lee, Loewy, Silverman, & Telsey, 2000; Fischer & Als, 2004; Gutbrod & Wolke, 2004; Knocker-Ribaupierre, 2004; Schwartz, 2000, 20004, 2011; Standley, 2000). Potential negative outcomes include blindness, deafness, hearing and visual disabilities, mental retardation, cerebral palsy, learning disabilities, language delay and emotional disturbance and attachment disorder (Loewy, 2000). Further, scientists have realized that upon reaching the third trimester (week 24) the placenta ceases to block stress hormone levels from the fetal environment. It is theorized that this is an evolutionary design intended to prepare the infant for the environment into which it will be born (Hodgson, Nakamura, & Walker, 2007). An infant exposed to these high levels of stress and anxiety hormones will thus be predisposed to a heightened sense of fight and flight, stress and alert. The emotional and physical ramifications impact overall health throughout the lifetime of the child leaving them more vulnerable to emotional and physical
disorders. Some identified illnesses include depression, panic disorder, generalized anxiety disorder, hypertension, diabetes, asthma (Hodgson, Nakamura, & Walker, 2007).

There is a growing amount of research and literature examining the uses and effectiveness of music based interventions as treatment for prenatal stress and anxiety. Neuroscientists, nurses, and music therapists are all contributors to the field of literature. As of yet, to the best of this researcher’s knowledge, the findings from the three branches of study have yet to be gathered into a single review. This study attempts to accomplish such an integration.

Initial research investigated included the potential uses of pharmaceuticals. Presently, the research has yet to demonstrate conclusively safety and efficacy of pharmaceutical intervention (Pawluski, Galea, Brain, Papsdorf & Oberlander, 2009; Sadock & Sadock, 2007). Many women have thus taken matters into their own hands and begun using herbal remedies bought from health food stores. Safety and efficacy are still an issue as these herbs are also chemical agents being introduced into the fetal environment (Gossler, 2010) (Pearlstein, 2008). Some research has also been done on the alternative and integrative methods such as hypnosis, massage, aroma therapy, light therapy and exercise (Freeman M. P., 2008) (Field, 2009). In this literature there seems to be promise. Traditional talk therapy such as psychotherapy and cognitive therapy have very promising results as well. Stigma, cost, time restrictions and availability of practitioners prove to be a significant barrier to care (Field, Diego, & Hernandez-Rief, 2010).

The purpose of this literature-based study was to assemble the present uses of music and music therapy during pregnancy to decrease maternal emotional and physiological stress and anxiety. The assembling of extant literature in this study intends to serve the health profession by 1) providing a clear explanation of the effects of untreated maternal stress and anxiety on fetal brain and physical development, 2) demonstrate that music and music therapy interventions are a powerful, safe and affordable intervention that can be recommended to all pregnant women, 3) elevate this common yet usually unaddressed experience of prenatal stress and anxiety to the forefront of discussion among music therapists and 4) inspire more music therapists to specialize in treating this delicate population.
The popularity of classical music CD collections for babies and books like *This is Your Brain on Music* by Daniel J. Levitin (2006) demonstrate that scientific explorations into the relationship between music and brain function have been well advertised and communicated to the lay level in recent years. Nursing research has become interested in the possibility of capitalizing on music's effect on mood and brain activity for pregnant women with some success. Effects of music and music therapy on stress and anxiety levels have been evaluated using self report assessments, standardized state anxiety assessment tools, and saliva strips measuring cortisol levels. Comparisons of the effect of live and recorded music on stress and anxiety have also been examined (Chang, Chen, & Huang, 2008; Wiand, 1997; Yang, et al., 2009). In a review of the literature, Harvard Neuroscientists have reported music interventions to positively affect experiences of stress and anxiety. The review compared the differences in effect between music listening and music therapy administered by a certified music therapist. They have stated that their findings suggest music therapy was the only music based intervention observed to positively shift physiologic measures of stress and anxiety. (Lin, et al., 2011).

Research included in this section of the review briefly presents studies of health care interventions other than music therapy for the treatment of prenatal stress and anxiety. It instead focuses on listening to live and recorded music and models or applications of music therapy for pregnant women suffering stress and anxiety. Some participant populations were limited to women already on bed-rest. Others included women diagnosed with prenatal depression. Although several randomized controlled studies were available, many studies were qualitative in format with smaller participant populations. This study was also limited to research presented in peer reviewed journals.
CHAPTER 2: LITERATURE REVIEW

2.1 Overview

This chapter includes a discussion drawn from extant literature on prenatal stress and anxiety, the negative health effects of untreated prenatal stress and anxiety on 1) the health of the mother, 2) the pregnancy itself, 3) fetal health, 4) fetal outcomes and 5) bonding and infant development. It follows with a comment on the cost of these outcomes to the family and the health care system. The penultimate presentation presents available treatments, safety, efficacy and causes for obstruction to treatment for prenatal stress and anxiety. It concludes with a review of the literature on present uses of music and music therapy in the treatment of stress and anxiety during pregnancy.

2.1.1 Terms and Definitions

In this review, prenatal refers to the time period of pregnancy. Antenatal is used interchangeably with prenatal. The term perinatal encompasses prenatal and postnatal time frames. Postpartum refers to the time period shortly after giving birth. According to some experts postpartum depression is limited to symptom onset within one month of birth and presentation within six months after birth (Freeman & Davis, 2010). Prenatal anxiety is a frequent forerunner to prenatal and postpartum depression. According to the DSM I-V-TR anxiety is a combination of psychological and biological experiences including restlessness, fatigue, difficulty concentrating, mind going blank, irritability, muscle tension, sleep disturbance. “Despite the abundance of literature in the 19th and 20th centuries, there is no formal classification of puerperal psychiatric illness in ICD-10 or DSM-IV-TR” (Henshaw, 2010, p. 480). Depression during and after pregnancy is characterized by the same symptoms of major depressive disorder (MDD) as defined by the DSM I-V-TR: depressed mood, loss of interest and pleasure, significant weight loss or gain, disruption of sleep patterns, loss of energy, feelings of guilt, difficulty concentrating, and recurrent thoughts of death. Stress related physiological changes during pregnancy can result in high-risk
pregnancy conditions. A high-risk pregnancy is defined as “one in which the life or health of the mother or infant is in jeopardy by a disorder coincidental or unique to pregnancy” (Richter, Parkes, & Chaw-Kant, 2007, p. 313)

2.2 Negative Health Effects of Untreated Prenatal Stress and Anxiety: An Overview

Pregnancy is a physically demanding experience for a woman. The physical strain causes her concern for her own well-being. The result is emotional stress in which a mother may “perceive that her well-being is endangered; thus she must divert energy to protect herself” (Chang, Chen, & Huang, 2008, p. 2581). Maternal concern for fetal health exacerbates the emotional stress of being in an already vulnerable physical state. This stress may manifest as anxiety. As described by Pritchard, anxiety manifests as the presence of “heart palpitations, elevated blood pressure, increased rate of breathing and sweating, in addition to a heightened sense of smell, touch and hearing” (Pittman & Kridli, 2011, p. 157).

Significant to the scope of this review is that “the health status of an individual in adulthood is proposed to be determined by events occurring in the prenatal and early postnatal period” (Hodgson, Nakamura, & Walker, 2007, p. 92). This far reaching influence is referred to in the literature as perinatal and/or fetal programming.

According to a longitudinal study aimed at identifying risk factors for maternal depression, “elevated levels of stress during pregnancy have been associated with a number of prenatal complications and negative birth outcomes, such as preterm labor, low infant birth weight and APGAR scores, and increased use of neonatal intensive care units services” (Urizar Jr., Milazzo, Le, Delucchi, Sotelo, & Munoz, 2003). Prolonged NICU hospitalization negatively influences physical and emotional infant development (Gutbrod & Wolke, 2004).

Developmental delays and disruptions lead to long term need for developmental, educational and handicap support services (Schwartz F. J., 2000). Further, the research proposes that fetal exposure to perinatal stress and anxiety negatively impacts the trajectory of long term physical and psychological health of the adult (Hodgson, Nakamura, & Walker, 2007).
In addition, long term health costs associated with untreated perinatal stress and anxiety compile over the course of a life straining both individual and systemic financial resources (Mehl, 1988). These costs include: prenatal hospitalization of at-risk pregnancies, hospitalization of prematurely displaced infants into the neonatal ICU, lost income of mother and father during medical crisis, public services directed at the developmentally delayed child and/or handicapped individual; and continuing adult medical costs associated with adult medical and psycho-pathologies linked to fetal exposure to maternal stress hormones. (Schwartz, 2004).

Further, according to research done by Hodgson and colleagues in 2007, exposure to physiological mechanisms of maternal stress during the fetal period is proposed to influence the regulation of stress, immunological maturation, pain perception, and cognition in the adult (Hodgson, Nakamura, & Walker, 2007). The authors go on to explain:

During the first and second trimester of pregnancy most of the mother’s circulating cortisol is unable to pass through the placenta to reach the fetus. However, in the final trimester of pregnancy, active cortisol is allowed to pass through the placenta to the fetus to assist with lung maturation. This influx ... helps set the tone of the HPA axis and prepares the fetus for the demands to be placed on it by the ex-utero environment. This “fetal programming” is an adaptive mechanism allowing the fetus to adapt to the environmental demands in which it will live. That is, if the fetal environment is characterized by gestational stress and, as such, high levels of in-utero exposure to glucocorticoids, the HPA axis of the fetus is programmed with a predisposition to expect similar levels of stress in the ex-utero environment.

Hodgson, Nakamura, & Walker, 2007, p. 94

The article goes on to explain the far reaching effects of perinatal programming; individuals exposed to high levels of the stress hormone glucocorticoids in-utero experience a number of chronic adult health issues as
well including cardiovascular disease, type 2 diabetes, asthma, and psychopathologies; in particular, anxiety and depression (Hodgson, Nakamura, & Walker, 2007). Seen through lens of preventative care, this single research article provides profoundly significant and serious rationale for the importance of standardizing prenatal stress and anxiety interventions during the third trimester.

2.2.1 Negative Health Effect of Untreated Prenatal Stress and Anxiety on Mother

“Elevated levels of stress hormones such as cortisol, have been suggested as a potential biological mechanism leading to health complications in pregnant women” (Urizar Jr., Milazzo, Le, Delucchi, Sotelo, & Munoz, 2003, p. 276). Health care practitioners are to be alert in identifying and treating pregnant women experiencing the symptoms of stress, anxiety and depression for “antenatal psychological disturbances have been shown to affect, adversely, the well-being of the mother and the foetus” (Chang, Chen, & Huang, 2008, p. 2581).

Women with prenatal anxiety tend to develop prenatal and postpartum depression (Field, Diego, & Hernandez-Rief, 2010). Women with prenatal depression suffer weaker immune function and higher levels of the stress hormone, cortisol (Field, Diego, & Hernandez-Rief, 2010). Maternal anxiety is highly correlated with “the incidence of preeclampsia, prolonged labor, precipitate labor, forceps delivery and post-partum hemorrhage” (Winslow, 1986, p. 29)

2.2.2 Negative Health Effect of Untreated Prenatal Stress and Anxiety on Pregnancy and Fetal Health Outcomes

Untreated symptoms can result in high levels of cortisol during pregnancy. Elevated stress hormones restrict fetal growth, (Diego, Field, Hernandez-Rief, Schanberg, & Kuhn, 2008) and contribute to prematurity (Field, 2010). Pregnancies at-risk of prematurity “require special care [including] the need to stay in bed, and the need of
medicine in order to continue the pregnancy” (Frederico & Whitwell, 2001, p. 301). Mothers may refuse medicinal intervention for fear of fetal health implications. (Gossler, 2010)

Although “research studies have failed to support the effectiveness of bed rest for antepartum complications such as the prevention of premature birth or improving fetal outcomes, it is still widely prescribed” (Richter, Parkes, & Chaw-Kant, 2007, p. 313). In a qualitative descriptive study, “bed rest is associated with adverse and physical and psychological complications” (Richter, Parkes, & Chaw-Kant, 2007, p. 313). The women in the study explain that bed rest actually aggravates the experience of stress. It is also held responsible for additional “feelings of depression, boredom, isolation, anxiety and somatic complaints” (Richter, Parkes, & Chaw-Kant, 2007, p. 314). This phenomenological study shows that traditional ‘special care’ designed to prolong at-risk pregnancies sometimes increase levels of maternal stress and anxiety. The study goes on to say that maternal concern for effects of medicine on the fetus causes greater physiological stress and emotional anxiety for already complicated pregnancies. (Richter, Parkes, & Chaw-Kant, 2007).

A 2003 (Bellieni, et al) retrospective control study examining the long term effects of bed rest on off spring, interviewed by phone 182 mothers who had been confined to bed rest for more than 15 consecutive days. The mothers completed a 20 item questionnaire on neurological development, behavior, and attitudes of children. Mothers of children with severe neurological abnormalities were excluded from the study. Three mothers did not fill out the questionnaire. 43 completed forms were collected. To randomize control and treatment groups, researchers made assignments by alternating same sex births. For premature and twin births researchers chose the subsequent premature or twin birth. Results indicate three statistically significant differences between bed rest offspring (BRO) and control group: higher incidence of allergies (p=0.005), increased need for rocking to attain sleep (p=0.01), and motion sickness (p=0.03). When comparing preterm and term babies independently, the only significant difference was that more BRO played musical instruments later in life (Bellieni, et al., 2003). The Bellieni study postulates that mothers confined to bed rest may have listened to more music than mothers able to pass the time in more active ways.
2.2.3 Causes of Premature Labor

Presently the exact cause of premature labor is unclear (Mehl, 1988). There is, however, recognition among health care professionals of a link between 1) anxiety and premature contractions, and 2) social/psychological stress with premature delivery. Several theories point to acute and chronic stress related changes in maternal hormone levels of epinephrine, corticosteroid, and oxytocin. (Janke, 1999) According to McCance & Heunter (2006) “the physiological response to anxiety is the stress response, which activates the hypothalamic-pituitary-adrenal axis and the sympathetic nervous system that triggers the release of hormones and catecholamines to supply the body with fuel for action. It is the release of these biological substances that cause the objective and subjective manifestations of anxiety” (Pittman & Kridli, 2011, p. 157). The theories suggest an evolutionary explanation: changes in stress hormones may inform the body that safety and survival of the mother is threatened. For survival of the species, the body may choose the mother’s survival over the pregnancy. The life of the mother would then be preserved for future reproductive opportunity. It follows that changes in maternal hormones due to anxiety triggered stress response triggers premature labor. (Schwartz F. J., 2000)

2.2.4 Negative Health Effects of Untreated Prenatal Stress and Anxiety on Infant Health

Prenatal stress, anxiety and depression also affect physiological measures in infants. Early research indicated that “clinical fetal distress was correlated to high anxiety levels in the mothers [including] lower birth weight, abnormalities, and juvenile ill health” (Winslow, 1986, p. 29). “Women with elevated cortisol levels are more likely to have ... infants with low APGAR scores, or have infants who need resuscitation assistance at birth” (Urizar Jr., Milazzo, Le, Delucchi, Sotelo, & Munoz, 2003, p. 276). Studies by Field and colleagues found that neonates of women suffering high anxiety (and the related hormonal changes) had “low dopamine and serotonin levels...greater relative right frontal EEG activation and lower vagal tone” which causes an inability to regulate heart beat. These babies also “spent less time in quiet and alert state,” and scored more poorly on neonatal assessment scales. (Field, et al., 2003, p. 140). According to a 2007 study done by Field, infants of prenatally
depressed mothers spent "less time in deep sleep, more time in disorganized sleep and more time fussing and crying" (Field, 2010).

2.3 Impact of Premature Labor and Delivery

Prenatal stress and anxiety can lead to premature delivery. Health implications for neonates prematurely displaced from the womb are critical. Premature delivery is related to low birth weight (LBW), developmental delays, and emotional and behavioral problems (Field, 2010). According to Schwartz, “the premature infant loses the opportunity to continue normal neurological development in the womb...both the complications and the interventions are highly correlated with increased impairment in neurological development” (Standley, 2000, p. 57). Additionally, “the last two months of pregnancy allow the fetus to develop reflexes that control breathing, absorb calcium to strengthen bones, produce fat to regulate body heat, and build immunities to fight infections. A premature baby's lungs, liver, brain, and other organs do not function as well as do organs in full-term infants” (Mehl, 1988, p. 42). For these reasons most premature infants require significant amounts of time spent in NICU.

2.3.1 Negative Effects of Neonatal Intensive Care Unit on Infant Development

“Although the NICU is designed to promote the well-being of high-risk infants, the NICU environment may, at times, actually threaten the health of these infants” (Abrams, Dassler, Lee, Loewy, Silverman, & Telsey, 2000, p. 22).

There exists already extensive research on the negative effects of premature displacement from the womb into the NICU environment. Much attention has been paid to the level of noise and light, the roughness of necessary yet invasive procedures, and a loss of opportunity to bond with mother. (Abrams, Dassler, Lee, Loewy, Silverman, & Telsey, 2000; Fischer & Als, 2004; Gutbrod & Wolke, 2004, Knocker-Ribaupierre, 2004; Schwartz,
"The contrast of the sound environment in the uterus compared to that of the NICU is rather dramatic" (Gerhard & Abrams, 2004). Neonates are not prepared to tolerate the chaotic human and mechanical stimuli of a NICU. Deprived of their normal intrauterine environment, they are susceptible to the stress in the NICU (Schwartz F. J., 2000). "While it is felt that sensory stimulation is necessary for optimal neurological development, the sights and sounds of the modern NICU provide an inappropriate sensory environment for the premature infant" (Schwartz F. J., 2000, p. 12) “Many of these babies suffer hearing and visual disabilities, mental retardation, cerebral palsy or learning disabilities” (Schwartz, 2004, p. 89).

### 2.3.2 Effects of the Premature Delivery and NICU on Infant-Mother Bonding

"Prematurity can adversely affect parental-infant interaction and bonding, especially when there are medical complications" (Mehl, 1988, p. 42). Mothers of infants requiring NICU hospitalization can experience further increases in stress and anxiety and become depressed. Because depressed mothers are less likely to engage with their infants, “newborns of depressed mothers are less responsive to stimulation” (Field, 2010, p. 5). Less responsive babies are at higher risk of developmental delays (Field, 2010). In *Human Development* (1983) Goldberg explains the significance of parent-infant interaction on development stating, the infant discovers its own effectiveness through parental response to its crying, smiling, and eye contact. This early experience is a foundation of healthy emotional and psychological development. Unfortunately, mothers of infants requiring intensive care report feelings of detachment: they describe a sense that the baby belongs more to the nurse than to her. (Mehl, 1988). This experience can obstruct maternal sensitivity to these significant and earliest attempts at communication.

### 2.4 Cost of At-Risk and Premature Delivery on Family and Health Care System
In addition to negative effects on prenatal stress and anxiety on length of gestation, mother, fetus, neonate and infant; there are significant financial costs of untreated prenatal stress and anxiety which strain both the family and the health care system.

Family costs include “initial [maternal] hospitalization costs, costs of additional hospitalizations for babies who live, and the long-term expenses of caring for children with disabilities or chronic birth-related diseases, including work loss by parents” (Mehl, 1988, p. 42). “In 1988, the comprehensive report Preventing Low Birth Weight discusses the high human and economic costs of these births, and advocates reducing risk of prematurity and low birth weight” (Mehl, 1988). Since then; however, due to advances in medical technology, “there has been a marked increase in the population of low and very low birth weight infants, whose care requires large resources in technology and personnel” (Schwartz, 2004, p. 89). In 2004, the cost of hospitalized intensive care in the US per day averaged $1,000 - $2,000 per day. At the time of that study, that amounted to over 3.5 billion dollars a year (Schwartz, 2004). Costs include initial hospitalization for at-risk pregnant women on bed rest, hospitalizations for profoundly premature babies who survive, the long-term expense of children with disabilities or chronic birth-related diseases, and work loss by parents both during perinatal phase and long term.

2.5 A Brief Overview of Traditional Interventions

Many health care interventions have emerged to treat prenatal stress, anxiety and depression. Some are proven effective yet carry significant risk (Misri, Pratibha, Corral, & Milis, 2004) (Pawluski, Galea, Brain, Papsdorf, & Oberlander, 2009). Some have risk and insignificant proof of effectiveness (Bellieni, et al., 2003) (Baille, Hewison, & Mason, 1999) (Gossler, 2010). Others have demonstrated efficacy within trials and are being offered in practice. These therapies include but are not limited to: pharmaco-logical interventions, alternative herbal remedies, supportive and educational prenatal home visitations, psychotherapy, psychotherapy combined with complementary therapies, massage, relaxation therapy, and hypnosis (Freeman M. P., 2008; Freeman & Davis, 2010; Henshaw, 2010; Marc, et al., 2011; Mehl, 1988; Pearlstein, 2008; Sadock & Sadock, 2007; Urizar Jr., Milazzo, Le, Delucchi, Sotelo, & Munoz, 2003).
2.5.1 Pharmacology during the Prenatal Period

In 2009 Pawluski, Galea, Brain, Papsdorf, and Oberlander conducted a prospective longitudinal study on mothers in the second trimester (n=76) to study the impact of using selective serotonin reuptake inhibitor (SSRI), an antidepressant medication, during pregnancy on serotonin-related neurodevelopment in human infants. Effect was analyzed by measuring levels of S100B protein in maternal blood and chord serum. S100B proteins are involved in the regulation of a number of cellular processes. 23 samples which were ultimately not obtained due to technical error. Of those, 6 were SSRI exposed, and 17 were SSRI non-exposed. Of those maternal samples obtained, SSRI exposed, N=36; non-exposed, N=15. Of neonatal samples obtained SSRI exposed, N=37; non-exposed, N=15. Levels of S100B were measured in infant cord serum using a commercially available enzyme kit for human S100B (Pawluski et al., 2009, p.e663). APGAR scores were taken at 1 and 5 minutes, birth weight, head circumference, body length and gestational age were obtained. Neonatal behaviors or an absence of behaviors indicating distress such as respiratory distress, jitteriness, tone and respiratory rate were tabulated over first 48 hours.

Findings indicated that cord and maternal serum S100B levels were significantly lower among prenatally exposed SSRI neonates than the non-exposed. APGAR scores were significantly lower and jitteriness was significantly higher in neonates with prenatal exposure to SSRI. “Neonatal levels of S100B were not associated with growth characteristics at birth (birth weight, head circumference, length)” (Pawluski et al., p. e666). “These findings are consistent with those for other prenatal exposures that alter central serotonin levels and decrease S100B expression such as alcohol and cocaine” (Pawluski et al., p. e667). Benefit ability to outweigh risk factors is dependent on severity of depression symptoms relative to risk of no treatment on health and well-being of mother and fetus. According to Kaplan and Sadock, “No definitive assurance exists that any drug is completely without risk during pregnancy and ... drugs with known risks ... should be avoided if acceptable alternatives are available” (Sadock & Sadock, 2007, p. 989).
2.5.2 Effectiveness of Combined SSRI and Cognitive Behavioral Therapy on Mood.

In a review of randomized control trials comparing the efficacy of SSRI monotherapy and SSRI combined with Cognitive Behavioral Therapy (CBT) on postpartum depression, authors state that several researchers: Cooper, Murray and Wilson, (2003), Holden, Sagovsky and Cox (1989), Wickberg and Hwang, (2006) and O'Hara, Stuart and Gorman (2005), have already demonstrated “the efficacy of psychotherapy in the treatment of postpartum depression...in well controlled research trials” (Misri, Reebye, Corral, Milis, 2004, p. 1236). Given that in acute cases of maternal depression pharmacological intervention is required for infant and maternal safety, the study hypothesized that when combined with CBT, remission from depressive symptoms would be achieved more quickly and with lower doses of SSRI. In this comparative study, 35 women referred to outpatient for postpartum depression with comorbid anxiety disorder were randomly assigned to monotherapy: SSRI (N=16) or dual therapy: SSRI combined with CBT (N=19) for 12 weeks. A blinded psychiatrist used the Hamilton Rating Scale for Depression (HAM-D), Hamilton Rating Scale for Anxiety, (HAM-A) and Edinburgh Postnatal Depression Scale, (EPDS) to monitor progress. Results indicated that both therapies were significantly effective. Although the combined intervention group went into remission earlier than the monotherapy group, the difference was not significantly different. The study did demonstrate that both treatments were effective in the treatment of acute postpartum depression. The study addressed neither the risks of exposing neonates to SSRI medication nor the effect of exposure through breast milk. Although SSRIs and Paroxetine have been proven effective in women with severe depression, given that "long term developmental risk that may become apparent only later in infancy and childhood ... remains to be determined" (Puwalksi et al., 2000, p.e688) many pregnant women will refuse treatment. In many cases, women self diagnose, seek alternative herbal remedies and withhold information from their obstetrician (Gossler, 2010).

2.5.3 Alternative Interventions for Stress and Anxiety During Pregnancy

With awareness of adverse effects of prescription medication on fetal development comes “a desire to maintain a more naturalistic approach to health care. [This] has helped create an interest in complementary and alternative therapies” (Gossler, 2010, p. 31). “Two major concerns in using complementary and alternative
therapies are the purity and safety of the herbs and herbal formulations and the potential lack of communication between the client and health care provider” (Gossler, 2010, p. 30) In the face of such concerns Gossler and Freeman conducted systematic reviews of available interventions and therapies.

Gossler lays out a list of complementary therapies with varying degrees of efficacy; namely, acupuncture, dietary supplements such as omega-3 and St John’s Wort, traditional Chinese medication (TCM), massage and relaxation therapy and aroma-therapy (Gossler, 2010). A review by Freeman included S-adenosyl-methionine (SAMe), folate, bright light therapy, and exercise. Acupuncture has been demonstrated to be effective in anxiety but not depression as of yet. This may prove significant as prenatal anxiety is frequently a forerunner to prenatal depression (Freeman, 2008).

Although in 2003 Foran, Flood and Lewandrowski concluded that fish oil capsules appeared “free of significant levels of mercury” (Freeman 2008), a 2009 Freeman study indicates that although Omega-3 fish oils have been shown to benefit women with depression, risks of heavy metal contamination are a real concern. (Gossler, 2010).

St John’s Wort is another commonly used herb for prenatal depression. In 2006, Dugoua, Mills, Perri and Koren stated “a systematic review of available literature provided very weak evidence for the safety of the use of St John’s Wort during pregnancy” (Gossler, 2010). Infants prenatally exposed to St. John’s Wort demonstrate similar symptoms of those exposed to SSRIs. (Freeman, 2009) St John’s Wort also has potential for drug interaction with birth control medication and may result in unwanted pregnancies (Freeman, 2009). Presently, TCM herbal remedies have not been proven effective and efficacy has yet to be systematically researched (Gossler, 2010).

2.5.4 Massage and Aroma Therapy

In a 2000 systematic review of the literature, Field noted that massage therapy had “been used for hundreds of years to relieve tension, increase circulation, and calm pain receptors in the body” (Gossler, 2010, p. 332). At that time there was no indication that massage was effective in reducing depression. In a later randomized control study, Field indicated that “when [massage is] administered by marital partners, dopamine
and serotonin levels increase” (Field, Diego, Hernandez, Reif 2010, p. 413) and women in the therapy group which received massage twice weekly from their partners from 20 weeks gestation until the end of pregnancy reported leg pain, back pain, depression, anxiety and anger decreased significantly more than in the control group. (Field, et al., 2010). Research done between Diego and Field indicated that moderate pressure, as opposed to light pressure, was observed to increase vagal activity, a precursor to infant and child behavior tendencies, which triggers a decrease in cortisol levels (Field, et al., 2010). Also, “massage therapy combined with group interpersonal psychotherapy was effective in reducing depression and cortisol levels” (Field, Diego et al., 2009, p. 409). Aroma therapy has not been proven effective in minimizing depression although may be worth using if combined with other effective treatments.

2.5.5 SAMe, Folate, Bright Light and Exercise

Freeman’s review makes the following additions to the Gossler review: SAMe, folate, bright light and exercise. SAMe is “naturally occurring...with important implications for mood disorders, including neorutransmitters...and cellular receptors and channels” (Freeman, 2009, p. 3-4). Research has been done to systematically assess effectiveness of SAMe on major depressive disorder (MDD). However, “no data are available regarding the efficacy of SAMe in antenatal depression” (Freeman, 2009, p. 4).

Folate levels predict response to antidepressant medications (Freeman, 2009) Systematic review of randomized, placebo controlled studies found that increases in folate levels may increase effectiveness of antidepressant medications particularly SSRI therapy. (Freeman, 2009)

Bright light therapy is typically prescribed for seasonal affective disorder (SAD). (Freeman, 2009). Studies show that bright light therapy is also effective with non-seasonal affective disorders. One study demonstrated significant improvement in control and therapy recipient groups. The control group received same amount of time under dim light while intervention group received bright light therapy. (Freeman, 2009) Bright light therapy for prenatal depression lacks systematic inquiry.
Exercise supports attaining and maintaining good health and shows small indications of positively affecting depressive symptoms. Exercise in pregnancy is difficult to achieve if no regime existed prior to pregnancy. Although a 2003 prospective study conducted by Da Cost and colleagues indicates pregnant women who exercise report fewer depressive symptoms in the second trimester, results did not continue through the third (Freeman 2009). As exercise is an affordable intervention, pregnant women are still encouraged, under supervision of obstetrician, to get 30 minutes mild exercise almost every day.

2.6 Preventative and Minimal Risk Interventions for Prenatal Stress and Anxiety

Given safety and effectiveness concerns over alternative therapeutic interventions in treating prenatal anxiety and depression, efficacy and effectiveness of less dangerous therapies have been systematically explored. The following is a presentation of some such studies. Topics include; Prenatal educational home visitation and ultrasound scanning, supportive psychotherapy, psychotherapy combined with complementary practices, therapeutic music listening and music therapy.

2.6.1 Prenatal Educational and Supportive Home Visitation

In critical response to previous research which Campbell asserts ignores parental behavior, “the most powerful and potentially alterable influences on pregnancy outcome and young children’s health” (Campbell, 1994, p. 82), Thomas Campbell designed a prolonged, four tiered, educational, prenatal, nurse, home-visit program. Four levels of assistance were offered: families received either 1) health and developmental screening at one and two years, 2) developmental screening and free transportation to prenatal and well child visits, 3) prenatal nurse visitation in the family home every two weeks throughout the pregnancy and 4) same services as group three with additional home visitation extended to the second birthday. Visits tapered off to every 6 weeks by end of second year (Campbell, 1994). Groups one and two were considered control groups. Four hundred women enrolled in the study. Five registered nurses were trained in curriculum and followed 20 – 25 families throughout the day. Data was collected pre intervention via interviews, again at 32 weeks, and every 4 to 6 months after birth. Caldwell and Bradley Home Observation checklist and interview was used to assess environment. Additional data were blindly collected from mother and infant hospital records. Women receiving intervention suffered “fewer kidney
infections, reduced the number of cigarettes they smoked, improved their diets, attended childbirth classes more often, and reported receiving more support from their families and friends” (Campbell 1994, p. 84). Intervention affected birth weight and gestation in mothers with high risk pregnancies: smokers receiving home visitation had 75% fewer preterm infants and neonates of teen mothers were 395 grams heavier than control group babies (Campbell, 1994). “These improvements in birth outcomes are clinically very significant” (Campbell, p.84). In non-risk pregnancies, intervention did not affect birth weight, length or gestation, nor did the intervention address or measure prenatal affect disorders. Correlation between smoking and lower IQ tests was discovered in follow up interviews. Children of smoking mothers who received nurse home visits had significantly higher IQ scores than children of smoking mothers who did not receive nurse visitations.

These finding suggests the program successfully diminished the number of cigarettes smoked a day enough to improve mental health outcomes for child. Although this study did not address the impact of intervention on prenatal anxiety and depression, it is included as it does note the impact of personal relationship between patient and care giver on efficacy of therapeutic intervention. This is significant to this review as relationship is the key difference between music listening and music therapy.

### 2.6.2 Ultrasound Scans

One consideration in the education component of prenatal care is the use of ultrasound scanning. Scanning allows the mother to see the infant in utero and assuage any unfounded fears. A 1992 study examining early interventions revealed that “mothers who received the ultrasound feedback had lower anxiety than the mothers who did not get feedback” (Field, 1992, p. 330). Ultrasound scans have become accepted as standard procedure in support of maternal peace of mind and bonding toward neonate. It had also been assumed that images of the fetus motivate mothers toward better health practices. (Baille, Hewison, & Mason, 1999). However, a 1999 systematic review of the literature posited that there is no evidence indicating a positive attachment effect and conclusive studies are yet to be done to support claims that ultra sound screening improves maternal health practices. (Baille, Hewison, Mason, 1999) Important to this review is the indication that ultrasounds may actually exacerbate anxiety. Considering that anxiety is a risk factor in fetal health and premature birth, serious re-examination of the
practice is encouraged. Significant to the scope of this review are patient reports of a positive experience in scanning being related to a “supportive interaction with the operator” (Baille, et al., 1999, p. 149). This finding points again to the important impact of relationship between patient and health care provider on effectiveness of any intervention.

2.6.3 Traditional Psychotherapy

In 2009 Freeman, in partnership with Davis, published a double-blind placebo controlled trial designed to “assess the preliminary adherence to and efficacy of manualized supportive psychotherapy” (Freeman, et al., 2010, p. 41) when combined with ingestion of omega-3 capsules. Assuming perinatal women have significant responsibility barriers to self care, Freeman’s psychotherapy program was designed to minimize time burden. Supportive psychotherapy intervention included: 1) a manual modeled after a pre-existing manual for treating adolescent depression, and 2) six 30 minute sessions with principal investigator (MPF) and trained psychiatry residents participating “in this study as part of a 1-2 year clinical research elective” (Freeman et al., 2010, p. 41). Participants included 59 women aged 18-45 years, presenting DSM-IV-TR MDD symptoms, when pregnant or postpartum. “Descriptive statistics and general linear models (GLM) were used to assess the study outcomes” (Freeman et al., 2010, p. 41). Using GLM, HAM-D this study measured factors influencing symptomatic baseline scores, adherence to psychotherapy regime and depression scores at end of trial. The study also analyzed response and remission rates (Freeman et al., 2010). Fifty-two of the participants participated in one or more psychotherapy sessions. Thirty participants attended all six sessions. Findings suggest that omega-3 influenced neither adherence nor response; both groups showed a significant improvement in depression scores (Freeman et al., 2010). Findings were consistent with prior psychotherapy regime adherence research indicating that treatment adherence is positively affected by personal interaction and relationship with health care provider (Freeman, et al., 2010).

2.6.4 Combining therapeutic interventions with Traditional Psychotherapy

Practitioners of traditional psychotherapies also enrich therapeutic practices by combining intervention with complementary therapies. Field, a significant researcher in the field of prenatal care, has compiled a
collection of articles by health care professionals in her book Complementary and Alternative Therapies Research, published 2009 by American Psychological Association (APA). In her opening chapter; Combining Complementary Therapies with Psychotherapy, she discusses 1) combinations which have already been researched, 2) therapies which can be integrated without training, 3) and easily integrated therapies which can be learned through workshops. Researched combinations include: Mindfulness combined with Cognitive Behavioral Therapy (MCBT) and group interpersonal psychotherapy combined with massage therapy. Therapeutic interventions easily integrated which require no training include: music listening and aroma therapy. Therapies requiring training include: progressive muscle relaxation (PMR), imagery, hypnosis, biofeedback and meditation (Field, 2009). This thesis addressed only those combinations that have been explored in research studies relevant to stress, anxiety and depression; namely, mindfulness combined with CBT, (MCBT) group interpersonal psychotherapy combined with massage, imagery, hypnosis and music listening.

In patients experiencing recurring episodes of depression, dysfunctional thinking is a strong predictor. MCBT is a combination of cognitive-behavioral approaches and Kbat-Zinn’s mindfulness stress-reduction program geared to “increase [patient] awareness of dysfunctional thinking and thus lead to change in thinking style over time” (Field, 2009, p. 8) thus preventing future depressive episodes. MCBT efficacy in prevention of recurring episodes of depression caused by dysfunctional thought habits has been researched in two random control trials done by Teasedale and colleagues. Research data found relapse rates were “significantly reduced in the MCBT group with three or more previous episodes of depression” (Field, 2009, p. 8-9). In patients experiencing single episodes MDD, life stressors are typical predictors. Given that perinatal depression can be single episode in direct response to the life stressor, pregnancy and child bearing, present research suggests that MCBT may only be worthwhile for perinatal women with preexisting MDD. Field suggests more research is needed as “the studies to date have been conducted only by the developers of MCBT” (Field, 2009, p. 9)

Interpersonal psychotherapy is “a time limited form of psychotherapy that focuses specifically on interpersonal relationships” (Field, 2009, p. 9). The underlying assumption is that depression can be either aggravated or mitigated depending on the social network. (Field, 2009). Interpersonal psychotherapy was demonstrated effective in treating depression in a 1990 study done by Frank and colleagues. However, “some
women may not seek psychiatric treatment because of stigma or lack of knowledge” (Friedman, Kaplan, Rosenthal, & Console, 2010, p. 219)

The combined use of interpersonal psychotherapy and massage for women suffering prenatal depression was first researched by Spinelli and Endicot in 2003. Results showed a decrease in symptoms yet, may be inconclusive as massage alone has been observed to reduce depressive symptoms and decrease cortisol levels in prenatal women (Field, 2009). (massage addressed in previous paragraphs).

Based on literature, some researchers hypothesize that group interpersonal psychotherapy combined with massage may show significantly greater results than individual interpersonal psychotherapy and massage. A descriptive exploratory study designed to identify common concerns among women on hospitalized bed rest found that, when given an opportunity, women will come together and spontaneously provide mutual support. The group therapy sessions provided a “safe climate in which to talk; active listening; validation of feelings; and provision of support; encouragement; and information when indicated. (Maloni & Kutil, 2001)

Field pursued the curiosity by conducting a randomized controlled trial (RCT): both receiving one hour group interpersonal psychotherapy sessions once a week for 6 weeks with the intervention group receiving additional 20 minute massage therapy sessions once a week during the same six weeks. The report does not mention when massage therapy was received relative to scheduled group therapy sessions. Results indicated that massage group better adhered to psychotherapy regime and reported fewer incidences of lack of interest as obstruction to adherence (Field, 2009).

### 2.6.5 Relaxation Therapies

Music, guided imagery, and hypnosis in service of relaxation have all been utilized in the treatment of pregnant patients. (Schwartz, 2004). A longitudinal pilot study examined the effect of simply offering stress reduction instructions. The instructions were: *Eliminate things that are stressful and/or participate in things that increase your level of relaxation.* To measure cortisol levels, participants in the study were asked to collect saliva samples at home over a ten day period. 95% of the participants adhered to the protocol. Results indicate that
when women are given stress reduction instructions, they can successfully decrease perceived levels of stress and morning cortisol levels. The study notes failure of measures to demonstrate an ability to manage evening cortisol levels may be due to differences in gestational age (Urizar Jr., Milazzo, Le, Delucchi, Sotelo, & Munoz, 2003).

In 2011 the Cochrane Collaboration came out with a review of randomized controlled trials of mind body interventions during pregnancy for preventing or treating women's anxiety. The review states, although “mind-body interventions like yoga or hypnotherapy may be effective for reducing anxiety... their effectiveness for treatment or prevention of women's anxiety during pregnancy needs to be confirmed in clinical trials” (Marc, et al., 2011, p. 2) The study suggests that these intervention can teach women to self-induce “mental relaxation and alter negative thinking related to anxiety to change the perception of a stressful event” (Marc, et al., 2011, p. 2). The Cochrane review identified 10 categories of relaxation interventions: Autogenic training, biofeedback, hypnotherapy, imagery, meditation, prayer, relaxation therapy, autosuggestion, tai chi, and yoga. As several studies had a high risk of bias, studies lacking randomized controlled trials were excluded. Of the ten categories four met inclusion criteria; namely, yoga, autogenic training, hypnotherapy, and imagery. Maternal anxiety was assessed via self-report, observation, standardized scales, questionnaires, interviews or physiological measures. Studies included were published between 1979 and 2009 in 6 different countries (Marc, et al., 2011).

Findings from the Cochrane Review:

**Yoga**, “a practice of gentle exercises for breathing and mental control”, versus a control wait list generated no significant reduction in anxiety state (Marc, et al., 2011, p. 5).

**Autogenic training** is a mental technique of body awareness, relaxation and autosuggestion aimed at strengthening the capacity for self-healing and stress reduction. Review of available studies found no statistically significant difference from control group (Marc, et al., 2011).

**Hypnotherapy**, as defined by Ernst, (2006) is “the induction of a trancelike state to facilitate relaxation and make use of enhanced suggestibility to treat psychological and medical conditions that affect behavioral changes” (Marc, et al., 2011). A Cochrane review found only one study of hypnotherapy: Teixeira (2005) measures reported
no significant effect after one session of hypnotherapy. Measures of anxiety included the following physiological indicators: noradrenaline, adrenaline, and cortisol levels, and maternal heart rate.

Uman (2006) defines imagery as “cognitive techniques used to encourage a person to cope with the pain of distress of a given procedure by having him/her imagine a pleasant object or experience” (Marc, et al., 2011, p. 4). According to a study by Korol (1992), imagery used during prenatal classes was found to induce “borderline significant difference (P .06) in anxiety state during pregnancy when compared to non-imagery” (Marc, et al., 2011, p. 13). When compared to group progressive and passive relaxation, “imagery failed to significantly reduce the anxiety” (Marc, et al., 2011, p. 14).

2.7 Music and Music Therapy: A Clarification of Terms and Applications

Presently research literature lacks consistency of terms regarding the use of music for therapeutic purposes. Music listening is frequently referred to in nursing literature as music therapy. Music therapy, however, is a prescriptive intervention implemented by a board certified music therapist. A key aspect of the effectiveness of music therapy is the relationship that forms between patient and therapist within the therapeutic intervention. In the conversation which follows a shared musical experience, a board certified music therapist guides her patient to greater insight and mental health. It is “an interpersonal process in which music is used as a communicative medium by trained therapists to promote their clients’ health” (Lin, et al., 2011).

On its website the American Music Therapy Association (AMTA) defines music therapy 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”. The AMTA elaborates on this definition by first itemizing categories of goals: “physical, emotional, cognitive, and social needs of individuals”. Secondly it describes the kinds of music experiences used in interventions: “creating, singing, moving to, and/or listening to music”. It then states how music therapy is uniquely effective: “through musical involvement in the therapeutic context, clients’ abilities are strengthened and transferred to other areas of their lives. Music therapy
also provides avenues for communication that can be helpful to those who find it difficult to express themselves in words. Research in music therapy supports its effectiveness in many areas such as: overall physical rehabilitation and facilitating movement, increasing people's motivation to become engaged in their treatment, providing emotional support for clients and their families, and providing an outlet for expression of feelings (http://www.musictherapy.org/about/musictherapy/).

This thesis utilizes the distinction between the two interventions. It is not the intent of this paper to dismiss music listening as a valid therapeutic tool. Listening to preferred music has been widely accepted among music therapists as a powerful means of managing emotion, mood state and physiological state. Mei-Yueh Chang, Chung-Hey Chen and Kuo-Feng Huang (2008) review the field's agreement on the phenomenon in the following statements:

By neutralizing negative emotions, music elevates the stress threshold, harmonizes inner processes, helps patients attain an advanced state of relaxation and reduces stressful situations (Hoffman 1997, Field 1998, Sidorenko 2000). In addition to altering mood, music stimulates the imagination, and autonomic responses at the thalamic level, where feelings and emotions are transmitted to the cerebral hemisphere (Watkins 1997). Furthermore it is believed that music influences the brain network that determines emotional experience via the limbic system. The aesthetic pleasure received by the right brain can release endorphins from the pituitary gland, thereby decreasing the concentration of adrenocorticotrophic hormone in the blood (Kaminski and Hall 1996, Sidorenko, 2000). Music changes the interaction of the thalamus and the reticular activating system (RAS) and affects emotions, body musculature and autonomic functions such as blood pressure, heart rate and respiration rate...music induces relaxation and decreases anxiety, stress and depression in women during their pregnancies. (Mei-Yueh Chang et al., 2008, p. 2581)
Given the above, explorations in the use of music listening as a useful tool for perinatal women should continue. It is however, suggested that researchers begin to take note of the distinction between therapeutic music listening and music therapy.

2.7.1 Effects of Listening to Recorded Music in the General Population

A Harvard review of music’s effect on the brain demonstrates that the effect of music listening on neurologic systems has been well researched. (Lin, et al., 2011) In a randomized controlled clinical trial designed to compare positive effects of traditional psychotherapy compared to music listening therapy on depressive symptoms, 79 patients from a clinical hospital belonging to the Institute of Social Security and Services for Government employees in Oaxaca, Mexico, ages 25-60 years and suffering low to medium degrees of depression received either music listening therapy of classical and baroque music for 50 minutes a day over the course of 8 weeks or, psychotherapy for same time period. Initial participant selection was based on the Zung Self-Rated Depression scale (ZSRS). The Beck Depression Inventory (BDI) was used to assess participants during the trial. Final evaluations were conducted using the Hamilton Depression Scale (HDS) (Castillo-Perez, Gomez-Perez, Velasco, Perez-Campos, Mayoral, 2010). Participants were voluntary and were suffering only low to medium levels of depression according to an expert psychologist with more than 10 years practice experience, were not on any drug therapy treatment plan and were not suffering any other pathologies or problems which would complicate study. Findings indicate that the music listening therapy group (n=41) showed improvement by the fourth session: upon conclusion of the study, 29 participants showed improvement, 4 showed lack of improvement, and 8 dropped out. Upon conclusion of study, the psychotherapy control group demonstrated improvement in 12 participants, 16 lacked improvement and 10 dropped out of study. In comparison with a statistically significant p-value of 0.0356, music listening proved more effective than traditional psychotherapy therapy (Castillo-Perez et al. 2010). Authors concluded that music stimuli could positively affect depression when integrated with other therapies. The study recognized small sample size was a limitation of study and although authors did not indicate specifically which
other forms of therapy would be best complemented by music listening therapy, they did mention in conjunction that some patients do not respond to drug therapies.

2.7.2 Effects of Listening to Recorded Music on Stress and Anxiety during Pregnancy

In her book, *Complementary and Alternative Therapies Research* (2009), Field highlights the significance of patient preference when prescribing music listening. In her 1998 study she observed that listening to Michael Jackson shifted electroencephalogram (EEG) patterns in depressed adolescent mothers “from the typical patterns of depressed individuals (greater right frontal EEG activation to greater left frontal EEG activation)” (Field, 2009, p. 11) except in those who did not like that particular music. Music preference is addressed in much of the research literature available on therapeutic music listening. What has yet to be researched, to this author’s knowledge, is the difference between the shift in EEG patterns when patients are engaged in a music making experience versus the shift in EEG patterns when a patient is passively receiving music through listening. This curiosity could inspire others to explore the link between music therapy theory and movement therapy theory.

A 2008 randomized experimental study conducted by Chang, Chen and Huang measured effects of music listening therapy on stress, anxiety and depression in 236 pregnant Taiwanese women. Participants were either assigned to music listening therapy (n=116) or control group (n=120). “The music therapy group received two weeks of music intervention. The control group received only general prenatal care” (Chang et al., 2008). Patients included were over 18 years of age, expected to have uncomplicated vaginal deliveries, and were at gestational ages between 18-34 weeks. Psychological health was measured using Perceived Stress Scale (PSS) to measure “perception of decreased control or the ability to cope with life events” (Chang et al., 2008, p. 2582), the State Scale of the State-Trait Anxiety Inventory (S-STAI) to measure “the level of anxiety experienced by participants” (Chang et al., 2008), and the EPDS to measure severity of symptoms. Data for self-reported evaluations were collected before and after intervention. Music listening was offered via 30 minute CDs of varying styles of music: 1) classical, 2) lullaby, 3) nature sounds and 4) crystal music performances of Chinese children’s rhymes and songs (Chang et al., 2008). Participants were asked to listen to one CD a day at any time of day and to continue for two weeks and
to keep a journal noting music selection and any activity during music listening. Findings indicate that after the two week trial, scores were significantly different on all three tests: PSS, S-STAI, and EPDS: “(p < .001, p=.01 and p,.001 respectively) (Chang et al., 2008, p. 2584). Analysis of music journals indicated a preference for lullabies, then nature sounds, crystal and finally classical music. Music listening took place while resting, before sleep or while doing chores (Chang et al., 2008). The authors conclude that in this study, therapeutic music listening reduced stress, anxiety and depression scores in the short term. Authors also indicated that rest may have caused the change in scores and recommended further study controlling for that variable.

In 2009, Min Yang and colleagues conducted a randomized controlled trial with 129 participants from a hospital in Changsha city, China, which did control for the variable of rest. This study sought out effects of music listening therapy on anxiety for prenatal women on bed-rest. The study included women with diagnosis of threatened preterm birth, at gestational ages between 28 and 36 weeks who had been hospitalized for 48 hours or more, with a single healthy fetus. Women in the intervention group were brought to a private room to receive 30 minutes of music listening a day over course of 3 consecutive days. Women in the control group were brought to a private room to receive 30 minutes of relaxation a day over course of 3 consecutive days. Music chosen for intervention group had tempos of 60 – 72 beats per minute, consisted of low to moderate pitch levels and “harmonious melody” (Yang et al., 2009 p. 319). Both groups were asked to empty their bladders before music or relaxation intervention. The instrument measures included PHILIPS fetal heart rate monitor and ECG to measure patient heart rate, respiratory rate and blood pressure. The S-STAI was used to measure anxiety levels. Improvements in intervention group after third day were higher and statistically significant in all measures. "Additionally, all of the between group differences for pre- and post-intervention measures were statistically significant (p< or = 0.01)” (Yang et al., 2009, p. 320). The authors concluded that, when controlling for rest, music is still effective in reducing anxiety levels in women on bed-rest due to high risk pregnancy.

A 1991 randomized controlled trial of 29 participants examined the effect of combined music listening and progressive muscle relaxation (PMR) training to treat anxiety in third trimester pregnant teens. The experimental group size was 19 and received combined music listening assisted PMR intervention. The control group of 20 received PMR alone. Accounting for the difference between subjects and participant numbers is the fact that only
participants who had received ten weekly sessions of 15-20 minutes were included in the results. “All subjects in the study were administered the Spielberger State Anxiety Inventory at the beginning of the seventh, eighth and ninth months of pregnancy. The statistical design employed in the study was a repeated-measures factorial design comparing the trait and the state anxiety scores between the experiment group and the control group. The repeated measures ANOVA revealed a statistically significant main effect difference between the two groups on the trait anxiety scores [and] a statistically significant main effect difference between the groups with regard to state anxiety (p<.01)

The authors go on to say that an effort was made to “make all of the subjects in the study feel special about their participation. However...those subjects in the experimental group felt they were getting something extra in the way of time spent with the therapist” (Liebman S. S., 1991, p. 96). The authors suggest that the therapeutic alliance may have skewed the results in favor of the combined intervention. According to the authors, another factor that may have polluted the results was that each of the girls in the experimental group took it upon her self to document each session done alone at home and turn it in as homework. It is possible that the repetition of the practice may have contributed to the greater impact of the music assisted relaxation on anxiety levels in the experiment group (Liebman & MacLaren, 1991).

Using biofeedback measures, a 1997 comparative study “employed an experimental Latin rectangle design to systematically alternate the order of music presented with a convenience sample of 36 lamaze-trained primiparous women in the third trimester of pregnancy” (Wiand, 1997, p. 4). The study measured differences in achieved relaxation between progressive relaxation (PR) alone and PR combined with listening to Baroque, New Age music and ocean sounds. “Relaxation patterns of 36 Lamaze-trained primigravidas” were measured using “a Self-Regulation System (SRS) Professional Series Nexus 1.15 biofeedback instrument ... which permitted simultaneous recording of two electromyography (EMG) sites, skin conductance level (SCL) and skin temperature (TEMP)” (Wiand, 1997, p. 5). Five minute baseline measures were taken prior to intervention. It was hypothesized that PR combined with music and ocean sound listening would induce greater relaxation the PR alone. No conclusive evidence indicated a difference between music and ocean sounds. Statistical significance in favor of combined therapy was achieved in measures of EMG and SCL but not for TEMP. Results cannot be
generalized due to small convenience sample and a lack of standardization of biofeedback instruments (Wiand, 1997).

Medical Resonance Therapy (MRT) is a body relaxation technique. MRT music compositions are informed by ancient Greek music theory and philosophy and derived from Pythagorus’ concept of music as medicine. Using laws of music harmony, it is theorized that a certain organization of sound “neutralizes negative disharmonious effects and raises the threshold for stress reaction and...harmonises inner processes” (Sidorenko, 2000, p. 200). According to research, MRT “influences cortical dynamics and through it subcortical and vegetative areas of the nervous system. Such influence causes an integration and synchronization of different activity systems of the human body, strengthens psycho-physiological defense and improves health condition” (Sidorenko, 2000, p. 200). Contemporary classical composer and musicologist, Peter Heubner wrote and recorded music according to these ancient theories for the purpose of supporting “harmonious inner processes” (Sidorenko, 2000, p. 199).

Over a period of five years in various Minsk hospitals, Sidorenko and colleagues have researched the uses and effectiveness of MRT in various medical settings. 140 of these patients were women with high-risk pregnancies (Sidorenko, 2000). The controlled trial measured MRT effect on maternal arterial pressure and variability and acceleration of heart rate in fetus. It also measured hormone levels of cortisol, estradiol and progesterone. Further measures included the Spilberger scale for anxiety and the Minnesota Multiphasic Personality Inventory (MMPI). The threshold for pain was observed in relation to pain killer usage. The experimental group received MRT in addition to traditional medical interventions. The control group received only traditional medical interventions. Findings indicate that MRT can significantly reduce anxiety and normalize arterial pressure. It was most effective for pregnant women with high arterial pressure. Stress hormone levels dropped 36% in the experimental group versus 18% in the control group. Progesterone levels increased 100% in MRT group versus 27% in control. Differences in estradiol measures were insignificant (Sidorenko, 2000). In the psychological measures, 85% of MRT group demonstrated significant improvements in MMPI scales. Control group demonstrated only 10% improvement. Maternal sleep and fetal heart rate normalized for those in the experimental group. “Signs of threatening premature labor disappeared completely in 96 percent of pregnant
women of the experimental group ... versus 72 percent in the controls treated with the conventional methods only” (Sidorenko, 2000, p. 206).

2.7.3 Listening to Live Music to Reduce Prenatal Stress and Anxiety

A 2001 study on prenatal music therapy projected that “the greatest benefit to the babies in utero will be derived from live music” (Frederico & Whitwell, 2001, p. 85). This science behind this intuition was briefly described by nursing researchers: “live music...establishes a flow of energy and vibrations from the source of the music to the listener [which is] conveyed both verbally and non-verbally through the electromagnetic field that permeates and surrounds each person” (Olson, 1998, p. 570). To this day, research on the therapeutic effects of live music listening during pregnancy is at best sparse. In her review of music therapy in obstetrics (1990), Cathy McKinney states that the “application of music therapy to pregnancy reported in the literature includes music enhanced relaxation, sing-alongs of lullabies and children's songs, music supported imagery and GIM” (p. 60). Since that publication, further examination of these and other applications have been reported.

There are available studies which examine the effect of live music listening on stress and anxiety in a variety of medical and hospital settings. Although these studies do not focus on pregnant women, it is reasonable to report on these findings here as many pregnant women with complications due to stress and anxiety will find themselves in the hospital for brief or extended terms.

2.7.3a Effects of Listening to Live Music on the General Population

In a review of the literature, live music tended to lower anxiety, positively affect perception of hospital stay, increase relaxation, and lower stress for patients requiring hospitalization and intrusive medical procedures. Live music also significantly improved quality of life measures hospice patients. An increase in pain thresholds and a decreased use of pain medications due to a decrease in patient perception of pain were also observed after live therapeutic music intervention. Studies included adult and pediatric populations (Walworth, Rumana, Nguyen, & Jarred, 2008).
A randomized study of live music intervention effect on anxiety in patients undergoing chemotherapy found that 20 minutes of therapeutic live music listening consistently reduced anxiety, fear, and fatigue measures as well as diastolic blood pressure readings. Patient reports also indicate greater levels of relaxation (Ferrer, 2007). Live classical piano performed by a surgeon for patients undergoing ophthalmic surgery was evidenced to statistically and significantly decrease mean patient arterial blood pressure, heart and respiratory rate (Camara, Ruszkowski, & Worak, 2008).

One review of the literature on live music intervention in medical settings states that, “positive patient outcomes can result from therapeutic music intervention via a variety of means - taped or live ... and through either a single experience or a repeated exposure” (Sand-Jeklin & Emerson, 2010). A second review of music interventions in preoperative medical settings found that “all 11 studies concluded that patients receiving a music intervention had decreased levels of anxiety, which was evidenced by statistically significant reductions in STAI scores” (Pittman & Kridli, 2011, p. 160). This study concluded; however, that evidence regarding music's effectiveness in lowering blood pressure, heart rate and respiration in anxious ... pre-operative patients was still inconclusive (Pittman & Kridli, 2011). Evidential differences between live and recorded music listening is inconclusive. As “both live and recorded music effectively reduce pre-operative anxiety ... increased mood states of hospitalized adult patients and according to a meta-analysis of 12 randomized controlled studies, decreased anxiety in adult hospitalized patients” (Walworth, Rumana, Nguyen, & Jarred, 2008, p. 351).

2.7.3b Effects of Listening to Live Music on the Prenatal Population

In 2010 researchers assessed a need to investigate a successful 7 year old music therapy program at West Virginia University Hospital. They used a quasi-experimental methodology with a pre and post intervention design. The population was a convenience sample with unplanned emergent admittance to West Virginia University Hospital. Rationale for the study was a recognition that “live therapeutic music interventions with hospitalized patients [are] less commonly investigated” and that extant studies “have not incorporated randomization or control groups” (Sand-Jeklin & Emerson, 2010, p. 9). The suggested reason is that
“circumstances surrounding the intervention are less controlled with the presence of a music practitioner, and it is impossible to blind either staff or patients to the treatment” (Sand-Jeklin & Emerson, 2010, p. 9).

The music therapy examined in this study was delivered in two different ways: 1) as live environmental music in open spaces with the intent of “impacting a number of patients, families and staff simultaneously” (Sand-Jeklin & Emerson, 2010, p. 9) and 2) in individual sessions with patient or family members according to physician or nurse referral (Sand-Jeklin & Emerson, 2010). The researchers hypothesized that: 1) patient subjective experience of pain and anxiety would decrease after the therapeutic intervention; 2) heart rate, pulse and blood pressure would decrease post intervention and; 3) patients would view the music experience as improving their hospital experience. Measures used included a numeric rating scale for anxiety (NRS). Pulse respiration and blood pressure were monitored on electronic device pre and post intervention. A Likert scale was used to determine patient likeliness to recommend music therapy to others. Finally, participants were asked to write in their own words how the music therapy affected their hospital experience. According to researchers, the exploratory study successfully demonstrated the positive impact of live music therapy in patient experience of pain, anxiety and muscle tension in patients admitted for emergent medical conditions.

### 2.7.4 Music Therapy Uses of Recorded Music to Treat Stress and Anxiety during Pregnancy

Although music therapy is usually considered a live music making experience, there are models which make use of recorded music: song and lyric analysis and Guided Imagery and Music. In her 1990 review of music therapy in obstetrics, Cathy McKinney states that the “application of music therapy to pregnancy reported in the literature includes music enhanced relaxation ... and music supported imagery and GIM” (1990, p. 60). Since that publication, further examination of these and other applications have been reported.

Guided Imagery and Music (GIM) is a “method of self-exploration that involves listening to specifically designed sequences of classical music to allow spontaneous images to come to conscious awareness and sharing the experience with a therapist” (McKinney, Antoni, Kumar, Tims, & McCabe, 1997, p. 392). This form of music
psychotherapy can be a relaxing experience. It also has the potential to generate discomfort. (McKinney, Antoni, Kumar, Tims, & McCabe, 1997). Presently there is only one known case study (Short, 1993) that discussed the effects of GIM therapy on prenatal stress and anxiety. Given that sample size was one, the results are inconclusive. There does exist; however, a randomized control trial which measures the effects of the Bonny Method of GIM on mood and cortisol levels in healthy adults. The study asserts that healthy individuals “may carry emotionally laden burdens emanating from stressful life events; and, disclosure of such burdens may have positive implications for psychological well-being” (McKinney, Antoni, Kumar, Tims, & McCabe, 1997, p. 390). Given that perinatal mood disturbance most commonly manifests as a single episode in direct response to the physical strain and emotional stress of pregnancy and child bearing (Field, 2009) it seems this research can inform this review. Measures included the Marlowe-Crowne Social Desirability Scale (MCSDS) and the Creative Imagination Scale (CIS). Results showed that experiment group and control “showed …an absence of between group differences at each measurement point … [and] no significant between-group differences at pretest on any mood measure, ps>.10” (McKinney, Antoni, Kumar, Tims, & McCabe, 1997, pp. 393-394). Effect on cortisol measures indicated a significant change across time in the experimental group. Levels also remained significantly lower seven weeks after conclusion of intervention. No significant changes were found in the control group cortisol levels. Changes in cortisol levels were strongly associated with changes in all three mood measures. This study examined the effects of the Bonny Method of Guided Imagery and Music (BMGIM). Previous studies examining the effects of listening to recorded music with relaxation and imagery suggestions do not report changes in measures of stress levels in healthy individuals (McKinney, Antoni, Kumar, Tims, & McCabe, 1997). The study did not include disclaimers of conflict or bias.

2.7.5 Music Therapy Uses of Active Participatory Music Making to Treat Stress and Anxiety during Pregnancy

In her 1990 review of music therapy in obstetrics, Cathy McKinney states that the “application of music therapy to pregnancy reported in the literature includes music enhanced relaxation, sing-alongs of lullabies and children’s songs” (1990, p. 60). Since that publication, further examination of these and other applications have been researched.
In 2010, a lullaby program at a community music school in Cleveland, Ohio examined singing during pregnancy. The program was “transferred to a perinatal mental health program at a community mental health facility” (Friedman, Kaplan, Rosenthal, & Console, 2010). Goals were to enhance self-expression, coping, and relaxation for pregnant women with depression, bipolar disorder, or psychosis. The program emerged in response to a “dearth of community services for women suffering mental illness during pregnancy” (Friedman, Kaplan, Rosenthal, & Console, 2010, p. 221). The program was successful and expanded to several area social service agencies. Professional health care teams were comprised of psychiatrists, nurses, case managers, counselors and music therapists. Program participants suffered from a variety of illness. The most common were pregnancy related social stressors, anxiety and depression. The hour long weekly therapy group was designed to increase client awareness of their own feelings and that of their soon to be infant. A music therapist used the lullaby to achieve this (Friedman, Kaplan, Rosenthal, & Console, 2010). In sessions, mothers participated by playing an instrument, singing or humming. They were encouraged to breathe, reflect and talk or physically move to the music. Interventions include: music assisted relaxation, music listening (live and recorded), lyric analysis and interpretation, choosing songs, playing instruments, writing songs, personalizing pre-existing songs and planning recordings (Friedman, Kaplan, Rosenthal, & Console, 2010).

Observations of the program are encouraging but inconclusive. Ratings on the Rogers Face Scale improved in short and long term. Attendance was inconsistent. The report does note that pregnant teen attendance was more consistent. Sixty-five percent of teens said they would continue singing at home. Eighty-four percent of teens reported feeling less anxious. Although the program success was indicated by quick reproduction of the same program at nearby facilities, a systematic analysis of the effectiveness of the therapy remains to be done. Findings suggest that complementary music therapy for pregnant women with mental illness deserves further investigation.

“When pregnant women of the Village of Vilamarxant, Spain, began singing for two hours a week they discovered a cascade of psychological benefits” (Montemurro, 1996, p. 9). Singing when pregnant is not a new idea. “The idea has both ancient roots and modern promoters” (Montemurro, 1996, p. 9). Midwife, Montemurro
attempts in her research to support these claims by framing her observations “within the context of modern understandings of healthy pregnancy, fetus development and bonding” (Montemurro, 1996, p. 10).

She notes that singing requires deep, rhythmic breathing and concludes that singing is a “good way to express our most intimate and profound feelings, liberating us from tension, and lightening our spirits” (Montemurro, 1996, p. 12). Relaxation research has demonstrated that deep breathing reduces the experience of stress and anxiety. (Janke, 1999) (McKinney, Antoni, Kumar, Tims, & McCabe, 1997) In further observations she notes the positive physical effects of singing: it can serve as a sedative, energizer, and induce an altered state. As inducing an altered state is a technique used by psychotherapists to gain access to unconscious material, it is possible that her conclusion may be well founded.

Montemurro and her colleague Dr. Michael Odent hypothesized that group singing would put women at ease and open them to emotional attachment with the clinic and other women. They hypothesized a woman’s need for greater intimacy during pregnancy stating; “most expectant mothers need much more social and emotional support than is available through a monthly meeting with an obstetrician. Pregnant women have a need for assembling, for linking themselves together, for sharing common anxieties, fantasies, questions, fears, problems and solutions” (Montemurro, 1996, p. 11). Although this report does not provide evidence for this claim, a more discriminating inquiry into the needs of at-risk pregnant women hospitalized and on bed-rest did report social connection to be of therapeutic support. (Richter, Parkes, & Chaw-Kant, 2007). Further research is required to generalize this claim to all pregnant women.

Although this report is qualitative in nature and small in scope, the vignettes are intriguing. Two cases in particular merit mention. Two of the participants were considered high-risk pregnancies due to advanced age, previously lost pregnancies, hypertension and potential for breech delivery. Both were scheduled for cesarean section delivery. Both were regular participants in the program. Both went into labor spontaneously at term without complications. Montemurro’s intuition may be reliable but, further studies are needed.

A Master thesis provided by Ming-Chen Lu (2002) purposed to design a fetus-directed singing therapy method for hospitalized pregnant women on bed-rest. The intent was to improve maternal mood state, increase
self-esteem, return locus of control to the patient, provide for peak experience and improve attachment. The study included 4 subjects primarily from the inner city with low socio-economic status and implemented a phenomenological interview design. Each participant received three sessions with follow up interviews. Results are based on self-reports. Sessions were designed to encourage relaxation. Subjects were encouraged to take deep breaths, sing, and rub their bellies. Subjects were asked to choose a favorite lullaby to sing. The music therapist supported musical expression with live guitar accompaniment and her own singing. Therapeutic conversations were humanistic in approach. Follow up, open-ended interviews were conducted by an outside party. All subjects reported the experience to be calming and relaxing to the self and fetus as well as promoting positive affect and thought. The researcher suggested further investigation into a group music therapy experience. She wondered if the opportunity to participate in group therapy with other women going through similar challenges would have increased benefits of therapy (Lu, 2002).

2.7.6 Music Psychotherapy

In addition to listening to music, most music therapy experiences invite the patient to actively participate in the music making process. Winslow, a music therapy researcher, observed that psychosocial factors regarding a woman's resistance to the role of mother lead to complications in pregnancy and prolonged labors. The authors believe their “findings indicate that this denial of anxiety may be correlated with inhibition of the physiological processes involved in childbirth. Helping such women during pregnancy to communicate anxiety may reduce the incidence of prolonged labor” (Winslow, 1986)

Winslow developed a procedure aimed at encouraging participation and relaxation. Individual 20-30 minute sessions were offered three or four times a week. Mothers were encouraged to speak to their infant in utero. Sessions began with progressive muscle relaxation and deep breathing. Guided imagery was then initiated. Patients also participated in weekly sing-alongs of lullabies and children’s songs. The music therapist then guided the group through verbal processing. As “many hospitalized patients feel as though they have no control” (Winslow, 1986, p. 33) patients were given a degree of control over the direction and design of the therapy
sessions. The therapist was also mindful of the importance of the therapeutic relationship. Overall the program was assessed to have decreased anxiety levels. It encourages further research into music therapy as standardized treatment in obstetric and gynecological patients. Winslow posited that music psychotherapy during pregnancy can resolve unconscious conflicts of identity and support a healthier pregnancy and delivery (Winslow, 1986).

A 1993 case study by Short, a music therapy researcher, examined music psychotherapy during pregnancy. In it Short (1993) suggests that pregnancy, socially advertised as the most joyous moment in a women's life, is actually a developmental crisis: that increased physical and emotional strains can exacerbate pre-existing unconscious material. Using Guided Imagery and Music (GIM), Short attempted to induce better emotional health in pregnant women particularly in relation to grief over previously lost pregnancies. Her case study was a continuation of earlier work by Lindquist (1985, as cited in McKinney, 1990). There were only three cases in this study. Results for all three patients were encouraging, yet due to small sample size the study is inconclusive.

### 2.7.7 Hospital Based Obstetrical Group Music Therapy

In 2001 a small regional hospital in Nova Scotia piloted a music therapy program for hospitalized pregnant women identified as high-risk. Referrals came from medical professionals and other clients. Initial assessments were used to identify client music preference and design an appropriate music therapy intervention (Bruce, 2004). For patients “experiencing persistent anxiety due to prenatal complications, concerns about the health of the baby, previous infant loss, or significant anxiety about the delivery, weekly or bi-weekly sessions were scheduled” (Bruce, 2004, p. 4). Otherwise, patients participated in a minimum of four sessions. “Music therapy sessions included the use of music assisted progressive music relaxation, deep diaphragmatic breathing, imagery and focused listening” (Bruce, 2004, p. 4). According to the researchers, the data collected from the nursing staff was not sufficient for assessing effectiveness of treatment. However, client satisfaction survey findings indicated that the therapy successfully reduced stress and supported relaxation. The program was assessed to be successful by clients and medical professionals alike and was extended to all pregnant women planning to deliver at that
hospital. Although more rigorous studies are needed, this pilot program suggests that hospital based music therapy for high-risk pregnant women could be useful.

In 2001 music therapist Frederico and colleagues noted that “music therapy is beginning to emerge as another discipline that offers assistance to pregnant women” (Frederico & Whitwell, 2001) and ventured to describe the procedures and techniques they had been developing. Citing work done by Montemurro and Dr. Odent, it posits that music therapy during pregnancy supports maternal involvement in the three major elements of the perinatal phase: physical, psychological and emotional states. They go on to suggest that music therapy during pregnancy be referred to as psycho-prophylactic music therapy as it serves two functions: creating an experience of pleasure and having therapeutic effects. In response to this belief, researchers created a technique called relaxation through music (RTM). The technique includes guided imagery with music. The therapist invites pregnant women to focus on pregnancy fantasies and concerns. The expectation is that endorphin levels will increase thus lowering anxiety and stress. The report does not test the effectiveness of the practice. It assumes a “hypersensitivity and vulnerability of pregnant women [that] can be relieved in a group setting” (Frederico & Whitwell, 2001, p. 304). The value of a group experience being found in the support provided by the exchange of pregnancy stories (Frederico & Whitwell, 2001). Although the report offers no grounding evidence, it concludes that “in general, we have found that music therapy during pregnancy guides future mothers to connect and bond with their babies ... this bond is ... strengthened by using the effect of music engaged with therapeutic activities within a group context” (Frederico & Whitwell, 2001, p. 299).

2.7.8 Hospital Based Obstetrical Individual Music Therapy

In a randomized, single-blinded control trial comparing recreation therapy and music therapy for alleviation of distress during high-risk antepartum hospitalization (n=80), researchers found, using paired t-tests, that single session 1 hour interventions of music therapy significantly decreased prenatal distress from baseline
scores immediately following intervention and 48-72 hours later. Music therapy interventions consisted of, “music-facilitated relaxation, active music listening, song writing, music for bonding, and clinical improvisation” (Bauer, Victorson, Rosenbloom, Barocas, & Silver, 2010, p. 524). The majority of clients chose music assisted relaxation. The control group received reciprocal visits from the same music therapist during which time the therapist read from a script reviewing the nature of the study and the directions for completing the Antepartum Bedrest Emotional Impact Inventory (ABEII).

Distress was measured with the ABEII. Measurements were taken pre, post and 48-72 hours post intervention. The ABEII was developed by the authors specifically for this trial as there was no prior tool for measuring distress of this unique population. Several related and validated measures were taken into consideration and drawn from in the creation of this new measure; namely, the Antepartum Hospital Stressors Inventory, the Hospital Anxiety and Depression Scale (HADS), Perceived Stress Scale, Stait- Trait Anxiety Inventory for Adults (STAI) and the Edinburgh Postnatal Depression Scale. The result is 3-4 minute, 18 point yes/no questionnaire with higher scores indicating higher distress levels. The authors simultaneously recognized that the ABEII was not sufficiently validated but express confidence in the tool.

The authors also recognized the following limitations of the study: the new assessment tool, patients who consented to participate may have been more motivated thus creating bias, increased contact with an attentive caring therapist in experiment groups may have positively influenced distress measures beyond influence of the actual therapy intervention. Researchers attempted to minimize this effect by using the attention-control group.

The study concluded that music therapies “have demonstrated preliminary acceptability and effectiveness in decreasing antepartum-related distress among this population” (Bauer, Victorson, Rosenbloom, Barocas, & Silver, 2010, p. 529). Future recommendations include collection of additional physiological measures and a further refining of the ABEII tool. The study goes on to say, “Given the high number of high-risk pregnant women being placed on bedrest and the association between antepartum distress and adverse pregnancy events … antepartum units would do well to initiate and support music therapy programs in the context of providing comprehensive medical and psychosocial care” (Bauer, Victorson, Rosenbloom, Barocas, & Silver, 2010, p. 529).
2.7.9 A Brief Discussion of Music Therapy Research

In summary, music therapy has demonstrated to be an effective tool in mitigating stress and anxiety during pregnancy. It has been reported effective in personal report, standardized state and trait measures and through physiological measures. What is holding music therapy back from emerging with force into prenatal care is actually two of its strengths: flexibility and diversity. Music therapy is a remarkably diverse intervention. It has a variety of applications; and, manifestations of those applications are as unique as are the individual music therapists employing them. Even within single sessions music therapists adjust and adapt interventions for the specific needs of the individual client in that moment. Thus, music therapy as an independent variable can be illusive. It is not a pill rather a human response altered by innumerable variables.

Because of this flexibility and diversity, research thus far into prenatal care gives the impression of being scattered and unfocused seemingly relying on the interests and opportunities of individual researchers as guide. Consider that the prenatal music therapy articles reviewed in this thesis represent a wide variety of music therapy applications across a variety of specific populations within the pregnant population. The spectrum of examined interventions include recorded and live music interventions, music assisted relaxation, music psychotherapy, GIM, receptive and participatory interventions, short term interventions, long term interventions, fetus-directed interventions, group music therapy, individual and therapy etc. Add to that the diversity of populations researched within the pregnant population; namely, hospitalized women on bed-rest, non-hospitalized patients, teens, high-risk and no-risk pregnancies not to mention the variety of countries represented which only further confounds the issue by adding the dimension of multicultural considerations. Given these factors, it is easy to understand the seeming lack of focus thus far.

The assembled literature does clearly come to a consensus on two things: 1) music therapists are interested in researching and applying music therapy interventions during pregnancy; and 2) music therapy professionals are confident in the importance, power and effectiveness of music therapy for prenatal care.
CHAPTER 3: METHODOLOGY

3.1 Design

In this literature based study, the systematic categorization approach was employed, using literature published in peer review journals. This includes a review of previous and historical uses of the methodology in question and a listing of present applications of the methodology being used among several health care practitioners.

3.2 Participants

There were no human participants used in this study.

3.3 Investigational Methods and Procedures

PsychInfo and MedLine were the two primary databases used for this literature based study. Journals from the creative arts therapies, nursing, psychology, psychiatry, neurosciences, and medicine were briefly perused. For reliability, all of the included articles related to therapeutic music and music therapy came from peer-review journals. A few book chapters were used when looking at alternative and integrative practices, and to glean greater understandings of the NICU environment as it relates to infant development. Data was managed using the Garrard Matrix method (Garrard, 1999). Based on data discovered, an outline for an approach to music therapy during pregnancy was formulated.

3.4 Data Analysis
The data analysis employed the use of the Garrard Matrix method in order to better visualize extant literature as it progresses from simple music listening to more specific applications of a variety of music therapy theories and models. Seventeen of the articles included in this review specifically examined the use and efficacy of music based interventions for pregnant women. Of the seventeen, two were reviews dating from 1990 and 1998. Of the remaining fourteen, ten examined the therapeutic effect of music listening during pregnancy, two examined the effect of guided imagery and music (GIM) during pregnancy and six examined music therapy during pregnancy. The discrepancy in totals of is due to the fact that three articles examined both the therapeutic effects of music listening and clinical therapy.

Of the seventeen, three articles were randomized control trials. Two of these RCTs were strictly assessing therapeutic effects of listening to recorded music. Together, these two studies represent participant numbers totaling 361. One compared the effects of both music listening and clinical group music therapy; participant total was 80. There were two controlled trials. The first assessed recorded music assisted relaxation. The second assessed Medical Resonance Therapy which also uses recorded music composed in accordance with Pythagorean music theory, an ancient Greek theory that believed in mathematical balance, as observed in planetary alliance, as the key to music and beauty. There was also one comparative study on music assisted relaxation. Participant numbers in the comparative study totaled 36. The remaining studies were comprised of one case study with one participant, two studies presenting a development of a model (one of which included four case vignettes), two papers from conferences; one on music assisted relaxation and the other on GIM. Two were reports on pilot programs. One was a phenomenological study on the experience of singing during pregnancy.

Noteworthy is the fact that the most widely researched use of music based interventions in the literature in terms of the number of articles available (8) is that of music listening assisted relaxation. Total number of participants was 156. Participant numbers ranged from 1 to 80 with a mean of 34. However, the most widely researched use of music based interventions during pregnancy in terms of participants was music listening: two studies totaling 361 participants. Only six articles examined music therapy with active participation in the music making process during pregnancy. Ten studies examined passive listening to recorded music, two examined active imagery music experiences and five examined active participant music therapy.
Articles cited in this thesis which are directly linked to the proposed music therapy approach during pregnancy include: Bauer, 2010; Bruce, 2004; Chang et al., 2008; Friedman et al., 2010, Lu, 2002; Maloni, 2001; McKinney, 1997; Montemurro, 1996; Richter et al., 2007; Short, 1993; and Yang et al., 2009.

3.5 Operational Definitions of Terms

- **Stress**: “the state in which a pregnant woman may perceive that her well-being is endangered” (Chang, Chen, & Huang, 2008, pp. 2580-2581).
- **Anxiety**: “a manifestation of the stress response” (Chang, Chen, & Huang, 2008, p. 2581).
- **Depression**: “a common mental disorder which presents with depressed mood, loss of interest or pleasure, feelings of guilt or low self worth, disturbed sleep or appetite, low energy and poor concentration” (Chang, Chen, & Huang, 2008, p. 2581).
- **Prenatal**: the period during pregnancy and before labor and delivery
- **Antenatal period**: synonymous to prenatal period
- **Perinatal**: the period of time encompassing pregnancy, labor and delivery
- **Postpartum**: a four – six week period following labor
- **Bed-rest**: a generalized medical prescription for a decrease in activity during pregnancy: Ranges from a decrease in work hours to strict hospitalized bed rest
- **Fetus**: an unborn infant in the womb
- **Neo-natal**: term for an infant during the first four weeks of life
- **Prematurity**: displacement of fetus from womb prior to the thirty-sixth week of gestation
- **Gestation**: length of a pregnancy
- **At-risk pregnancy**: a pregnancy in which the health of the mother, pregnancy or fetus is at risk.
- **High-risk pregnancy**: a pregnancy in which the life of the mother or fetus is at risk
- **Placenta**: a temporary nutritive organ in the womb which extracts and passes nutrition from maternal system to fetal system.
• Quiet Alert State: the ideal state of being for the processing of external stimuli.

• Electroencephalogram (EEG): the recording of electrical activity in the brain via metal discs attached to the scalp (Sadock & Sadock, 2007).

• Hypothalmic–Pituitary-Adrenal Axis (HPA): a regional system within the brain considered central to the generalized stress response, arousal, sensory processing, stimulus habituation and sensitization, pain, sleep and memory (Sadock & Sadock, 2007).

• Vagal Tone: heart beat inhibiting impulses from the vagal nerve (Field, 2010).
CHAPTER 4: RESULTS

The purposes of this literature-based study was to; 1) systematically categorize historic and present uses of music and music therapy during pregnancy to decrease maternal emotional and physiological stress, anxiety and depression; and 2) to suggest a framework, based upon evidence based practice, for an approach to music therapy during pregnancy. Goodheart defines evidence based practice in psychology as “the integration of the best available research with clinical expertise in the context of patient characteristics, culture, and preferences” (Goodheart, Kazdin & Sternberg, 2006, p. 51).

This thesis then attempted to; 1) select from the research those music and music therapy interventions which have been supported by neuroscience and/or corroborated by interdisciplinary health care literature; and 2) include interventions from randomized controlled trials. An example of this corroboration can be seen through this author’s linkage of the findings of neuroscience researcher, Lin, et al., (2011) with the music therapy practice of Bauer (2010). Examples of randomized controlled trials include the work of Yang, et al (2009), Chang et al. (2008) and Bauer (2010).

Research related to the effects of recorded music listening, live music listening, medical music resonance therapy and music therapy interventions indicate that all applications demonstrate positive influence in either or both the experience and physiological indicators of stress and anxiety.

The flow of the presentation of the data in this thesis moves from passive listening with minimal therapeutic results toward active music therapy with significant, observable and measurable therapeutic results. It culminates with a personal music making experience where the therapeutic relationship with a board certified music therapist is central to the effectiveness of the intervention.

4.1 Research Reports

PsychInfo and MedLine were the two primary databases used for this literature based study. Journals from the creative arts therapies, nursing, psychology, psychiatry, neurosciences, and medicine were briefly perused. All of the included articles related to therapeutic music and music therapy came from peer-review
journals. A few book chapters were used when looking at alternative and integrative practices, and to glean greater understandings of the NICU environment as it relates to infant development. Seventeen studies directly addressed music and music therapy interventions with pregnant populations. Ten studies examined the efficacy of music and music therapy on mood and stress indicators of healthy individuals and medical patients not pregnant. Eight studies examined the importance of sound and music to the womb environment and its translation into music therapy for the premature neonate. Of the Seventeen studies directly targeting music interventions for pregnant women with elevated stress and anxiety levels, there were three randomized control trials, one pilot program, four case vignette and case studies, two phenomenological studies and six reviews. The studies included women ranging from little or mild to severe stress and anxiety, no-risk to high risk pregnancies. Of the randomized controlled trials, two measured the effect of music listening on prenatal stress and anxiety for women on bed-rest. Participant numbers were 120 and 241. Both concluded that music listening may be therapeutic for prenatal emotional distress. A third RCT examined medical music resonance during pregnancy. The sample population consisted of several hundred patients seen over a course of a decade at a single hospital. A fourth RCT examined individual music therapy for individuals with depression. Pregnant women were not included in the study. In this study 79 were randomized to experimental and control groups. Of these articles two dated back to 1983 and 1986. Five were published in the nineties. The rest were published at or after 2000.

4.2 Music Based Interventions: Music Listening, Medical Resonance Therapy, Music Assisted Relaxation, Guided Imagery and Music and Music Therapy Techniques

In studies involving recorded music, selections ranged from patient preference to specific recordings of lullabies, traditional folk music, children’s music and classical music. (Yang, et al., 2009) Medical Resonance Therapy (MRT) uses recordings of compositions structured by ancient Pythagorean music theory (Sidorenko 2000). Various relaxation techniques include a variety of recorded music with the intent to enhance the relaxation response. Guided Imagery and Music also has its own preordained collections of classical music recordings (Goldberg, 1995). Live music instrumentation included classical piano and voice (Camara, et al, 2008, Montemurro, 1996). Applications of music therapy included group and individual improvisation, song parody, song writing and song analysis (Lin, et al., 2011).
4.3 Findings

Findings of this study indicate that listening to music has been reported to decrease the experience of stress and anxiety during pregnancy. MRT has been reported to improve mood and state of mind. Guided Imagery and Music has demonstrated the ability to minimize anxiety and stress and open pathways for talk therapy and psychotherapy. Clinical applications of music therapy with active participation have also reported positive changes in stress and anxiety levels. It is difficult to reach conclusions for best practice recommendations. In a non-pregnancy related Harvard review of the mental health implications of music, neuroscientific and clinical study findings indicate that music therapy interventions demonstrated improvements in clinical and physiological measures; whereas, simply listening to music showed no demonstrable evidence of clinical improvement (Lin, et al., 2011). This review did not include studies with pregnant populations.

CHAPTER 5: DISCUSSION

This chapter summarizes the results of this study and makes recommendation for music therapists to continue reaching into the obstetrical care arena in the treatment of prenatal stress and anxiety. It also lays out a potential framework and considerations for a homogenized approach to prenatal music therapy.

5.1 Overview of Results

The literature presented, reviewed and analyzed in this study point to several things. Firstly, that prenatal stress and anxiety are frequently left untreated for a variety of reasons. Among these reasons are pharmaceutical risk to fetal development, stigma and access to care. Secondly, that when left untreated, prenatal stress and anxiety can trigger wide spread and long lasting negative health implications including, initial decrease in maternal mental and physical health during pregnancy, a decrease in the health of the pregnancy, an increase in the
likelihood of prescribed bed rest and premature labor, developmental disruption to fetus, a heightened risk of
postnatal mental health problems, poorer health in neonates and infants, an increased likelihood of NICU
hospitalization, poorer physical and emotional outcomes for infants and the possibility of a life-long trajectory of
poorer emotional and physical health for the adult.

Neuroscience has provided a foundation for optimism in the neurological explanation of the power of
music to positively affect stress and anxiety which has inspired further research on music and mood in general and
the use of music therapy interventions specifically for the treatment of stress and anxiety during pregnancy.

Substantial research has been conducted on the negative health implications for untreated prenatal stress
and anxiety. Also, many thorough studies have been published describing the problem of untreated prenatal stress
and anxiety. However, research on music therapy interventions is too sparse. In fact, of the seventeen articles
reviewed relating to the uses of music based interventions during pregnancy, only five examine the effect of active
participation in the music making process and of those, only four models resemble psychotherapeutic based music
therapy models. Three of these five were published in 2010 and the remaining two were published in 2011. Of the
five, the single randomized controlled trial, comparative and single blind had participants numbering 80. It may be
that now, in an era focused on preventative care, is an opportune moment for music therapists to focus on prenatal
interventions.

5.2 Rationale for Music Therapy during Pregnancy

Music Therapy seems to be an intervention well worth pursuing for this vulnerable population for several
reasons. The strength of this argument rests initially with Harvard neuroscience researchers who have
demonstrated both the power of music to shift state anxiety and that simply listening to music showed no
beneficial change in physiologic measures while music based intervention administered by a board certified music
therapy professional did (Lin, et al., 2011). Secondly, the greatest obstruction to prenatal care is stigma. Inhibition
to seek mental health care during pregnancy due to social stigma can be overcome through education. The first
step is to normalize the experience of increased stress and anxiety during pregnancy through education. The
second step is to present the option of music therapy, a safe and empirical based intervention, as an appropriate maternal intervention in service of the long term health and development of an unborn child. Therapeutic intervention then becomes something the mother is doing for her infant. The desire to seek out therapy is no longer stigmatized; rather, newly elevated to ideal maternal nurturance.

5.3 Recommendations for a Model and Future Directions for Research

Taking into consideration the findings of this thesis, it seems a three pronged approach to prenatal music therapy naturally emerges: 1) Independent music assisted relaxation 2) Individual music therapy for maternal emotional health and 3) Group music therapy for maternal emotional health and building community support. Patients can participate in any or all of the interventions. This researcher recommends the implementation of said interventions ideally no later than the twentieth week of pregnancy, prior to the moment when the placenta ceases to block stress hormones from entering the fetal system.

Ideally music therapy would be considered a standardized part of prenatal care. Initial sessions would thus include a typical standardized assessment. Discussion of assessment models are beyond the scope of this thesis and readily available through internet searches. Earliest sessions can focus on co-creating an individualized music relaxation soundtrack based on patient preference. The therapist should also work to expand patient awareness to other genres which may better serve relaxation. Identifying a realistic home relaxation schedule and journal practice should be encouraged. To prevent additional pressure, the schedule should be one in which the mother assesses to be easily achieved.

Weekly individual and/or group music therapy sessions can follow traditional music therapy practices drawing from the psychodynamic and adapted GIM models already in use. As stigma may continue to be an obstructive force, it is important to continually reassert the benefits of participation to the baby. Music therapy experiences can be designed as fetus-directed and discussed as such during verbal processing. Group music therapy should be client centered in order to support the creation of an independent support community for life beyond the music therapy intervention. At all stages it is recommended that lullabies and children’s songs provide
a significant portion of the repertoire used as they will provide the new mothers with postpartum tools for the purpose of consoling and attachment. Singing should also be the foundation of the majority of music experiences. GIM adaptations created specifically for stress reduction may be well suited for both individual and group music therapy sessions as well. GIM should be used with caution by experienced GIM practitioners as GIM is a psychotherapeutic method which can increase anxiety in which case it would be contra-indicated.

These recommendations are made for the following reasons. Fetus-directed singing as part of music therapy has the potential to eliminate concerns over stigma. Beginning in the second trimester around week 20 provides time to effectively assess, manage and potentially prevent heightened stress and anxiety responses prior to the time when the placenta, in preparation for the ex-utero environment, allows stress hormones to pass into the fetal system. It will also provide the therapist time to identify the nature of (do they aggravate or support) the social systems in place prior to delivery. Group music therapy provided in the hospital should focus on group cohesion and diminishing the stressors of isolation and boredom. Groups outside of hospitals should emphasize group cohesion with the intent of building a post-natal support community for the mothers. Both individual and groups sessions can be designed to include supportive spouse or family members.

Another consideration is the timing and use of music assisted relaxation. Using music assisted relaxation as an opener and/or closer experience can provide a soothing transition for the mother out of and into her daily routine. Over time and with repetition, the skill can transfer to an independent ability to positively affect her mood state during the course of her day. Ideally she will learn to access a state of calm while in the flow of stressors unique to the perinatal period. Relaxation should be reinforced in each therapy session as the skill will strengthen with repetition. The following is a rough framework for a possible approach to prenatal music therapy care:

Session 1 – Initial Assessment

- Intake assessment interview
- Identify support network
- Assess source and degree of stress and anxiety using valid and standardized measures as presented in the included research
- Provide recordings of musical selections for consideration
- Provide information on existing prenatal music therapy groups
- Close with a music assisted relaxation
• Provide relaxation technique instructions

Session 2 – Create Plan for Home/Hospital Relaxation Practice

• Discernment of patient music preference
• Introduction to other genres if patient preference is counter productive
• Introduce journaling
• Identify and carve out time for independent home relaxation practice
• Compile listening selections
• If indicated, schedule individual and/or group music therapy sessions
• Close with music assisted relaxation

When indicated: Weekly Individual Music Therapy

• Client centered – focus may be on relaxation, solution based therapy or working through unresolved unconscious material
• Consider opening and/or closing with music assisted relaxation experiences
• Utilize GIM or traditional music therapy interventions: song writing, music improvisation, lyric analysis, fetus-directed singing.
• Verbal processing
• Continue to support home practice of music listening and journaling

When indicated: Weekly Group Music Therapy

• Consider opening and/or closing with music assisted relaxation experiences
• Opportunity for journal sharing to identify common themes
• Group singing
• Group improvisation
• Song writing and/or analysis
• Singing of lullabies and children’s’ songs
• Verbal Processing

Post natal follow-up

• Reinforce the practice of singing to infant
• Educate on the importance of “motherese”
• Reinforce benefits of home music listening and music making
• Encourage continuation of participation in an independent support group

5.4 Recommendations for Future Research

Existing literature does not provide ample studies to demonstrate the effectiveness of a music therapy protocol as recommended in this review. A phenomenological qualitative study combined with a quantitative longitudinal randomized and controlled trial of suggested protocol would be an ideal measure of its worth. A report on the personal experience of pregnancy when supported by a music therapy intervention would best communicate the value of the protocol to both music therapists, other prenatal health care practitioners as well as potential future clients. If future researchers were to successfully document and analyze the life-long health
profiles and trajectories of a significantly sized population of individuals whose mothers had participated in music therapy during the second half of their pregnancy, then the proposed benefits of this earliest of interventions could be explicitly confirmed or negated. Potential benefits include improved maternal health during pregnancy, health and duration of the pregnancy, infant bonding, especially through the use of fetus-directed singing and fetus-directed speech, also referred to as motherese (Lu, 2002 & Winslow 1986). Additional potential positive benefits may effect child development, adult health profiles, quality of caretaker’s life, and, due to healthier outcomes, there may be a decrease in financial strain on the both family and health care system. Such an extensive and encompassing documentation of widespread benefits following a simple and safe music therapy intervention could certainly embolden music therapists in asserting themselves as best practice primary care takers for this vulnerable population so badly in need of safe and accessible support.

5.5 Limitations of the Study

The music therapy literature in this study was limited to published book chapters, peer review research articles and journal articles. The literature did not necessarily reflect all music therapists working in obstetrics. The recommendations for a prenatal music therapy protocol were generated from this researcher’s understanding and interpretation of the literature and were in no way conclusions drawn from other research. This may dilute the rigor and validity of this study. The studies were all provided in English with, in two cases, translations from Chinese and one from German. Studies dating before 1980 were not included.
CHAPTER 6: SUMMARY AND CONCLUSIONS

In conclusion, it is widely recognized that untreated stress and anxiety during pregnancy is a problem worth the attention of health care practitioners. When left untreated, the health of the mother, pregnancy and fetus are put at risk. In addition, the life-long developmental, physical and emotional health trajectory of the child can be seriously and negatively altered. Children who do suffer the ill effects can cause tremendous amounts of emotional strain on the family into which they are born. They will also require additional medical and developmental support which puts additional financial strain on both the family and the health care system.

Due to the safety of and empirical based evidence that music therapy does positively affect stress and anxiety levels in pregnant women, efforts should be made to reinvigorate a homogenized presence of music therapy intervention in prenatal care.

Presently the extant research has examined selective music listening, MRT, music assisted relaxation, GIM, individual music therapy and group and music therapy. Music listening studies examined the uses of listening to recorded lullabies, children’s music, classical music or patient preference to relieve stress and anxiety and induce relaxation. Music assisted relaxation research includes Medical Resonance Therapy, adaptations of GIM and music assisted Lamaze techniques. Literature discussing the Bonny Method of Guided Imagery and Music (GIM) and music psychotherapy demonstrate the indications for psychotherapeutic applications of music therapy during pregnancy. Music therapy provided research explored the uses of both recorded and live music as well as active patient participation in the music making process. A few studies included depression in the dependent variables. Otherwise, studies were limited to prenatal stress and anxiety. All studies of music based interventions reported positive if not significantly positive results. A 2011 Harvard review of the effect of music on state and trait anxiety stated that merely listening to music did not demonstrate any change in physiologic measures of stress in the way that professionally administered music therapy with active music making participation did.

The results of this study should encourage a renewed interest among music therapists in prenatal care. It also speaks to a need for the development of a homogenized prenatal music therapy intervention model. This review lays out a variety of interventions that have already been implemented individually and encourages
combining the techniques into a three pronged approach. Early indications of effectiveness of the individual interventions suggest that future studies can be undertaken with a degree of optimism. It seems the maternal instinct to sing can be capitalized on for the health and welfare of not only the pregnant mother, but for the pregnancy, the fetus, the neonate, infant, child, adult and the health care system itself.
Works Cited


<table>
<thead>
<tr>
<th>YEAR, AUTHOR</th>
<th>TYPE OF STUDY</th>
<th>AUTHOR'S PROFESSIONAL PERSPECTIVE</th>
<th>DEPENDANT VARIABLE</th>
<th>MUSIC INTERVENTION</th>
<th>NUMBER OF SUBJECTS</th>
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<tbody>
<tr>
<td>2011, Erkkila, et. al.</td>
<td>RCT</td>
<td>Music Therapy</td>
<td>Depression, General functioning, Quality of life and Alexythimia</td>
<td>Music Psychotherapy</td>
<td>79</td>
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<td>2010, Bauer, et. al</td>
<td>Comparative RCT single blind</td>
<td>Music Therapy and Recreational Therapy</td>
<td>Antepartum related distress</td>
<td>Music Therapy: assisted relaxation, active listening, song writing, clinical improvisation</td>
<td>80</td>
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<td>2010, Castillo-Perez, et. al</td>
<td>Comparative RCT</td>
<td>Music Therapy and Psychotherapy</td>
<td>Depressive Symptoms</td>
<td>Music Therapy</td>
<td>79</td>
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<td>2009, Yang, et. al</td>
<td>RCT</td>
<td>Nursing</td>
<td>Physiological Indicators of Anxiety</td>
<td>Music Listening: Lullabies, classical music, nature sounds, or crystal music of traditional Chinese children songs</td>
<td>120</td>
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<tr>
<td>2008, Chang et. al</td>
<td>RCT ROXO / RO 0</td>
<td>Nursing</td>
<td>Stress, Anxiety and Depression</td>
<td>Music listening: lullabies, classical music, nature sounds or crystal music of traditional Chinese children songs</td>
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<tr>
<td>2000, Sidorenko</td>
<td>Controlled Trial</td>
<td>Obstetrics</td>
<td>Relaxation, Self Esteem, Stress, Pain Management, Mental health, Sleep, Premature Labor</td>
<td>Music Listening: Recording of Medical Resonance Therapy Compositions</td>
<td>Author stated patient numbers over years of practice were too numerous to count</td>
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<td>Year</td>
<td>Authors</td>
<td>Study Type</td>
<td>Methodology</td>
<td>Outcome Measures</td>
<td>Associated Techniques</td>
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<td>1996</td>
<td>Montmuro</td>
<td>Case Vignettes</td>
<td>Psychology</td>
<td>Personal experience, mood, joy, connection to pregnant community, connection to fetus</td>
<td>Singing during pregnancy</td>
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<td>1991</td>
<td>Liebman, MacLaren</td>
<td>Controlled Trial</td>
<td>Lamaze</td>
<td>Relaxation</td>
<td>Music listening assisted relaxation: Patient preferred music</td>
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<td>1989</td>
<td>Gonzales</td>
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<td>Medical</td>
<td>Woman's attitude toward motherhood, Pain management, Anxiety during third trimester</td>
<td>Music listening assisted relaxation</td>
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<td>1986</td>
<td>Winslow</td>
<td>Case Study</td>
<td>Music Therapy</td>
<td>Relaxation, Anxiety, and Compliance with treatment</td>
<td>Music assisted relaxation and Music Therapy</td>
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## MUSIC BASED INTERVENTIONS DURING PREGNANCY

<table>
<thead>
<tr>
<th>Article</th>
<th>Method</th>
<th>Subject Type and total participants</th>
<th>Independent Variables</th>
<th>Dependent Variables</th>
<th>Instruments</th>
<th>Results, Findings and Comments</th>
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<tbody>
<tr>
<td>Bauer, Victorson, Rosenbloom, Barocas, Silver (2010)</td>
<td>Comparative RCT – single blind n=80</td>
<td>Hospitalized pregnant women on Bedrest experiencing increased antepartum-related distress</td>
<td>1 hour of music therapy: Music listening and music therapy: assisted relaxation, active listening, song writing, clinical improvisation or recreation therapy</td>
<td>Antepartum related distress</td>
<td>Antepartum Bedrest Emotional Impact Inventory</td>
<td>Recreational Therapists and Music Therapists conducted single session music and recreation sessions effectively alleviate antepartum related distress among high risk pregnant, hospitalized Bedrest patients.</td>
</tr>
<tr>
<td>Bruce (2004)</td>
<td>Pilot Program, not research rather program evaluation and improvement</td>
<td>Hospitalized Pregnant Women with Pregnancy Induced Hypertension, Hyper Emeses, Gestational Diabetes, at risk and High risk pregnancies</td>
<td>Individualized recorded music listening assisted PMR, no less than four sessions</td>
<td>Stress and Anxiety</td>
<td>Survey given to nurses to ascertain if therapy helped labor and delivery, survey to mothers</td>
<td>Music Therapist collected postpartum Data from nurses. Sheets were not conclusive as not enough were returned. Client satisfaction surveys were returned at 50%. “Mothers reported the music helped relaxation during pregnancy, helped reduce stress during prenatal complications, helped reduce blood pressure” p.4</td>
</tr>
<tr>
<td><strong>Chang, Chen, Huang (2008)</strong></td>
<td><strong>Randomized Control Trial</strong> with prospective pretest-posttest experimental design</td>
<td><strong>241 women, &gt;18y/o anticipating uncomplicated vaginal delivery at gestational age 18-22 weeks or 30-34 weeks.</strong></td>
<td><strong>30 minutes of 4 Pre-recorded music listening to CDs consisting of:</strong> Lullabies, classical music, nature sounds or crystal music of Chinese children’s songs. Tempo adjusted to mimic heart beat of mother</td>
<td><strong>Stress levels, anxiety, depressive symptoms,</strong> Pretest instruments: PSS, S-STAI, EPDS, Data Analysis instruments – CHI-square test</td>
<td>After two weeks comparison of baseline and posttest scores revealed significantly lower means on all three measurements (p &lt; .001, p=.01 and p&lt;.001) In the control group only significant change seen in one measure PSS scores (p&lt;.017) Results revealed a preference for nature sounds, then crystal music, then classical</td>
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<tr>
<td><strong>Frederico and Witwell (2001)</strong></td>
<td><strong>Paper based on a presentation at Inter, Conference of the Assoc for Prenatal and Perinatal Psychology and Health</strong></td>
<td><strong>Psychoprophylactic Music Therapy:</strong> Model of Music Relaxation through movement (RTM) and music, imagery (recorded music with music therapist for talk therapy)</td>
<td><strong>Intrauterine Connection, infant stimulation, anxiety, stress, relaxation, increase joy beauty love, holistic integration, creativity and imagination</strong></td>
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<td>Reference</td>
<td>Model Development</td>
<td>Settlements</td>
<td>Recorded Music Listening, Improvisation, etc.</td>
<td>Continued...</td>
<td>The Music Therapist...</td>
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<tr>
<td>Friedman, Kaplan, Rosenthal, Console (2010)</td>
<td>Music School in Cleveland Ohio</td>
<td>Recorded music listening and&quot;: Music assisted PMT, Live and Recorded Music Listening, Lyric Analysis, Song Parody, Song writing, Recording sessions 101</td>
<td>Also a Lullaby Program 101. Included the previously mentioned AND infant directed singing and Songs of Kin</td>
<td>The music therapist concluded that the use of lullabies for pregnant mothers and their infants is an effective integration of music therapy with mental health disciplines. She recognized a need for more research.</td>
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<tr>
<td>Gonzales, (1989)</td>
<td>Exploratory/Developmental Study (developed)</td>
<td>140 people including couples and un/newborn infants participating in regular childbirth classes, participation in at least 3 MT sessions, husband present in delivery room</td>
<td>Music therapy with recorded music listening to patient preference, breathing and relaxation exercises</td>
<td>Mother's attitude toward Motherhood, pain management alternatives, anxiety during third trimester and child development in later gestational period, spousal support</td>
<td>MTAC program benefits as an extension of prenatal classes reported by mother's are: reduction of anxiety during reproductive cycle, high level of satisfaction in childbirth experience, ability to soothe infant through prenatal music</td>
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<tr>
<td></td>
<td>Quantitative</td>
<td>No control</td>
<td></td>
<td></td>
<td>90% of respondents report music listening as influential in reducing anxiety during MTAC training. Over half found music listening &quot;quite effective&quot; for relaxation, comfort and positive feelings</td>
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<td>Author(s)</td>
<td>Study Type</td>
<td>Sample Size/Description</td>
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<td>Lu, Ming-Chen (2002)</td>
<td>Development of a Model Master's Thesis</td>
<td>4 case vignettes</td>
<td>Fetus Directed Singing</td>
<td>Stres anxiety, maternal attitude</td>
<td>Music therapy supported women in working through unresolved emotional distress related to pregnancy, attachment and identity during pregnancy</td>
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<tr>
<td>Liebman, MacLaren (1991)</td>
<td>Controlled Trial</td>
<td>29 total, 19 in experimental group</td>
<td>PMR with individual recorded music listening to patient preference for 15-20 minutes</td>
<td>Anxiety</td>
<td>&quot;data from this study suggest that a music therapy intervention, such as the one employed in the present study, if effective in reducing state anxiety during the third trimester in adolescent pregnancy&quot; p. 96-97.</td>
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<tr>
<td>McKinney (1990)</td>
<td>Review of music during pregnancy, labor and delivery</td>
<td>GIM, classical music recordings assisted PMR, sing-alongs of lullabies and children's songs, GIM</td>
<td>Resolution of unresolved fears/issues, Relaxation, Lamaze preparation for birthing,</td>
<td>Applications of these music therapy interventions to pregnancy reported in literature include recorded music-enhanced relaxation, sing-alongs of lullabies and children's songs, music supported imagery and GIM</td>
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<td>Montemurro (1996)</td>
<td>Phenomenology Study</td>
<td>Pregnant Women</td>
<td>Singing during pregnancy</td>
<td>Personal Experience, mood, altered states, joy, connection to pregnant community, sense of connection to pregnancy and fetus</td>
<td>Case vignettes Limited experience, mothers continue to connect to group and continue to sing with community after giving birth, two cases of at risk pregnancies and scheduled cesarean sections as proceeding instead along a healthy track.</td>
<td></td>
</tr>
</tbody>
</table>
| Olson (1998)        | Literature Review                  | Pregnant women laboring women and Postpartum women                                      | Live bedside music obstetric care through pregnancy and neonatal care          | Relaxation, body coordination                                                    | In 1998 music therapy in Obstetrics was considered the fastest growing field of music therapy intervention...
Recommendations that in-service education on bedside musical care be offered and that music be woven into standardized hospital care |
<table>
<thead>
<tr>
<th>Author</th>
<th>Study Type</th>
<th>Participants</th>
<th>Interventions</th>
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<tr>
<td>Short, Allison (1993)</td>
<td>Case Study</td>
<td>1 client</td>
<td>GiM</td>
<td>Relaxation, adjustment, bonding and resolution to lost pregnancies.</td>
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<tr>
<td></td>
<td></td>
<td></td>
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<td>&quot;clearly beneficial to client and recommendations for larger studies was made&quot;</td>
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<tr>
<td>Sidorenko (2000)</td>
<td>Control Trial</td>
<td>140 High risk Pregnant women</td>
<td>Medical Resonance Therapy Music Compositions (MRT-Music)</td>
<td>Relaxation, Sense of Self esteem, threshold of stress reaction, pain management, mental health, sleep, premature labor</td>
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<td>Spielberger Scale Minnesota Multiphasic Personality Inventory, Pain killing drugs recorded. Systolic arterial pressure, diastolic arterial pressure, mean arterial pressure, pulse arterial pressure and variability/acceleration of heart activity of fetus, hormone levels of cortisol, estradiol and progesterone</td>
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<td>Anxiety dropped significantly in first trimester, MRT normalized arterial pressure, hormone changes were dramatic, significant improvements of the psychic conditions were observed in 85 % of trial vs. 10% of control. Diminishment of pain killers dropped enough to reduce negative effects of pharmaceuticals on fetus, normalization of sleep patterns, signs of premature labor disappeared in 96% of pregnant women of experimental compared to 72 % in control group</td>
</tr>
<tr>
<td>Wiand, N. (1997)</td>
<td>Comparative Latin rectangle quasi-experimental study</td>
<td>36 third trimester Lamaze trained primigravidas</td>
<td>Recordings of Baroque and New Age recordings music and ocean sounds vs. PMR alone</td>
<td>relaxation</td>
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<tr>
<td>Winslow (1986)</td>
<td>Case Study</td>
<td>3 Hospitalized High-Risk Pregnant Women</td>
<td>20-30 minute sessions 4x /week With PMR, recorded music and guided imagery, weekly sing-alongs, of lullabies and children songs with group discussion</td>
<td>Relaxation and anxiety and compliance with treatment</td>
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<tr>
<td>Yang, Li, Zhu, Alexander, Liu, Zhou, Ren (2009)</td>
<td>RCT</td>
<td>120 Pregnant women on bed rest in hospital in Changsha City, China</td>
<td>Preference based recorded music listening for 30 minutes/day for 3 days</td>
<td>Anxiety, Physiological responses, State-trait Anxiety Inventory, vital signs, fetal heart rate,</td>
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<tr>
<td>Study</td>
<td>Design/Methodology</td>
<td>Participants/Context</td>
<td>Interventions</td>
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<tr>
<td>Castillo-Perez, Gomez-Velasco, Perez-Campo, Mayoral (2010)</td>
<td>2 Randomized Trials – comparative study between patients receiving psychotherapy and those receiving music listening therapy</td>
<td>79 un-medicated patients with low to medium depressive symptoms from a clinical hospital belonging to the Spanish Institute of Social Security Services for government employees</td>
<td>Music therapy, Psychotherapy</td>
<td>Depressive symptoms, Zung Self-rated depression scale (initial selection test) Beck Depression Inventory, Hamilton Depression Scale</td>
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<tr>
<td>Lin et al, Harvard Review (2011)</td>
<td>Neuroscience and clinical studies review</td>
<td>Music, listening, clinical music therapy</td>
<td>Mental health</td>
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<tr>
<td>Erkkila, Punkannen, Fachner, Ala Rouna, Pontio, Mari (2011)</td>
<td>RCT The first RCT on improvisational music therapy for depression</td>
<td>79 Adults with unipolar depression</td>
<td>Music therapy anchored in psychodynamic music therapy tradition control group received standard care</td>
<td>Depression, anxiety, general functioning, quality of life and alexithymia Montgomery Asberg Depression Rating Scale, Hospital Anxiety and Depression Scale, GAF, Toronto Alexithymia Scale, Health related quality of life RAND scale</td>
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<tr>
<td>Study</td>
<td>Design</td>
<td>Population</td>
<td>Interventions</td>
<td>Outcomes</td>
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<td>Campbell (1994)</td>
<td>Multiple RCT Ecological/sys temic model</td>
<td>High Risk (&lt;19 y/o, unmarried, or poor) white, first time pregnancy women from one of poorest communities in US: Elmira, NY</td>
<td>Home visits, Parent education, involvement of family and friends in supporting mother, linkage of family to health organizations</td>
<td>Family overall health and mental health of mother / child</td>
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<td>Misri, Reebay, Corral, Milis (2004)</td>
<td>Cochrane Review</td>
<td>35 Women referred to outpatient hospital for DSM-IV diagnosis of PPD with comorbid anxiety disorder</td>
<td>Paroxetine mono-therapy And Paroxetine with CBT combination therapy</td>
<td>Postnatal Anxiety, Obsessive Compulsion, Depression</td>
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<td>Murray, Cooper, Wilson, Romaniuk (2003)</td>
<td>Three Randomized Control Trials</td>
<td>Community sample of 193 Women with DSM-III-R MDD post partum depression</td>
<td>non-directive counseling, CBT or psycho-dynamic therapy</td>
<td>Mother Child Relationship and child outcome</td>
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<td>Field (1992)</td>
<td>Observation Qualitative study</td>
<td>Pre-term neonates and cocaine pre-term neonates</td>
<td>Video feedback during ultrasound, providing pre-term neonates non-nutritive sucking opportunities to reduce stress during heel stick and feedings and infant massage therapy,</td>
<td>Attachment, weight, Brazelton scores</td>
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<td>Friedman, Heneghan, Rosenthal (2009)</td>
<td>Retrospective record review</td>
<td>Women presenting at delivery or immediate postpartum with no prenatal care</td>
<td>Disposition and health outcomes of infants born</td>
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<td>Standley, (2002)</td>
<td>Meta Analysis</td>
<td>Premature oxygenated infants in NICU</td>
<td>20 – 30 minutes daily auditory stimulation</td>
<td>Oxygenation saturation levels, heart rate, respiratory rate, weight gain, number of apnea/bradycardia episodes, days in hospital, behavior state, non nutritive sucking, feeding rate,</td>
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<td>Waldworth (2009)</td>
<td>Observation study</td>
<td>Premature and full term infants</td>
<td>Music therapy group intervention for parents and child under two years old</td>
<td>Parental responsiveness and infant social development</td>
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