

# **The effects of infant-directed singing on psychological status of a mother**

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## **Introduction**

Transition to motherhood can be a challenging, though exhilarating, time for a woman. Along with the joy of bringing a new life into the world, feelings of anger, sorrow, frustration, pain and confusion may arise in the new mother, who often finds herself continually asking questions such as, “Am I doing a good job as a mother?”, “Is this the best thing for my baby?”, “Why won’t my baby stop crying?”, etc. (MacKinlay & Baker, 2005). A considerable gap exists between women’s expectations of motherhood (“the mother myth”) and the reality of postpartum. A new mother often finds herself not being able to keep up with the requirements of career, housekeeping and being an “ideal” woman. Normal interactions with friends and family can be interrupted due to new time constraints and general change of interests and priorities. Relationships between spouses can be hampered, too, with addition of a new member to the family. Change in hormone levels after birth contributes to the new mother’s vulnerable psychological status. Many women experience “baby blues”, feeling stressed, sad, anxious, lonely, tired and helpless during the first several weeks after delivery; and about 1 in 7 women suffers from a more serious mood disorder – postpartum depression (APA data, retrieved November 23, 2010). There is scientific evidence that depression in new mothers negatively affects not only the mother herself, but also the child’s development and mental health outcomes (Paulson, 2010).

Having had experienced both postpartum depression and “baby blues” with, consequently, her first and her second children, the author of this research found music, and especially singing to the babies, to be a very powerful tool for both building a solid bond with a newborn and for establishing and supporting mother’s own sense of wellbeing. The author’s personal experience concurred with her professional interest in the field of alternative family care, which includes music therapy. As officially defined by American Music Therapy Association, “music therapy is 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” (definition retrieved November 26, 2010).

The author strongly believes that infant-directed singing may have a homeostatic effect on the psychological status of a new mother and an overall positive impact on the whole immediate family functioning in postpartum period. The following literature overview is intended to provide the theoretical and empirical data support for the author’s idea that music therapy may be an effective intervention for new families during the transition period, with the timeframe from the last trimester of pregnancy through the second year of the infant’s life.

## **Research findings**

Maternal singing to infants has been documented in every culture and historical period for which information is available (Shenfield, Trehub, Nakata,

2003, p.370). As evident from the existing literature on the subject (see Nakata & Trehub, 2004), from the first days of life, infants prefer their own mother's face and voice to those of a stranger. As early as at 28 weeks GA, fetuses already show some heart rate response to music stimulus (Kisilevsky, Hains, Jacquet, Grnier-Deferre & Lecanuet, 2004). Research conducted by Ilari & Sundara (2009) showed that 5-month old, 8-month old and 11 month-old babies listened much longer to the unaccompanied than to the accompanied versions of the same song. L'Etoile (2006) speculates that "singing to infants may have conferred some type of evolutionary advantage by promoting behaviors considered necessary for survival".

Some of the functions of infant-directed singing, suggested by various researchers (Milligan et al., 2003; Nakata & Trehub, 2004; MacKinley, Baker, 2005; Byrn & Hourigan, 2010; L'Etoile, 2006), are the next:

- 1) it attracts and maintains infant attention, thus increasing opportunities for meaningful interaction and communication;
- 2) it "fine-tunes" the brain mechanisms that are in charge of infant's budding perceptual or social-emotional skills;
- 3) it provides enculturation of the infant in musical as well as conceptual and social terms (which includes passing on and creating family traditions);
- 4) by conveying emotional information, ID singing helps infants regulate their own affective state;
- 5) it assists new mothers in establishing positive home environments;

6) being a ritualized expressions of deep emotions, ID singing thus serves dual function of soothing/stimulating a child while simultaneously releasing the singer's own feeling;

7) finally, ID singing enables mothers and infants to coordinate their emotional states and establish a social bond.

There are some specific characteristics of infant-directed (ID) singing as compared to other types of interpersonal musical exchange, which include emphasizing positive emotions, using the loving tone of voice, slight alteration in the upper harmonics, singing more slowly, using more sustained vowels, using more gliding between pitch levels, singing at a higher pitch level, more expressive performing style. All of the above characteristics are more evident when mothers sing in their infants' presence than in their absence (Milligan et al., 2003; L'Etoile, 2006).

It is important to mention, that even though maternal speech and maternal singing appear to be similar in the sense of enhancing infant attention, averting distress and fostering interpersonal bonds, research suggests that "the repetitive, lulling properties of infant-directed singing may foster more moderate arousal levels, which facilitate longer bouts of infant engagement" (Nakata & Trehub, 2004, p.457). Even more so, there is a possibility that similar styles of singing may provide both subtle elevations in arousal for infants with low initial arousal levels and subtle reductions for those infants with higher initial levels (Shenfield, Trehub & Nakata, 2003), which makes maternal singing a unique parenting mechanism.

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Though a rapidly growing body of research is being conducted on benefits of mother's singing for both premature and full-term infants (Cevasco, 2008; Nakata & Trehub, 2004), a very few number of studies have examined the effect that singing has on singer's own mood state. As Kenny, Davis & Unwin (2002) note: "It is surprising that so little research attention has been paid to the impact of singing on human emotion or mood, given the importance that is attached to singing in a number of cultures" (Kenny, Davis & Unwin, 2002, p.175).

In their study of effects of a song-singing intervention on people with traumatic brain injury, Baker, Wigram & Gold (2005) found that among long-term effects of such intervention the subjects reported experiencing becoming happier, less afraid, less sad, less confused and less tense. Interestingly, the immediate effect of treatment showed the contrary responses: subjects reported being more afraid, more angry and more sad. Given that the authors of the experiment considered song singing an enjoyable expressive outlet for subjects to give voice to their pain, to vent unexpressed and tension causing emotions, as well as the fact that similar short-term effects were reported when improvised songs were employed with hospitalized children, a probability was suggested that singing allowed the subjects of the study to increase the intensity of experienced emotions and to release the emotional energy, creating a cathartic effect.

The act of singing (as opposed to listening) allows singer to express and take ownership of the stated feelings (MacKinlay & Baker, 2005). Kenny, Davis & Unwin (2002) speculate that the midbrain periaqueductal gray (P.A.G.), a primitive and unconscious part of the brain, which is responsible for the emotional sounds of all animal species studies, might be also responsible for some aspects of singing, such as mediating emotional intonation, the motivation to communicate and vocal intensity. They further suggest that, “in any event, as vocal and respiration patterns are part of the physiological changes that signal emotional states, <...> the possibility exists that intentional manipulation of these patterns may induce an emotional response” (Kenny, Davis & Unwin, 2002, p.181). The researchers then refer to the study with actors which provides the evidence that the adoption of breathing changes accompanying the emotional changes of sadness, anger or fear, when sustained for several minutes, is capable in inducing in the actors a perception that they were “feeling” this emotion.

If such “intentional manipulation” is indeed possible, then it opens vast capabilities for music therapy research and intervention, permitting different types of music material to affect the singer, who participates in the intervention, in the desired and a priori programmed ways. The fact that the same midbrain P.A.G. is responsible for the vocalizations (“cry”) of a newborn (Kenny, Davis & Unwin, 2002, p.181), may be of interest for the future researcher as well.

The six-week song-singing program for new mothers, conducted by MacKinley & Baker (2005), provided a rich data set of mother's infant-directed singing experiences. During the one-week baseline period of the study, 18 mothers participating in the study were asked to complete a mood scale (Profile of Mood States – Short Form) and a diary before and after putting their infants to bed on at least four occasions over a seven-day period. The diary entries included information about the mother's feelings, mood and type of day she had with her baby, as well as the descriptions of the bedtime experience and her feelings and mood at that moment.

An interview followed, when the participating mothers were asked about their motherhood experiences and given the Beck's Depression Inventory to complete. At the end of the interview a music therapist demonstrated how the mothers could use lullabies effectively to create an environment of safety and calmness and to put their babies to sleep. Mothers were asked to use and report their use of lullabies at least four times per week over consecutive six-week period.

Most of the mothers, though not necessarily encountering depression issues, described their early motherhood experiences as challenging at the very least. Kathy, one of the participants, described the feelings of inescapable tension, opposition, and need to be both professional and mother: "In having both you can never do either role completely, and I mean for me, as someone who likes things perfect, that's like I can't do both". She spoke at length about how motherhood brought with it an increased sense of worry and fear about death and mortality. In



her diary entries she described nighttime as bringing with it an overwhelming sense of anxiety, fear and terror (SIDS was mentioned in the interview). In her diary in the course of the study Kathy described the effect of singing lullabies on her as “relaxing”. She felt that the singing provided her a moment to feel calm, close to, and intimate with her baby, that it made the bedtime experience pleasant and enjoyable for her. She also felt that the singing was probably more for her than her baby, that it made her a more patient mother who looked forward to that special emotionally bonding time when she watched her baby falling asleep.

Another participant of the study, Melissa, at the beginning expressed the feelings of guilt about how much she wanted to go back to studying; she also worried intensely that something might happen to her baby. In the course of the study, Melissa was surprised to discover that her singing could calm her baby down. Melissa had a warm association with one of the songs she used, Brahms’ “Lullaby”, having had as a child a little wind-up toy duck that played this melody. Singing lullabies tended to have a sedative affect on Melissa; she felt less tense, more calm, and sometimes more happy after singing lullabies to her baby. The program provided opportunities for positive quiet time with her baby and time out from having to worry about the daily chores.

As the result of this program, Mia, another participant, felt better as a mother in her own eyes, more confident, happy, proud and rewarded that she is able to settle her baby using the singing routine. This had enhanced her relationship with her baby. Previously Mia reported feeling guilty about going back to work and not having so much time to spend with her baby. She described that singing to him at

bedtime filled a need to spend time with him, to relieve that sense of guilt and also make up the quality time.

Another new mother, Sally, who had a baby with several medical complications, used lullabies to “help me get through those periods of the day and night where I was absolutely exhausted and she was in pain and screaming, to calm myself down, and her”. Sally often reported feeling frustrated, tired and hungry as she sang to her baby. However, despite these feelings, the lullabies relaxed her when she was tired, and singing helped her keep in control, because she felt as she “was doing something”. Overall, singing experience gave Sally sense of validation that she was doing it right and that she was a good mother. She also felt good about herself that she could create an atmosphere through singing where her baby felt safe and secure.

Anna described the feeling of not being able to soothe her baby or give him what she thought he needed as awful – desperate, hopeless, and inadequate. She described the singing experience as therapeutic, invigorating, and energizing. Singing provided a mental focus that assisted her in getting through this distressing and difficult bedtime period. It seemed to change her perception of time in that the bedtime ritual was experienced as shorter than it really was. She reported feeling more calm and optimistic after singing her baby to sleep, and more relaxed, while more tired.

The choice of lullabies by a mother seemed to be defined by two main factors: mother-focused considerations and baby-focused considerations. Mothers

tend to use lullabies 1) that they know they would respond to in a positive way, 2) that best reflect their mood at the time of singing, 3) that are important in mothers' own childhood experiences. Thus, the moment of choosing a lullaby is likely to have the therapeutic effect of its own, as it provides mothers with an opportunity "to self-reflect, to consider their own physical, emotional, and mental needs, and to respond to them in an engaged, active, and embodied way through the process of singing" (MacKinley & Baker, 2005). Overall, the participants of the experiment described the use of lullabies as being positive experience for their own emotional and physical wellbeing.

Singing, reportedly, increased maternal feelings of mothers towards their babies, giving them a chance to observe and connect with their babies (MacKinley & Baker, 2005). This appears to be especially important in the light of mother-infant attachment theory. Attachment pertains to the nature of the mother-infant relationship that develops as a result of reciprocal interactions during the infant's first year. The goal of attachment is to maintain the infant's proximity to the mother, thus providing him with a sense of security (L'Etoile,2006). In a securely attached relationship, the mother clearly recognizes her infant's current arousal needs or desire to interact, and she will respond accordingly. By contrast, with insecure attachment, the mother may not accurately interpret or attend to her infant's signals for interaction. Researchers have identified two behaviors as possible predictors of secure attachment: maternal sensitivity and infant affect regulation. The relationship between these two factors supports a connection between infant-

directed singing and mother-infant attachment. By modifying various musical elements, mothers demonstrate awareness of their infant needs (see, for example, (Milligan et al., 2003)). In response, infants experience necessary changes in attention and arousal state, which are two key components of affect regulation. Basing on these observations, L'Etoile (2006) suggests then that through ID singing, mothers and infants may be able to rehearse two behaviors needed for secure attachment: maternal sensitivity and infant affect regulation. This creates a solid theoretical foundation for a possible music therapy intervention with the purpose of improving mother-infant attachment by means of musical interaction coaching.

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Custodero (2007) notes that “when healthy mothers and infants converse, they do so musically in mutually imitative and synchronous give-and-take that is so regular one can draw bar lines to reflect the metric unity”. Sometimes – for example, in case of maternal postpartum depression, in some cases of preterm birth (Cevasco, 2008), as a result mother-infant separation or substance abuse (Swain et al., 2007), or when a new mother is under the duress of immigration adjustment and coping with feeling of alienation and loss of belonging (Custodero, 2007) – this universal parenting strategy may be lost.

For parents in NICU, infant-directed singing may provide a significant way to participate in the care of their children, strengthening the bond between parent and child, increasing the amount of time mothers spend with their babies, giving mother

sense of empowerment and increasing their confidence and relaxation, as Blumenfeld & Eisenfeld (2006) report. One of the participants of their study, an “especially anxious mother”, began to sing to her baby every day, stating that it comforted her. Another mother reported that singing gave her “a great pleasure” and indicated that she would continue after baby comes home from the NICU. The authors conclude that “whatever music’s direct effect on babies, there remain many potential benefits for parents and caregivers” (Blumenfeld & Eisenfeld, 2006, p.69).

Even in the case when not live singing, but rather the recordings of mother’s songs were used in NICU, preterm mothers reported a mean score of 4.75 (with 5 indicating that they strongly agreed) for the following statement: knowing my infant listened to my singing helped me to cope with my infant’s stay in the NICU (Cevasco, 2008).

As emotional distress, anxiety and overall impact of a preterm birth continues for the first four years or the child’s life (see Cevasco, 2008, for more information), continuous music therapy intervention may be considered beneficial for such mother-infant couples. Further research is needed to develop an appropriate music therapy program model for this population.

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Swain and his colleagues, in their research on brain basis of early parent-infant interactions, state: “Parental wellness (and/or presence of other attuned caregiving adults) has long-term positive effects on resiliency and emotional well-

being of children as they grow up and for decades later” (Swain et al., 2007, p.268). However, transition to motherhood is often associated with significant stress for new mothers, “who may be experiencing difficulties with day-to-day coping, resulting in the development of feeling of failure, frustration, tension and guilt” (MacKinley & Baker, 2005), and maternal depression is prevalent. In the national sample (Paulson, Dauber & Leiferman, 2006), 14% of mothers and 10% of fathers exhibited levels of depressive symptoms on the Center for Epidemiologic Studies Depression Scale that have been associated with clinical diagnoses. Mothers who are depressed are ~1.5 times more likely to engage in less healthy feeding and sleep practices with their infant. Depressed mothers and fathers are involved in less positive interaction with their children, with a particular reduction in the degree of enrichment interactions such as reading, telling stories and singing songs. Maternal depression is associated with decreased levels of affective communication and ‘motherese’ (baby talk) use (Milligan et al., 2003).

Distinct differences in brain circuitry exist between non-depressed and depressed mothers. Recent research has found that activation in Brodmann’s area 32 (dorsomedial prefrontal cortex of the brain) occurs when healthy mothers hear their infant cry or watch a video of their infant crying after separation. Depressed mothers, relative to comparison mothers, showed decreased activation in this region in response to the social stimulus of a face (Leibenluft & Yonkers, 2010).

It is important to note that mother and her infant are not the only ones affected by maternal postpartum depression. The odds of significant paternal depression increase three-fold when the mother experiences mild depression and

increase to more than eight-fold when the mother experiences moderate to severe depression (Paulson, 2010). Maternal depression can also negatively affect the relationships with her partner (MacKinlay & Baker, 2005).

Each year in the United States only, over 900 000 children become victims of abuse or neglect, with the biological mother identified as a perpetrator in two-thirds of these cases (Swain et al., 2007). Further study of the nature of mother-infant interactions and implementation of inexpensive music therapy interventions, such as infant-directed singing, might appear to be beneficial for preventing and fighting maternal negative psychological states and for establishment of secure mother-infant attachments. Cevasco (2008) suggests that music therapy interventions prior to birth can be used to assist with any onset on depressive symptoms.

Among all the existing literature on the subject, at least one recent research (Lopes, Maia & de Andrada e Silvia, 2009, in Portuguese) specifically describes a case when use of infant-directed singing helped to establish a secure attachment in an originally detached mother-infant pair. A 36-year old first time mother could not establish an emotional bond with her infant; she also suffered from severe back pains and dysphonia (voice loss). The goal of the study was to follow and to describe the process of establishing of a mother-infant relationship, emerging from the use of maternal singing as the way of interacting with the baby.

At the beginning of the study, absence of mother-infant attachment was observed; the mother did not pick her baby from the crib, did not talk to him or look at him, or otherwise interact. The baby cried often and for long periods of time. All

the caregiving duties were performed by other members of the family. The mother manifested most of the regular symptoms of postpartum depression.

After several treatment sessions, during which elements of psychotherapeutic talking, massage therapy and birth imitation were used, the mother was asked to sing for the baby. At first, the mother was reluctant to sing and worried about the quality of her voice. Following the therapist's modeling, though, she started singing, and soon realized that the baby, who was lying nearby, stopped crying. Both mother and baby appeared to be more relaxed, and the first communication between them was observed. The mother started singing to her baby every day, which had positive effect on the infant (he did not cry). During the subsequent session the mother picked her baby for the first time and sang, while holding him in her lap. By the end of the session, the baby fell asleep, and the mother cried with relief. From that point, the mother and the infant started to interact regularly, with the interaction being not limited to the therapeutic sessions. Maternal singing remained a significant constituent of this interaction.

It is important to note that this study was not conducted by a certified music therapist, and other alternative medicine techniques (massage therapy, play therapy) as well as elements of psychotherapy were involved into the treatment. Nevertheless, this study provides an evidence that therapist-modeled infant-directed singing can be a helpful tool to be used in treating of postpartum depression and the subsequent disruptions in mother-infant attachment.



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Horace Mann, an early educational leader, emphasized: "Unlike many human attainments where a high degree of excellence must be reached before rewards can be received, singing offers rewards for everyone who attempts it". But a considerable issue that a music therapist working with mother-infant pairs may encounter is the discomfort and even resistance than many mothers at first exhibit when it comes to singing to their babies in the presence of other people (Blumenfeld & Eisenfeld, 2006). "Many mothers vocalized concern about the quality of their singing and seemed very insecure of their voices", - reports Cevasco (2008). Many mothers preferred lower keys and did not use their upper vocal register". Therefore, an important task for music therapy theorists and practitioners would be to develop a strategy which will help new mothers to liberate themselves from such self-consciousness in singing and improve their confidence in vocal performance. This strategy may include recording a CD of the mother singing songs for her baby (Ceasco, 2008), regular participation in parent-infant music groups (Gudmundsdottir & Gudmundsdottir, 2010), elements of psychotherapy (Lopes, Maia & Andrada e Silva, 2009) and modeling of singing activities (L'Etoile, 2006; Lopes, Maia & Andrada e Silva, 2009).

Interestingly, parents' performances for their infants, though not meeting conventional musical standards of excellence, are often estimated as "charming" by naïve adult listeners (Trehub, Hill & Kamenetsky, 1997). In particular, parents use a dynamic range that is unparalleled in any other types of vocal performances, as well

as such “sophisticated” techniques as *rubato* and *ritardando* for tempo changes. All of those serve the expressive intentions of parental performers.

## **Conclusions**

The overview of existing literature on the subject of infant-directed singing and its influence on the new mother’s psychological state shows that maternal singing is an effective means of mother-infant communication, that has positive influence on both the infant’s and the new mother’s well-being. Some of the effects of infant-directed singing on psychological status of a mother include increased relaxation, decreased feelings of sadness, frustration, anxiety and guilt, improved mother-infant attachment, increased confidence in her mothering abilities, increased ability to cope with day-to-day difficulties, feeling more calm, more happy and more optimistic, feeling in control of the situation.

Considering the aforementioned scientific evidence of psychological benefits of maternal singing for both mother and her infant, we can suggest that this intuitive technique engaged by new mothers to reconnect with their babies has a potential to be successfully used as a music therapy intervention.

L’Etoile (2006) suggests the next possible basic strategies of mother-infant interaction coaching by a music therapist: 1) modeling the interaction by singing to the infant while mother observes, 2) guiding the mother to understand the connection between her infant’s cues and specific musical elements, 3) instructing

the mother to sing to her infant in the style that she considers most appropriate to his/her current needs.

Considering diverse psychological needs of new mothers, the future researchers and music therapy practitioners could employ different music therapy strategies, including, but not limited to group, family and individual sessions, use of live or recorded music, keeping a “singing diary”, prenatal and postnatal sessions, vocal and instrumental improvisation, songwriting, and lyric substitution.

Music therapy materials, which could be used for this population, require to be defined as well. Could other types of music, besides lullabies and play songs (the two types of infant-directed songs, universal throughout different cultures (Trehub, Hill & Kamenetsky, 1997)), be beneficial for wellbeing of new mothers? Additional research is needed to answer this question.

Exploration of parent-infant relationships is a comparatively new and rapidly growing field of science. It is noteworthy that many of the articles included into this overview came from the paradigm of music education as well as from some other adjacent areas of science (psychology, psychiatry, neurology, pediatrics, linguistics). In the light of this overlay of the interests, interdisciplinary research techniques may be beneficial for future studies of this subject.

## References

### Articles:

Baker, F., Wigram, T., & Gold, C. (2005). The effects of a song-singing programme on the affective speaking intonation of people with traumatic brain injury. Brain Injury, 19 (7), 519-528.

Blumenfeld, H., Eisenfeld, L. (2006). Does a mother singing to her premature baby affect feeding in the neonatal intensive care unit? Clinical Pediatrics, 45, 65-70.

Byrn, M.D., Hourigan, R. (2010). A comparative case study of music interactions between mothers and infants. Contributions to Music Education, 37 (1), 65-79.

Cevasco, A.M. (2008). The effects of mother's singing on full-term and preterm infants and maternal emotional responses. Journal of Music Therapy, 45 (3), 273-306.

Custodero, L.A. (2007). Harmonizing research, practice, and policy in early childhood music: a chorus of international voices (part 1). Arts Education Policy Review, 109 (2), 3-5.

Gudmundsdottir, H.R., Gudmundsdottir, D.R. (2010). Parent-infant music courses in Iceland: perceived benefits and mental well-being of mothers. Music Education Research, 12 (3), 299-309.

Ilari, B. (2005). On musical parenting of young children: Musical beliefs and behaviors of mothers and infants. Early Child Development and Care, 175 (7&8), 647-660.

Ilari, B., Sundara, M. (2009). Music listening preferences in early life: infant responses to accompanied versus unaccompanied singing. Journal of Research in Music Education, 56 (4), 357-369.

Kenny, D. T., Davis, P.J. & Unwin, M.M. (2002). The effects of group singing on mood, Psychology of Music, 30(2), 175-185.

Kiselevsky, B.S., Hains, S.M.J., Jacquet, A-Y., Granier-Deferre, C. & Lecanuet, J.P. (2004). Maturation of fetal responses to music. Developmental Science, 7 (5), 550-559.

L'Etoile, de, S.K. (2006). Infant-directed singing: a theory for clinical intervention. Music therapy Perspectives, 24 (1), 22-29.

Leibenluft, E., Yonkers, K.A. (2010). The ties that bind: maternal-infant interactions and the neural circuitry of postpartum depression. The American Journal of Psychiatry, 167(11), 1294-1296.

Lopes, M.E., Maia, S.M. & Andrada e Silvia, de, M.A. (2009). Singing voice and the constitution of mother/baby relationship / Voz cansada e a constituicao da relacao mae-bebe. Revista CEFAC – Atializacao Cientifica em Fonoaudiologia e Educacao, 127 (7), in Portuguese.

MacKinlay, E., Baker, F. (2005) Nurturing herself, nurturing her baby: creating positive experiences for first-time mothers through lullaby singing. A Journal of Gender and culture, 9, 69-89.

Milligan, K., Atkinson, L., Trehub, S. E., Benoit, D., & Poulton, L. (2003). Maternal attachment and the communication of emotion through song. Infant Behavior and Development, 26, 1-13.

Nakata, T., & Trehub, S. E. (2004). Infants' responsiveness to maternal speech and singing. Infant Behavior & Development, 27, 455-464.

Paulson, J.F. (2010). Focusing on depression in expectant and new fathers: prenatal and postpartum depression not limited to mothers. Psychiatric Times, 27 (2), 48.

Paulson, J.F., Dauber, S., Leiferman, J.A. (2006). Individual and combined effects of postpartum depression in mothers and fathers on parenting behavior. Pediatrics, 118 (2), 659-668.

Shenfield, T., Trehub, S. E., & Nakata, T. (2003). Maternal singing modulates infant arousal. Psychology of Music, 31, 365-375.

Swain, J.E., Lorberbaum, J.P., Kose, S. & Strathearn, L. (2007). Brain basis of early parent-infant interactions: psychology, physiology, and *in vivo* functional neuroimaging studies. Journal of Child Psychology and Psychiatry, 48 (3/4), 262-287.

Trehub, S.E., Hill, D.S., Kamenetsky S.B. (1997). Parents' sung performances for infants. Canadian Journal of Experimental Psychology, 51 (4), 385-392.

Web-sites:

Postpartum depression. American Psychological Association web-site, <http://www.apa.org/pi/women/resources/reports/postpartum-dep.aspx>, retrieved November 23, 2010.

What is the profession of music therapy? American Music Therapy Association web-site, <http://www.musictherapy.org>, retrieved November 26, 2010.