Perinatal Music Therapy and Antenatal Music Classes: Principles, Mechanisms, and Benefits

Wolfgang Mastnak, PhD

ABSTRACT

Antenatal music activities are in the ascendant. Regarding evidence-based research, the article advocates 5 main aims: music therapeutic control of pre- and perinatal stress, anxiety, and depression; music-related mental and physical birth preparation comprising cognitive adjustment, emotional regulation, physical activity, relaxation and pain management, and social inclusion; music-associated bonding and self-efficacy; prenatal sound stimulation to trigger learning processes, pedagogical priming and brain maturation; music activities to facilitate the child's acculturation and adaptive self-regulation. Underlying mechanisms such as neuroplasticity help to understand the multifaceted effects of music in pre- and perinatal care. Individual conditions and features of the mother and her child have to be taken into account and music interventions to be harmonized with complementary perinatal programs.

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Mothers tell us about a remarkable discovery: As soon as they know that they are pregnant footways, shopping centers and parks seem to be full of baby pushchairs, prams, and buggies. This common phenomenon, however, does not only apply to buggies. Filtering out irrelevant information and focusing on

things which are relevant to us is a cognitive mechanism of high practical importance: selective attention.

Of course, pregnant women not only see more prams than before pregnancy. Watching TV, surfing on the Internet, or listening to chats in the metro are similarly controlled by their very individual mode of selective attention: Music increases the unborn child's intelligence, sound stimulation enhances the brain's maturation, the Mozart effect boosts creativity and cognitive skills, and in utero listening to lullabies improves postnatal sleeping habits.

This sounds good, is highly promising, triggers expectations, and opens new markets: the commercialized birth of antenatal music classes and prenatal

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music education. In fact, there is high evidence that music exerts a positive influence on the fetal development. However, music should not be considered a sort of “aesthetic panacea.” Even though many musical effects on the developing human psychophysiological system are stunning, we have to be careful not to overestimate the power of music and not to ignore underlying mechanisms.

Nonetheless, the more we discover how sound, rhythm, neural maturation, neuroplasticity, epigenetic processes, cognitive development, and so forth are interrelated, the more “music in antenatal care” gains in medical and educational importance. In obstetrics, midwifery, pre- and perinatal education, and developmental psychology, music has become a topic of concern. In many cases, however, interdisciplinary research and antenatal music application go separate ways.

Bridging this gap could help to optimize the benefits of antenatal music activities, to control possible sound-associated risks, and to create scientifically reliable standards for best practice. This article intends to contribute to a scientific basis of this promising movement and suggests a multidimensional framework for antenatal music classes.

CONTROL OF PERINATAL STRESS, ANXIETY, AND DEPRESSION

Hernandez-Reif, Maluga, and Field (2012) point to the remarkable correlation between maternal depression symptoms, obstetric complications, and distress-associated infantile facial expressions. As these babies, exposed to lullabies, cried more often than controls, the authors hypothesize a certain inner relationship between these phenomena.

Music therapeutic reduction of maternal distress, anxiety, and depression as well as music-associated control of related dispositional risk factors concern antenatal care. Vivette Glover (2015), one of the outstanding experts on prenatal stress, highlights that many prospective studies have shown that if a mother is depressed, anxious, or stressed while pregnant, this increases the risk of her child having a wide range of adverse outcomes including emotional problems, symptoms of attention deficit disorder, or impaired cognitive development. Glover mentions that genetic conditions and postnatal care clearly affect these outcomes but lays stress on prenatal causal components.

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Hadzi-Pavlovic, Leader, Saint, & Parker, 2005). Maternal stress seems to affect especially cognitive abilities and fearfulness in infancy (Bergman, Sarkar, O'Connor, Modi, & Glover, 2007). Birth, however, does not mark the end of these unfavorable influences. Both pre- and postnatal maternal anxiety and depression may contribute to the child's maladjustment (Barker, Jaffee, Uher, & Maughan, 2011).

Considering these findings from a music therapeutic perspective raises further issues: Can music therapy help to reduce maternal stress, anxiety, and depression and consequently control related pathogenic influences on the fetus? Are there positive “side effects” of music therapy? Is music therapeutic efficacy limited to transplacental transmissions or should we also assume other beneficial mechanisms?

Music therapy has proved to be an efficient means to reduce stress and anxiety in patients with various, for example, cardiovascular diseases (Bradt, Dileo, & Potvin, 2013) and looks back to a long tradition of treating depression (Heise, Steinberg, & Himmerich, 2013). Regarding music therapy in psychological prevention programs and psychiatric care, principles of emotional regulation seem to play a crucial role (Moore, 2013). Emotional regulation encompasses a broad spectrum of psychological factors. In music-induced prenatal stress reduction, these also include prenatal bonding (Carolan et al., 2012a, 2012b). During the third trimester of pregnancy, music and relaxation proved to have significant effects on the reduction of anxiety levels (Liebman & MacLaren, 1991).

Pre- and perinatal stress, anxiety, and depression have to be seen in a multidisciplinary and etiological context. Music therapy is one of the disciplines that are involved in prenatal health care and has shown positive effects on stress, anxiety, and depression (Chang, Chen, & Huang, 2008). On that account, we suggest individually shaped programs and treatment plans for antenatal music classes.

MENTAL AND PHYSICAL PREPARATION FOR CHILDBIRTH

There are highly valid quality standards for antenatal, perinatal, and postnatal health care. They refer crucially to the control of physiological and mental

risk factors such as hypertension in pregnancy or depressive dispositions. From this perspective, we understand music therapy as an add-on intervention, as a way to facilitate health promotion as well as preventive measures, and to improve individual and social well-being. In carefully balanced collaboration with obstetrics and midwifery, music therapy helps to stabilize physiological and psychological conditions during pregnancy and to enhance the sustainability of antenatal care measures.

Cognitive Adjustment and Emotional Regulation

Pregnancy is obviously an important life event. It may be joyful, and it may torment the mother's cognition and emotions. It may enrich life or destroy plans and life expectations. Cognitive adjustment is often a sensitive issue when expecting a baby. Affonso, Liu-Chiang, and Mayberry (1999) identify most heterogeneous worries women may experience during the childbearing period such as how pregnancy affects one's body image, whether the baby will be normal and healthy, how being pregnant affects the relationship with the spouse or mate, whether to continue employment during or after pregnancy, and uncertainties about adequate finances to support the new or growing family.

Emphasizing that these worries are strongly influenced by the characteristics of the woman's personality, coping styles, cultural orientation, and social environment, the authors consider the "women's childbearing adaptation" to be of decisive importance to mental health. There are, of course, myriads of psychoanalytic, cognitive-behavioral, Gestalt-therapeutic, and so forth methods to support and enhance life adjustment. Music therapeutic approaches may refer to these theoretical principles but are more typically based on the very unique features of the dyad human and music: music-induced trance triggering mental self-organization and life readjustment, music-guided readjustment of life philosophies and one's self-concept, and musically controlled energy and mood regulation. As these approaches are mostly not conflict-centered but resource-oriented, they are not likely to generate unfavorable pathological self-labeling.

There is common clinical evidence that pregnant women tend to intensify emotional life and are prone to mood swings: "When a woman learns that she is pregnant, her emotions are like a roller coaster" (Torgersen & Curran, 2006). Although the previous paragraph "Control of perinatal stress, anxiety, and

depression" refers to clear-cut issues such as specific anxieties or depression, discussing emotional regulation involves the whole spectrum of the woman's feelings and moods. In their systematic review, Fink, Urech, Cavelti, and Alder (2012) showed that relaxation during pregnancy promotes well-being and highlighted that "relaxation during pregnancy is associated with salutogenic effects that include regulation of emotional states and physiology" (p. 296).

Regarding the regulation of mood swings, we advocate music therapeutic methods that not only provide relaxation techniques but also comprehend emotion in a wider sense. Such approaches are designed to respect the mother's individual expectations and pregnancy-related moods. Music therapy not only lays stress on emotional problems but also enhances positive attitudes toward pregnancy, childbirth, and parenting. Music therapy provides a wide spectrum of evidence-based methods for emotion regulation which apply to pre- and perinatal care (Uhlig, Jaschke, & Scherder, 2013).

Physical Activity

Many studies advocate physical activity during pregnancy and show positive effects on birth (Domenjoz, Kayser, & Boulvain, 2014). Hence, clear-cut antenatal exercises have become a standard in obstetrics and midwifery. In sports medicine, however, the delicate discrepancy between knowing and doing represents a problem of high preventive medical relevance. Listening to music to increase one's impetus to physical activities has become a common practice. Moreover, Fritz, Halfpaap, Grahl, Kirkland, and Villringer (2013) showed that combining music making with systematically increasing physiological arousal by exercise machine workout makes physical workout more desirable.

These results point to possibilities of increasing the positive valence of health-related sports. In pregnant women, these effects may positively interrelate with the fact that they show stronger psychological as well as physiological reactions to music (Fritz et al., 2014). This is of importance to music-related mood regulation and may serve as an add-on means to control maternal hypertension by acoustic stimulation. Regarding repetitive exercises, music also helps to support motivation and to enhance cognitive and motor programming for rhythmical and cyclic processes that dominate birth. Carefully adjusted antenatal music-sports programs are promising but still need further investigations.

Relaxation and Pain Management

Muscle tensions and lower back pain are common pregnancy discomforts. Although they are mostly caused by the woman's rapid weight gain and specific abdominal muscle strain, we also have to take possible psychosomatic stress factors into account. In such cases, progressive muscle relaxation (PMR) therapy proved to be an adequate complementary therapy that is likely to improve the physical and psychological outcomes of pregnancy. Akmeşe and Oran (2014) show that PMR accompanied by music may be an effective therapy for improving pain and quality of life in pregnant women with lower back pain.

Relaxation, muscular control, and pain management play, of course, a crucial role in obstetrics and midwifery. Today, music is widely regarded as an appropriate alternative, complementary, or add-on means to reduce anxiety and pain (Beckett, 2012). By contrast, a meta-analysis on relaxation techniques for pain management in labor says that there was insufficient evidence for the role of music and audio-analgesia (Smith, Levett, Collins, & Crowther, 2011).

Facing such contradictions, we advocate a complex continuum of pre- and perinatal trainings as well as subsequent early childhood music activities. Although there is good general evidence for positive effects of music in anesthesia and analgesia (Matsota et al., 2013), we emphatically suggest classes including active music-body-oriented trainings for relaxation, pain management, and the preparation of birth. The woman's competence to actively control pain sensation and motor processes seems to be more adequate than singular application of music during labor and birth.

Social Inclusion

The poetic title of a qualitative meta-data analysis of postpartum depression gets to the heart of the problem: "suffering in silence" (Knudson-Martin & Silverstein, 2009). A main result of this study refers to the coincidence of a mother's feeling to have failed to live up to cultural standards for a "good mother" and the experience that these feelings could not be spoken. In this psychological high-risk constellation, the self-attribution of incompetence and isolation play crucial roles.

Nevertheless, postpartum depression is a complex condition, a major public health issue, and profoundly impacts the whole family. Dealing with the complexity of postpartum mental health and

illness, a Canadian study aims to identify the main mechanisms and factors associated with the presence or absence of postpartum depression. Sword, Clark, Hegadoren, Brooks, and Kingston (2012) stress that main protective factors and processes did not exist in isolation. These findings are compatible with most other studies on this topic such as an Australian paper that identifies social exclusion, infant behavior, and social isolation among migrant mothers' as main determinants of postnatal depression (Eastwood et al., 2013).

There are myriads of music educational and music therapeutic models to enhance social inclusion, the feeling of safeness, responsiveness and reciprocity, and verbal as well as nonverbal expressions of feelings. These approaches may also serve as a reasonable basis for an ante- and postnatal continuum of aesthetic and creative activities with the child.

BONDING AND SELF-EFFICACY

Music is often tagged as a perfect tool to strengthen mother-child bonding. A recent study brings the complex aspect of vaginal birth and pain up to consideration. Regarding the fact that unfavorable birth experiences have been shown to negatively impact postpartum maternal health, Simavli et al. (2014) underscore that using music therapy during labor decreased postpartum anxiety and pain, increased the satisfaction with childbirth, and reduced early postpartum depression rate (p. 194). They say that music therapy can be clinically recommended as an alternative, safe, easy, and enjoyable nonpharmacological method for postpartum well-being. Moreover, music is also an appropriate means to decrease preoperative anxiety in mothers expecting cesarean surgery (Kushnir, Friedman, Ehrenfeld, & Kushnir, 2012; Li & Dong, 2012). In this context, we have to consider anxieties and pain experiences as important factors that interfere with bonding, attitudes toward parenting, and self-efficacy.

From a music therapeutic perspective, such positions match up with Hosseini, Bagheri, and Honarparvaran (2013) who say that music therapy during labor increases tolerance to pain, increase parturition and uterus activity, and shorten labor duration. In a wider context and comparing similar results, we have to take multifaceted consequences of these benefits into consideration. Pain and the experience of helplessness are likely to exert a negative influence on bonding and the mother's awareness of self-efficacy. Symptoms of self-consciousness and

lacking self-efficacy not only decrease the mother's life quality but also may destabilize bonding characteristics and the infant's emotional stability.

Experience of helplessness, intolerance of uncertainty, and poor self-efficacy are potentially detrimental to a mother's quality of life and may exert unfavorable influences on the child's development and behavior. To control such negative factors and their probable interference with pregnancy, parenting is considered a major benefit of antenatal classes. Although we advocate holistic antenatal programs, even simple activities show convincing results. An antenatal music project in Limerick showed that singing lullabies in pregnancy had a soothing and calming effect and appeared to facilitate the expression of difficult emotions such as fear and anxiety (Carolan, Barry, Gamble, Turner, & Mascareñas, 2012a). These interventions that are easy to implement appeared to have an effect on reducing maternal stress and encouraging infant attachment (Carolan, Barry, Gamble, Turner, & Mascareñas, 2012b).

Self-efficacy, particularly, has become an important factor in psychosomatic health care. An individual's awareness of self-competence, that involves the ability to control possible pathological risks and conditions, maintains and enhances emotional stability and holistic well-being. It is obvious that childbirth confidence is an important marker for women's coping abilities during labor and birth (Schwartz et al., 2015). Nonetheless, in a wider context, self-efficacy plays an important role in the mother-father-child triadic interaction, hence, the great influence on the family members' well-being (Korja et al., 2015). There is still a lack of scientific research about the effects of antenatal music classes on the mother's self-efficacy and the impact of postnatal music sessions on her educational self-confidence. In the light of practical experiences, however, we suggest a dual mechanism consolidating the mother's self-reliance: (a) music-induced emotion stabilization processes and (b) the achievement of skills to use arts-related means to support the child's development, social interactivity, and adaptive responsiveness.

LEARNING AND PEDAGOGICAL PRIMING EFFECTS

Partanen, Kujala, Tervaniemi, and Huutilainen (2013) use a clear-cut setting to yield convincing and plausible arguments for prenatal learning.

Using event-related potentials, they show that extensive prenatal exposure to a melody induces neural representations that last for several months. Moreover, the fact that infants recognize music and particularly the mother's singing voice (Cevasco, 2008) from their intrauterine times gives rise to music psychological questions. Fetal learning mechanisms and neural brain development are closely interrelated. Positive auditory experience is considered essential for early brain maturation and a potential contributing factor for healthy neurodevelopment (McMahon, Wintermark, & Lahav, 2012).

These two aspects are of fundamental importance to prenatal music education: What does a fetus actually learn and how does prenatal stimulation enhance early brain maturation? These very different perspectives are complemented by the question of how intrauterine music exposure influences peri- and postnatal behavior. Arya, Chansoria, Konanki, and Tiwari (2012) used the Brazelton Neonatal Assessment Scale to evaluate the effect of antenatal music exposure on term appropriate-for-date newborns' behavior. The infants of mothers exposed to music during pregnancy performed significantly better clusters. Maximal beneficial effects were seen with respect to orientation and habituation. These results are compatible with a Brazilian study (Tabarro, de Campos, Galli, Novo, & Pereira, 2010) showing that exposure to music that had been used in antenatal musical sensitization sessions considerably reduced stress "and made it easier for the baby to adjust in the first months of life" (p. 445).

In addition to these evidence-based benefits of prenatal music activities, there are widespread opinions that antenatal music classes would make a child more intelligent. Although rigorously opposing that position, our article highlights more subtle cognitive mechanisms that may be triggered by antenatal sound stimulation. Translational studies and interdisciplinary syntheses point to the high impact of sound stimulation on the fetal brain development. In general, music is nowadays regarded as important means to promote neuroplasticity across the life span (Wan & Schlaug, 2010).

Epigenetics provide a complementary aspect that underscores the significance of music for neuropsychological development. Although in clinical contexts, this still young discipline focuses more on pathological, epigenetic, and altering environmental factors (Lo & Zhou, 2014); there are strong arguments (Brigati et al., 2012) for the positive

epigenetic influence of music on our brain and mind. An interdisciplinary approach allows us to understand music as a means that enhances neurophysiological preconditions of our mind and cognition and hence learning processes in general. These theories emphatically advocate a whole continuum of music activities and doubt that isolated prenatal music stimulation has a significant positive long-term effect on the child's intelligence and intellectual features.

ACCULTURATION AND ADAPTIVE SELF-REGULATION: RECIPROCITY AND WELL-BEING

Naively speaking, crying babies are unhappy babies and stress their mothers. More clinically speaking (Dennis & Ross, 2005), "Infant sleep patterns and maternal fatigue are strongly associated with a new onset of depressive symptoms in the postpartum period" (p. 187). There is high evidence that the amount of infant crying during the first months of postpartum irritate the mothers' circadian rhythms, exacerbate their tiredness, trigger depressive symptoms, and interfere with the parent-child interaction (Kurth, Kennedy, Spichiger, Hösl, & Stutz, 2011).

This condition represents an important clinical and health-care-related challenge and calls for appropriate means (Kurth et al., 2010): "Today mothers rarely enjoy restful days after birth but enter directly into the challenge of combining baby and self-care. They often face a combination of infant crying and personal tiredness. Yet, routine postnatal care often lacks effective strategies to alleviate these challenges which can adversely affect family health." Although Kurth et al.'s (2010) study does not mention music-related approaches, music therapy provides a wide spectrum of evidence-based methods and should be taken into consideration.

Particularly in neonatal intensive care research, evidence of music therapeutic benefits "for premature infants, especially in terms of pacification and stabilization" (Haslbeck, 2012, p. 203) was found. Compared to conditions at home, neonatal intensive care unit (NICU) structures facilitate greatly systematic investigations, hence, the advanced status quo of music therapeutic research in premature infants. Studies point to favorable effects of music therapy on vital signs, feeding, and sleep in premature infants (Loewy, Stewart, Dassler, Telsey, & Homel, 2013) and underpin the hypothesis that music listening may alleviate and appease inconsolable

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crying babies (Keith, Russell, & Weaver, 2009). Such studies qualify older statements that deny significant influences of music on newborns (Owens, 1979).

Studies dealing with the effect of perinatal application of music are mostly difficult to compare and partly contradictory. A randomized clinical multisite trial of 272 premature infants, for instance, shows that lullabies, instrumental sounds that simulate the fluid noises of the womb and acoustic stimuli which are meant to "remind" the baby of heartbeat sounds that would be heard in the womb, have very comparable positive effects on postpartum sleeping behaviors (Loewy et al., 2013). By contrast, other studies say that babies prefer music to other auditory stimuli and underscore the high importance of the mother's voice (Standley & Madsen, 1990).

Friedman, Kaplan, Rosenthal, and Console (2010) highlight beneficial perinatal effects of singing on mothers with psychiatric disturbances. Characterizing lullabies as a universal and ancient song form that play an important role in both comforting infants and providing a critical bonding experience, the authors emphasize their perinatal benefits on mothers with psychiatric problems such as depression, bipolar disorders, or psychoses (p. 219).

In spite of a clear identification of single favorable effects of ante- and perinatal music application, we advocate a multidimensional and more holistic view. According to Gestalt psychology, the whole phenomenon cannot be narrowed down to the sum of the parts. In this context, we stress that the quotation "The whole is greater than the sum of its parts" is incorrect: it is "other." This is precisely what we want to say in clinical contexts: Calming down the crying infant may be a goal. But we have to see the target in a wider context. It may be that the true target refers to a process of rebalancing. In both cases, music known from in utero times, bonding, and "anthropomorphic harmony"—a certain presumed analogy between musical and human structures—play crucial roles, although in a different way. Single music functions have to be seen in a systemic context of biophysical adaptation, individual growth, and acculturation.

CONCLUSION

Worldwide antenatal classes and prenatal music stimulation gain in importance. Ethical standards require high responsibility when dealing with the development of the fetus and a sound stimulus-controlled enhancement of cortical neuroplasticity. We advocate activities that are based on interdisciplinary scientific research and respect individual experiences. There are good arguments to assume significant benefits of ante- and postnatal music classes. Nevertheless, there are also certain risks to be considered and controlled. In many fields, music has become a strong health-promoting factor. It seems that this applies also to the fetus and the newborn child. This article aims to foster professional discussion and contribute to optimized applications.

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WOLFGANG MASTNAK is a professor of music education and therapy in Munich and Shanghai. His main fields of research are music therapy, cross-cultural music education, music therapy in psychiatry and cardiology, neuropsychology, music in pre- and perinatal care.