EFFECTS OF MUSIC STIMULATION ON PREGNANCY

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ABSTRACT

The study aims to explore, review and report the effects of music stimulation among pregnant women. Music therapy is the clinical and evidence-based use of music to complete the individualized goals within a therapeutic relationship by a professional who has completed an approved music therapy program (American Music Therapy Association definition, 2005). Studies found that music increases the unborn child's intelligence; sound stimulation enhances the brain's maturation (McMahon, Wintermark, & Lahaina, 2012); the Mozart effect boosts creativity; and in utero listening to lullabies improves prenatal and postnatal sleeping habits (Wolfgang, 2016). The study aims to explore the effects of music stimulation on psycho-physiological problems.

Music-related bonding, prenatal sound stimulation to trigger learning processes, pedagogical effects, an evolutionary perspective of music, and brain maturation among pregnant women psycho physiological problems among pregnant women were discussed in this study. The effects of music on pregnant women are powerful to overcome psycho-physiological mechanisms (Akmese& Oran, 2014). Studies also discover how sound, rhythm, neural maturation, neuroplasticity, epigenetic processes, and cognitive development to music in prenatal care, benefit medical and academic performance (Mastnak, 2016). Music therapy affects the endocrine, autonomic, cognitive, and emotional domains of the human stress response. Music Therapy can also be utilized with healthy individuals to improve overall wellness (Scheve, 2004). Music has been utilized to provide quiet and relaxation for centuries and all across the world. These are the most extensively researched effects of music (Chanda & Levitin, 2013; de Witte et al., 2020a; Juslin&Vastfjall, 2008; Koelsch, 2015; Mehr et al., 2019). As a result, music therapy interventions are increasingly being used to reduce stress and improve client well-being across a wide range of clinical populations (Agres et al., 2020; Bainbridge et al., 2020; Juslin&Västfjäll, 2008; Kemper &Danhauer, 2005; Koelsch, 2012, 2015; Landis-Shack et al., 2017; Thaut&Hoemberg, 2014).

Key Words: *Music therapy, pregnant women, prenatal care, postnatal care*

1. INTRODUCTION

Music has become in popularity as a low-cost, easily accessible intervention with high acceptability among pregnant women (Corbijn van Willenswaard et al., 2017). When confronted with the emotional, physical, and social changes that occur during pregnancy, most pregnant women experience a variety of stress (Chang, Chen, & Huang, 2008). Prenatal stress, anxiety, and depression must be examined from a multidisciplinary and etiological perspective. One of the disciplines included in prenatal health care is music therapy, which has been demonstrated to have beneficial benefits on stress, anxiety, and sadness (Chang, Chen, & Huang, 2008). Furthermore, pregnant women are concerned about their fetus's health and the upcoming lifestyle change (Chang et al., 2008).

Music's medical significance has been argued and documented since 4000 BC (Spintge and Dorh 1992), demonstrating a long history of music and its association with health and well-being. Music has been termed the "world's most underutilized asset" (House of Lords 2019), underlining its potential to create health and economic gains in the UK. The World Health Organization (WHO) analyzed the global evidence relating the arts to health and well-being in a report. It confirms that participation in the arts has a positive impact on both mental and physical health from conception to death (Fancourt and Finn 2020).

The relaxing and stress-relieving benefits of music have received the greatest attention (Chanda & Levitin, 2013; Gillen, Biley& Allen, 2008; Juslin&Västfjäll, 2008; Koelsch, 2015). For decades, music has been utilized as a stress-reduction strategy, such as music activities (such as singing or composing music), music listening for a specific patient group (music as medicine, and live music therapy provided by music therapists (Bradt, Dileo, & Shim, 2013b; Gold et al., 2011).

However, the more we learn about the connections between sound, rhythm, brain maturation, neuroplasticity, epigenetic processes, cognitive development, and other factors, the greater the medical and educational value of music has become a source of concern in obstetrics, midwifery, pre, and perinatal education, and developmental psychology (Mastnak, 2016). Interdisciplinary research and antenatal music application, on the other hand, often go their different paths.

In a study published in 2013, exposing an unborn baby to music has a long-term influence on the brain. The researcher discovered that newborn babies remembered a version of 'Twinkle, Twinkle Little Star' that was played to them in the womb and responded differently also other versions were played to them (Partanen et al., 2013). Music promotes the IQ of an unborn child, sound stimulation improves brain maturation, and listening to lullabies during pregnancy improves postnatal sleeping patterns. The unborn baby will undoubtedly be able to play music during the third trimester (Partanen et al., 2013). While mild sounds, such as lullabies, are intended to be relaxing, excessively loud or irregular noises frighten unborn babies, and too

much noise can be stressful (Committee on Environmental Health, 1997). Assure the volume isn't too loud and that the music selection is fairly melodic - maybe wait a few years before exposing the infant to favorite thrash metal tracks. A few years ago, when approaching such topics from an evolutionary perspective (Wallin et al., 2000; Justus, 2005; McDermott, 2005; Cross, et al, 2007; Vitouch &Ladinig, 2009), there is still debate regarding whether music is rooted in our biology, if it played some role in our species' survival, or if so, whether musicality was the outcome of natural.

The results of a study conducted by Frances Rauscher, Gordon Shaw, and Catherine Ky (1993) on the influence of listening to Mozart music on spatial reasoning were published in Nature. After listening to Mozart's Sonata for Two Pianos in D major, K. 448, vocal relaxation instructions, and silence, the authors gave study participants one of three standard assessments of abstract spatial reasoning. The researcher discovered a transitory improvement in spatial reasoning, as judged by the Stanford-Binet IQ test's spatial reasoning subtasks. Rauscher et al. demonstrate that the music condition's enhancing effect is only transient: no student experienced effects that lasted longer than the 15-minute time in which they have been assessed. The research does not claim an enhancement in overall IQ (Rauscher et al., 1995).

According to Rauscher, Shaw, and Ky, (1993) the Mozart effect has been used to describe the transient improvement in spatial performance in standardized tests following exposure to the first movement "allegro con spirito" of Mozart's sonata for two pianos in D major. These discoveries proved incredibly difficult to repeat, resulting in a plethora of contradictory outcomes. Sixteen years after the initial publication, we conduct the largest, most exhaustive, and up-to-date meta-analysis to date (nearly 40 studies, over 3000 subjects), besides a variety of unpublished research papers, to finally clarify the scientific record on whether or not a specific Mozart effect exists (Pietsching & Voracek, 2010).

Researchers were able to prove that the overall estimated effect is small (d=0.37, 95 percent CI [0.23, 0.52]) for conditions relevant to the Mozart sonata KV 448 vs samples exposed to non-musical stimuli or no stimulation before spatial task performance. Furthermore, the estimate of effect sizes for the sample was subjected to other musical stimuli and samples exposed to a no stimulus at all resulted in effects that were similar in strength, whereas the effect between the two music conditions was negligible. Furthermore, formal tests revealed indications of confounding publication bias, necessitating downward effect correction. The major conclusion of this article, however, is unquestionably the considerably greater overall effect (Pietsching & Voracek, 2010).

1.1. THE AIM OF THE STUDY

The study aims to explore, review and report the effects of music stimulation among pregnant women.

1.2. OBJECTIVES OF THE STUDY

The following objectives were constructed to understand and explore the problems during the pregnancy period.

1.2.1. To understand the effects of music stimulation on psycho physiological wellbeing among pregnant women.

1.2.2. To explore, review and report the effects of music stimulation among pregnant women.

1.2.3. To review and report the effects of music among pregnant women.

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2. MUSIC THERAPY AND MUSIC MEDICINE

Music therapy is the professional and evidence-based use of music treatments to achieve customized goals within a therapeutic partnership into physical, emotional, mental, social, and approach problems (Aalbers et al., 2019; Agres et al., 2020; American Music Therapy Association [AMTA], 2018; de Witte et al., 2020a). Music therapy research is rapidly expanding (de Witte et al., 2020a). The effects of music listening interventions, such as music medicine,' are primarily caused by music's general influence on the stress response, however, the outcomes of music therapy may also be described by the therapeutic relationship through patient-therapist attunement through the use of music. According to Dileo (2006), Music therapy is more effective than music medicine therapies because music therapists tailor their interventions to the specific needs of their patients (Bradt et al., 2010; Dileo, 1999, 2006).

Bradt et al. (2016) found that music medicine therapies and music therapy were similarly helpful in reducing (state) anxiety in a Cochrane study. Bradt et al. (2015) compared 'music medicine' to music therapy and discovered that both types of therapies were equally helpful for anxiety and stress management, even though 77.4% of participants preferred music therapy for treatment options. This patient's choice for music therapy was related to the quality of therapeutic interactions, interactive music-making, and the ability to express emotions, which is what distinguishes music therapy from music listening interventions (Bradt et al., 2015; Gutgsell et al., 2013). Importantly, because it is sometimes difficult to meet the standards for randomization and/or masking methods, the majority of effective research on music therapy is quasi-experimental (Bradt et al., 2013b; de Witte et al., 2020a; Magee et al., 2017).

3. SELECTION OF MUSIC FOR PREGNANT WOMEN

Pregnant women and fetuses can benefit from music in terms of both physical and psychological well-being. Music fetus education can help pregnant mothers release stress and keep a happy mindset, which will be passed on to the fetus. The fetus will grow steadily and healthily in the pregnant woman's womb as a result of this good attitude. Music can have physiological impacts on pregnant mothers and their fetuses in addition to its pleasant psychological effects (Zhang, 2020).

To a certain level, music coordination can effectively alleviate pregnant women's worry and nervousness during labor. Pregnant ladies benefit from music coordination in terms of analgesia. To some extent, it can successfully activate the central nerve of pregnant women's hearing system, raising encephalin concentration, suppressing discomfort, and playing soft music during the cycle of pregnant women. We perceive a gradual decrease in pain when an individual's attention is drawn to internal and exterior stimuli because these sensations are more exciting than pain (music, conversation, etc) (Zhang, 2020). Our Future helps pregnant women to relax during labor and helps to decrease stress. Playing calm and gentle music inside the delivery room will provide pregnant women with a relaxed sense.

The volume should be moderate and clear enough for pregnant ladies to sense the rhythm of the music. To some extent, it can shorten the labor phase and successfully boost natural birth, reducing the likelihood of cesarean section for pregnant women. Music has educational qualities that can not only ease a pregnant woman's emotions but also influence the fetus via sound waves. As a result, when pregnant women choose music in the early stages of pregnancy, they should first consider music with a steady pace and a mellow melody to help them relax. Music with a feeling of rhythm can be added to the middle and late stages of pregnancy to encourage the development and growth of fetal motor neurons. For example, Mozart's Sonata for two pianos in D major is one of the most well-known pieces of fetal education music in the world. A dynamic rhythm will encourage the development of spatial thinking patterns and cognitive development of the middle-late fetus (Zhang, 2008).

When choosing a song, music should avoid wide-frequency symphonies and high-frequency compositions, which cause brain weariness. High-frequency stimulation damages the cochlea's basal membrane, which is hazardous to fetal education. And avoid music with a quick burst of sound, especially low and medium frequencies music, which is possible to enter the uterus with a sudden burst of music. It is not appropriate for fetal education. Choose music with high sound pressure and regulate the relaxing and quiet music between 5 and 1500 Hz. In addition to considering the frequency of music, it is necessary to assess the rhythm of the song and analyze the impact of rhythm on the fetus, and avoid music with excessive rhythm stimuli to the fetus. (Zhang, 2020).

4. MUSIC THERAPY AND PSYCHOPHYSIOLOGICAL WELL-BEING AMONG PREGNANT WOMEN

In terms of evidence-based research, the study explores the psychophysiological well-being of music therapeutic control of antenatal anxiety, stress, depression, hypertension, gestational diabetes, and childbirth preparation, including adjustments in cognitive function, emotional stability, pain control, and social integration (Mastnak, 2016). Anxiety during pregnancy predicted gestational age and preterm delivery in seven of the 11 studies reviewed, but only when paired with other characteristics or in subgroups of the sample (Schetter, 2011).

Pregnancy anxiety (also known as "pregnancy-specific anxiety" and comparable to "pregnancy distress") has been reported to have more consistent effects. Pregnancy anxiety appears to be a distinct and definable syndrome characterized by anxieties about fetus health and well-being, hospital and health-care experiences (including one's health and survival during pregnancy), impending childbirth and its aftermath, and parenting or the maternal role(Schetter, 2011). The music describes an emotional state that is similar to state anxiety but is more contextually related, meaning it is linked to concerns about a current pregnancy.

Feeling nervous, frightened, afraid, or panicked about the pregnancy were among the four descriptors used to assess prenatal anxiety (Roesch, et al., 2004). The negative effects of pregnant anxiety on preterm birth (PTB) (gestational age at birth) have surprisingly convergent empirical evidence across investigations of varied cultures (Schetter, 2010 &2009). More than ten prospective studies have been undertaken, which all show significant effects on birth time. More than a dozen of investigations on sad mood or trauma symptoms, on the other hand, showed significant impacts on gestational age or PTB (Schetter, 2011). Increased antenatal depressive symptoms were linked to an increased risk of PTB in a Swedish study (Fransson, Ortenstrand & Hjelmstedt, 2011).

Music therapy stimulated emotions are related to brain regions that are also associated with non-musical basic emotions, such as the reward system, insula, orbit frontal cortex, amygdala, and hippocampus, according to neuroimaging studies (Blood and Zatorre, 2001; Trost et al., 2012). Additionally, music can have a significant impact on the emotions of both the listener and the performer (Studer et al., 2011). As a result, music therapy is easily seen as having a favorable impact on children's and adults' well-being and social development. However, the more we learn about the connections between sound, rhythm, brain maturation, neuroplasticity, epigenetic processes, cognitive development, and other factors, the greater the medical and educational value of "music in antenatal care." Music has become a source of concern in obstetrics, midwifery, prenatal and perinatal education, and developmental psychology. Interdisciplinary research and antenatal music application, on the other hand, often go on different paths.

The study found that pregnant women incorporate this low-cost way of music into their daily routines to relieve stress, anxiety, and despair. More research is required to determine the long-term advantages (Chang, Chen & Huang, 2008). Music is shown to have therapeutic effects on both the body and the mind in the last decade (Liu, Chang, & Chen, 2010). Music, by neutralizing negative emotions, raises the anxiety threshold, harmonizes inner processes, assists patients in reaching an advanced state of relaxation, and decreases stress. The right brain's aesthetic enjoyment might cause the pituitary gland to release endorphins, lowering physical responsiveness and relaxation.

Furthermore, music impacts emotions, body musculature, and autonomic processes such as blood pressure, heart rate, and respiration rate, as well as the interaction between the thalamus

with the reticular activating system (Chang et al., 2008; Sidorenko, 2000; Wigram, Pederson, & Bonde, 2002). In adults and children, calming music with a flowing, lyrical melody, simple harmony, gentle tonal color, and easy rhythm (about 60–80 beats/minute) might replicate a relaxation response and allow emotional equilibrium (Chang et al.; Han et al., 2010; Hayes, Buffum, Lanier, Rodahl, &Sasso, 2003; Liu et al., 2010). Prenatal music composed of soothing music is thought to give birth to a maternal stable condition both psychologically and physically, as well as to help establish a comfortable environment for the fetus in Korea (Choi, 2002).

Music has also been used as a therapeutic intervention in several patient situations, with ages ranging from adults to the elderly (Han et al., 2010; Jeon, Kim, & Yoo, 2009; Lai et al., 2006; Lee, 2010; Na & Yang, 2009; Park & Na, 2003). Many types of study, in particular, suggest the good effects of music therapy used during pregnancy on lowering anxiety and stress (Chang & Chen, 2005; Laopaiboon, Lumbiganon, Martis, Vatanasapt, & Somjaivong, 2009; Liu et al., 2010; Yang et al., 2009). Most studies, however, only revealed that music was useful for decreasing anxiety, stress, and discomfort during preterm, labor, and cesarean delivery (Lee; Yang & Kim, 2010).

Music's calming benefits have been traditionally understood for generations. Despite this, music has received little attention in professional medical settings, where patients have high levels of anxiety. While anxiety does not induce chronic hypertension (HT), can produce acute elevations in blood pressure (BP), as seen in patients in several medical settings; consequently, BP and heart rate (HR) may be a result of anxiety in these contexts. Music therapy has been studied to see how it affects self-reported anxiety, blood pressure, and heart rate (Loomba et al., 2012; Wiklund, 1997). According to the findings of the included research, music may have a greater effect on lowering SBP, DBP, and HR in mechanically ventilated patients.

Larger randomized controlled trials investigating music as an intervention to reduce physiological characteristics such as blood pressure and heart rate, and thus anxiety, are required. Future research should preferably include a large number of patients and focus on a specific healthcare context (Loomba et al., 2012). Music of various genres, including patient-selected music, should be examined (Stevens, 1990). The appropriate duration of music therapy, as well as the scheduling in the relation to operations, have yet to be determined. Larger patient populations will also enable subgroup analysis based on criteria such as age, gender, culture, and diagnosis (Loomba et al., 2012).

5. MUSIC PEDAGOGICAL EFFECTS OF PREGNANT WOMEN

Partanen, Kujala, Tervaniemi, and Huotilainen (2013) to generate credible arguments for prenatal learning, employ a clear-cut context. The extensive prenatal exposure to music develops brain representations that endure for several months using event-related potentials. Furthermore, the fact that infants recognize music and in particular, the mother's singing voice (Cevasco, 2008) from the time in the womb raises music psychological questions. Learning mechanisms in the womb and neural brain development are intrinsically tied.

Positive auditory experience is thought to be important for early brain maturation and a possible contributor to healthy neurodevelopment (McMahon, Wintermark, &Lahav, 2012). What does a fetus truly learn, and how does prenatal stimulation boost early brain maturation? These two factors are crucial to prenatal music education. The topic of how intrauterine music exposure affects peri- and postnatal behavior rounds out these various viewpoints. In addition to these scientifically established advantages of prenatal music activities, there are many differing viewpoints.

Epigenetics adds another layer of complexity to the importance of music in cognitive development. There are compelling arguments supporting music's positive epigenetic influence on the human brain and memory (Brigati et al., 2012). As a result, prenatal music stimulation has a considerable long-term favorable impact on a child's intelligence and intellectual characteristics. Music is now widely acknowledged as a key tool for promoting neuroplasticity across the lifespan (Wan & Schlaug, 2010).

6. EFFECTS OF MUSIC ON PAIN MANAGEMENT DURING PREGNANCY

Muscle tensions as well as lower back pain, are common side effects of pregnancy. Although pregnant women primarily caused rapid weight gain and specific abdominal muscle tension, psychological stress factors must also be considered. In these situations, progressive muscle relaxation (PMR) therapy is effective adjunct therapy that can help pregnant women achieve better physical and psychological outcomes. PMR combined with music, according to Akmese and Oran (2014), may be a beneficial therapy for reducing lower back pain and quality of life in pregnant women.

In trials that only looked at primiparous women, the results indicate the benefits of music therapy as compared to other standard therapy, however, the therapy should be measured differently (Santivanez-Acosta, Tapia-Lopez & Santero, 2020).Only two research examined the use of music therapy in the postpartum period (Simavli, Kaygusuz, Gumus, Usluogulları, Yildirim, Kafali, Usluogullari & Yildirim, 2014). These studies found significant results from the first to the last 24 hours after birth, however, the heterogeneity and existence of bias made a meta-analysis difficult. Only one study investigated changes in pain intensity with music therapy, and no significant differences were detected during labor; however, the particular time of labor, how the intervention was administered, or how long it was assessed was not mentioned (Kimber, 2008).

Many researchers (Li & Dong, 2012; Ebneshahidi & Mohseni, 2008; Reza et al., 2007) examined the impact of music therapy on the degree of post-cesarean pain and found substantial reductions in the visual analog scale (VAS) between 1.6 and 1.9. However, the variability of experimental methodologies precluded a meta-analysis. In obstetrics and midwifery, relaxation, muscular control, and pain management are all important. Music is frequently considered a

suitable alternative, supplement, or add-on method for reducing anxiety and pain (Beckett, 2012). In contrast, a meta-analysis of relaxation strategies for labor pain management found a lack of evidence for the role of music and audio-analgesia (Smith, Levett, Collins, & Crowther, 2011).

Gate Control Theory helps explain how music might relieve pain (GCT). Melzack and Wall created and explains the perception of pain from a variety of angles. Many researchers have supported it over the years, and it has evolved into the most prominent and significant pain perception theory. According to the hypothesis, the nerve center works as a "gate" that may be opened or closed before harmful and non-damaging stimuli reach the brain, allowing pain to be adjusted. The "gate" is not closed when the pain signal travels via the nerve carrying fiber to the spinal cord, and the pain is communicated. When the "gate" is closed, fewer or no neural impulses are available to convey pain.

Certain elements influence whether the "gate" is switched inside or outside: the quantity of damaging stimulation, the level of stimulation perceived by the brain as producing mood swings, and so on. Individuals cannot pay attention to anything that happens in our surroundings all of the time due to the limitations of the human intuitive system (Zhang, 2020).

7. CONCLUSION

In conclusion, music listening and music intervention in the prenatal care unit reduced anxiety in pregnant women, influencing their cognitive system, emotional state, and psychophysiological stress system. Music is a cheap and effective way to help women with high-risk pregnancies feel less anxious by properly choosing the pregnant woman's preferences.

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The authors made significant contributions to the work reported in this manuscript, participated in its drafting or critical revision for key intellectual ideas, and authorized the final version before it was submitted for publication.

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