

IMPORTANCE OF PRENATAL SOUND & MUSIC

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Editor's Note: Giselle Whitwell, R.T.M., Doula, is a practicing prenatal music therapist in the Los Angeles area who has been a music educator for over twenty-five years. Since 1989 she has given lectures and workshops on prenatal music in the United States, Asia, Europe and Russia. To facilitate her work with pregnant women she has also become a doula and childbirth educator. She welcomes your stories or questions on the role of sound in the prenatal period of development. Please contact her at Winds, P.O. Box 20813, Northridge, CA 91328 or send email to prenatalmusic@yahoo.com.

THE IMPORTANCE OF PRENATAL SOUND AND MUSIC

Column Editor: Giselle E. Whitwell, R.M.T.

*Editor's Note: **Giselle Whitwell** is a practicing prenatal music therapist in the Los Angeles area who has been a music educator for almost 20 years. For the last seven years, she has given lectures and workshops on prenatal music in the United States, Asia, and Europe. To facilitate her work with pregnant women, Giselle is currently in the process of becoming a Certified Childbirth Educator. She welcomes your stories or questions on the role of sound in the prenatal period of development. Please contact her at Winds, P.O. Box 280513, Northridge, CA 91328 or send email to prenatalmusic@yahoo.com*

Overview of the Field

Introduction

Music has played an important role in different cultures since time immemorial. It has profoundly affected human beings in their physical, mental, emotional and spiritual well being. But only in this century has music begun to attract scientific attention. The research at the University of California in Irvine has provided some information about the effect of Mozart on the spatial and mathematical intelligence of children. Recently, an article in the *Los Angeles Times* newspaper (11/9/98) reported neurobiological research to the effect that "undeniably, there is a biology of music." Music is destined to play a more active role in the future of medicine. The following ideas illustrate how music affects our early development.

The importance of prenatal music was born in my awareness over twenty years ago when I was expecting my youngest son. Through my communication with him telepathically and through his delay in arrival I was able to attend a music conference that was very important to me at that time. The doctor thought it would be dangerous for me to participate in something very active aside from the fact that he was due that week, and being the second child, he surely would arrive early if not on time. Well, our son was born the day after I attended this stimulating week of singing and gentle movement.

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Already at that time I observed that lullabies were relegated to the past: young mothers no longer knew this folk song tradition. Michel Odent, M.D., believes that women have a profound need to sing to their babies but that the medicalization of birth has upset this process. In the past, women all over the world have sung lullabies to their babies. These were very important because as we now know the fetus is having first language lessons in the womb. The inflections of the mother tongue are conveyed not only through speech but most importantly through song. The singing voice has a richer frequency range than speech. In fact, studies in other disciplines such as linguistics and musicology (e.g., David Whitwell, 1993) point out that there was a time when speech was song and therefore singing is the older of the two. Babies born of deaf mothers miss these important first lessons in language development. French pioneer Dr. Alfred Tomatis mentions being intrigued by the fact that song birds hatched by silent foster mothers can't sing. What the baby learns in utero are the intonational patterns of sound and the frequencies of a language in his/her particular culture. Frequency is the level of pitch measured in Hertz (Hz.) This range varies between 16 to 20,000 Hz. There is very little distortion of the mother's voice as heard by the fetus whereas other external voices sound more muffled, especially in the higher frequencies. According to Rubel (1984), the fetus is responsive first to lower frequencies and then to higher ones.

Verny and others have noted that babies have a preference for stories, rhymes, and poems first heard in the womb. When the mother reads out loud, the sound is received by her baby in part via bone conduction. Dr. Henry Truby, Emeritus Professor of Pediatrics and Linguistics at the University of Miami, points out that after the sixth month, the fetus moves in rhythm to the mother's speech and that spectrographs of the first cry of an abortus at 28 weeks could be matched with his mothers. The elements of music, namely tonal pitch, timbre, intensity and rhythm, are also elements used in speaking a language. For this reason, music prepares the ear, body and brain to listen to, integrate and produce language sounds. Music can thus be considered a pre-linguistic language which is nourishing and stimulating to the whole human being, affecting body, emotions, intellect, and developing an internal sense of beauty, sustaining and awakening the qualities in us that are wordless and otherwise inexpressible.

The research of Polverini-Rey (1992) seems to indicate that prenatals exposed to lullabies in utero were calmed by the stimulus. The famous British violinist Yehudi Menuhin believes that his own musical talent was partly due to the fact that his parents were always singing and playing music before he was born.

The Sound Environment of the Womb

The sound environment of the womb is very rich. There are various interpretations as to the noise level, ranging between 30 to 96 dB. (decibel being a measure of sound intensity or loudness). A whisper can register 30 dB., a normal conversation is about 60 dB. and rush hour traffic can average about 70 dB. On the other hand, shouted conversations and motorcycles reach about 100 dB. Rock music has been measured as 115 dB. and the pain threshold begins at 125 dB. Yet, recent research with hydrophones have revealed that the womb is a "relatively quiet place" (Deliege and Sloboda, 1996), something comparable to what we experience in our environment between 50 and 60 dB.

Uterine sounds form a "sound carpet" over which the mother's voice in particular appears very distinct and which the prenatel gives special attention because it is so different from its own amniotic environment. These sounds are of major importance because they establishes the first patterns of communication and bonding. Some researchers have discovered that newborns become calmer and more self-regulated when exposed to intrauterine sound (Murooka et. al 1976; DeCasper 1983; Rossner 1979). The soothing sounds of the ocean and water are probably reminiscent of the fluid environment in which we began life. Tomatis suggests that the maternal heart beat, respiration and intestinal gurgling, all form the source for our collective attraction to the sound of surf and may have to do with our inborn sense of rhythm. Prenatal sounds form an important developmental component in prenatal life because they provide a foundation for later learning and behavior. With fetal sound stimulation the brain functions at a higher level of organization.

The ear first appears in the 3rd week of gestation and it becomes functional by the 16th week. The fetus begins active listening by the 24th week. We know from ultrasound observations that the fetus hears and responds to a sound pulse starting about 16 weeks of age (Shahidullah & Hepper, 1992); this is even before the ear construction is complete. The cochlear structures of the ear appear to function by the 20th week and mature synapses have been found between the 24th and 28th weeks

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(Pujol et al. 1991). For this reason most formal programs of prenatal stimulation are usually designed to begin during the third trimester. The sense of hearing is probably the **most** developed of all the senses before birth.

Four-month-old fetuses can respond in very specific ways to sound; if exposed to loud music, and their heart beat will accelerate. A Japanese study of pregnant women living near the Osaka airport had smaller babies and an inflated incidence of prematurity-arguably related to the environment of incessant loud noise. Chronic noise can also be associated with birth defects (Szmeja et al. 1979). I recently received a report from a mother who was in her 7th month of pregnancy when she visited the zoo. In the lion's enclosure, the animals were in process of being fed. The roar of one lion would set off another lion and the sound was so intense she had to leave the scene as the fetus reacted with a strong kick and left her feeling ill. Many years later, when the child was 7 years of age, it was found that he had a hearing deficiency in the lower-middle range. This child also reacts with fear when viewing TV programs of lions and related animals. There are numerous reports about mothers having to leave war movies and concerts because the auditory stimulus caused the fetus to become hyperactive.

Alfred Tomatis notes that the ear is "the Rome of the body" because almost all cranial nerves lead to it and therefore it is considered our most primary sense organ. Embryonically, according to him, the skin is differentiated ear, and we listen with our whole body.

In order to better understand the role of music in its elements of rhythm and melody, we must briefly clarify the two parts of the inner ear. These are the vestibular system and the cochlea. The vestibular system controls balance and body movements, including the integration of movements which make up the rhythm of music-making the vestibular system the more archaic. And according to Paul Madaule (1984)"it is in fact because of the vestibular system that music seems to have an impact on the body." At around 4 ½ to 6 weeks gestational age the vestibular and the cochlear systems become differentiated, at 7 ½ the auditory ossicles start to grow, and at 4 ½ months the ear of the fetus is already adult-like in shape and size.

The cochlear system enables the transformation of acoustic vibrations into nervous influx, thus allowing the perception of melodies which carry higher frequencies. Knowing this, one can have a better understanding of the intimate relationship and unity of rhythm and melody. George Gershwin expressed this nicely: "Music sets up a certain vibration which unquestionably results in a physical reaction." With this in mind, we should choose for early music stimulation melodies and rhythms that are simple.

Tomatis has a unique view of the function of the human ear going beyond what is traditionally assumed. He regards it as neither an instrument solely for hearing and listening, nor an organ for the maintenance of equilibrium and verticality. For him the ear is primarily a generator of energy for the brain, intended to give a cortical charge which is then distributed throughout the body "with the view to toning up the whole system and imparting greater dynamism to the human being" (Gilmor and Madaule, 1984, p. 6). Hence the importance of right sound stimulation which will lead to vocal expression, listening, and thinking. Sound, music and human development are intricately interwoven.

Clearly, the vestibular system progresses rapidly as seen by the active movement of the fetus in utero. As early as the first trimester, regular exercise patterns have been observed with ultra-sound: rolling, flexing, turning, etc. (Van Dongen & Goudie, 1980). The movements appear as graceful somersaults, flexing of the back and neck, turning the head, waving arms, kicking legs-- all self initiated and expressive in nature. When the baby moves in utero, the heartbeat accelerates. DeMause (1982) summarizes reactions of the second trimester as follows: "The fetus now floats peacefully, kicks, turns, sighs, grabs its umbilicus, gets excited at sudden noises, calms down when the mother talks quietly, and gets rocked back to sleep as she walks about."

The fetal heart is fully developed by the second trimester and its pulse rate oscillates between 120 to 160 beats per minute. Some think the distinctive rhythm of the mother's heart beat in utero is the basis and our attraction to drumming, rock rhythms, and the African tribal beat. Salk (1960), Murooka (1976), and De Casper (1983) provided evidence that newborns learned and remembered their mother's heart beat in utero. Ashley Montagu (1962) suggested that the universal appeal of music and the soothing effect of rhythmical sounds may be related to the feeling of well being assumed to exist in utero in relation to the mother's heartbeat. Salk (1960) showed that newborns in hospitals listening to heartbeat sounds gained weight at a faster rate. Likewise, breathing was deeper and

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more regular among these babies. According to W. Ernest Freud "rhythm itself provides a most reassuring 'cradle' because of its promise of repetition and continuity."

Sound and Learning in Utero

The powerful connection between sound/music and prenatal memory/learning have been revealed in formal experiments, parental observations, clinical records, and first person reports. Chamberlain (1998) using Howard Gardner's concept of multiple intelligences, has presented evidence for musical intelligence before birth. Peter Hepper (1991) discovered that prenatals exposed to TV soap opera music during pregnancy responded with focused and rapt attention to this music after birth-evidence of long-term memory. On hearing the music after birth, these newborns had a significant decrease in heart rate and movements, and shifted into a more alert state. Likewise, Shetler (1989) reported that 33% of fetal subjects in his study demonstrated contrasting reactions to tempo variations between faster and slower selections of music. This may be the earliest and most primitive musical response in utero.

The pioneering New Zealand fetologist, William Liley, found that from at least 25 weeks on, the unborn child would jump in rhythm with the timpanist's contribution to an orchestral performance. The research of Michele Clements (1977) in a London maternity hospital found that four to five month fetuses were soothed by Vivaldi and Mozart but disturbed by loud passages of Beethoven, Brahms and Rock. Newborns have shown a preference for a melody their mother sang in utero rather than a new song sung by their mother (Satt, 1987). Babies during the third trimester in utero respond to vibroacoustic as well as air-coupled acoustic sounds, indicative of functional hearing. A study by Gelman et al. (1982) determined that a 2000 Hz. stimulus elicited a significant increase in fetal movements, a finding which supported the earlier study by Johnsson et al. (1964). From 26 weeks to term, fetuses have shown fetal heart accelerations in response to vibroacoustic stimuli. Consistent startle responses to vibroacoustic stimuli were also recorded during this period of development. Behavioral reactions included arm movements, leg extensions, and head aversions (Birnholtz and Benacerraf, 1983). Yawning activity was observed after the conclusion of stimuli. Research by Luz et al. (1980 and 1985) has found that the normal fetus responds to external acoustic stimulation during labor in childbirth. These included startle responses to the onset of a brief stimulus.

New evidence of cognitive development in the prenatal era is presented by William Sallenbach (1994) who made in-depth and systematic observations of his own daughter's behavior from weeks 32 to 34 in utero. (The full report of his findings is available on this website in Life Before Birth/Early Parenting) Until recently, most research on early learning processes has been in the area of habituation (Querleu et al., 1981), conditioning (Van de Carr, 1988) or imprinting sequences (Salk, 1962). However, Sallenbach observed that in the last trimester of pregnancy, the prenatals learning state shows movement from abstraction and generalization to one of increased specificity and differentiation. During a bonding session using music, the prenatals was observed moving her hands gently. In a special musical arrangement, where dissonance was included, the subject's reactions were more rhythmic with rolling movements. Similarly, in prenatal music classes, Sister Lorna Zemke has found that the fetus will respond rhythmically to rhythms tapped on the mother's belly.

From what research is telling us, we may presume that prenatals would prefer to hear lullabies sung by their mothers, or selected slow passages of Baroque music such as Vivaldi, Telemann, and Handel which have a tempo resembling our own heart beat at rest. Recent research has shown that four month old infants demonstrate an innate preference for music that is consonant rather than dissonant (Zentner and Kagan, 1998). However, this allows great latitude in the selection of music which babies and their mothers might like to hear. Our ultimate objective, of course is to help create not a musical genius but a person well integrated in his physical, emotional, intellectual and spiritual self.

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Introduction to "A Prenatal Project in India"

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Gajanan Shridhar Kelkar has directed a unique prenatal program in Lonavla, India, for the last 18 years, although this program has been in existence much longer than that. The philosophical foundation of this program is based on the teaching of Swami Vijnananand, who became Mr. Kelkar's mentor and spiritual guide while he attended college. An Ashram was dedicated to the activities and interests of the Swami who not only stressed science but other subjects as well. The prenatal work was one of the earliest programs alongside others related to the wellbeing of mankind. Mr. Kelkar's expertise in engineering and electronics has enabled him to design and construct particular machines used in this prenatal program.

Music and sound is interwoven in this curriculum in the form of chants, mantras and prayers, what we would call vibrational medicine today. These forms are ancient and still being practiced today, an integral part of the culture of India. Chanting in general has enjoyed a revival in the USA during the last decades, especially with several recordings by the Monks of Silos and others, but these are Gregorian Chants with Latin text not to be confused with the older Sanskrit chants from India. The latter have been disseminated mostly through the practice of yoga. Frequently, the stretches and postures are followed by a period of brief meditation where Indian chants are heard to support a feeling of peace and tranquility of mind. Meditation sessions are also offered as separate courses by their own right. The music in general supports a relaxed, tranquil state of mind as well as uplifting feelings. The cultures of the world each have created their own native chants.

In addition to the Gregorian and Indian Chants alluded above, the Buddhist, Tibetan and North American Indian Chants have also received wide exposure. Chants are sacred songs, prayers in sound, hymns that have been a source of inspiration and solace not only to those who sing them but also to the attentive and devoted listener. The Vedas, one of the oldest sacred text of India, dating back as far as 3,000 years ago, expresses the concepts embodied in chanting, phrased in language that is difficult to understand. Olivea Dewhurst-Maddock¹ has given us a loose translation and summary of the four stages of chanting:

1. There is silence and formlessness
2. The creative Word precipitates the cosmos, and the interaction of all energies.

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3. The individual consciousness hears the Word, recognizes it, and returns the separated parts to the whole, by singing the music in a "sacrifice" of song.
4. One reaches fulfillment within reunification.

Mantras on the other hand are words, syllables, phrases or simply sounds that are spoken inwardly or subvocally, and when repeated or spoken out loud may transform into chants. Through repetition they acquire more power due to the quality of resonance, they are able to clear the mind of superficial layers of thought and making one more receptive to the inner voice of Spirit. According to Kay Gardner, the power of mantra vibrates the spiritual body through thought. It is not necessary to know what the mantra means for its effectiveness "for it is the sound itself, without intellectual translation, that touches the spirit."² The most sacred and well-known mantra is OM or its variation AUM. Each culture and religion has its own mantras such as *Shalom* (peace) in the Jewish language; *Om Ah Hum* (The Trinity of Power: Creation, Maintenance, Dissolution) from Buddhism, and *Insha Allah* (If God wills) an example from Islam, etc.³ The origin of the word mantra derives its meaning from the Sanskrit verb *man* which means to think, contemplate, or meditate, and *tra*, to free oneself. When mantric sounds transmit a spiritual awareness it is elevated to the level of Shabda or Sacred sound. Mantras have survived through the centuries via an oral tradition, from teacher to student. Chanting a mantra can harmonize all levels of our being: the physical, emotional, mental and spiritual bodies. Generally, it will consist of predominantly long, open vowels, designed to impose a new rate of vibration on the person chanting it, creating a new resonance.⁴ One of the mantra's used in the Prenatal Project of India is known as the *Gayatri Mantra*, one of the oldest Sanskrit mantras known also in the West through recordings, it is one of the most beautiful and famous ones. There is a healing dimension associated with mantras as cited by a cardiologist Dr. P. Pandya from India who found that a particular mantra was able to reduce the stress level of his cardiac patients. Through his research, he found that the mantra brought not only neurological changes but also psychological ones. Reciting the mantra resulted in the release of endorphins, thereby bringing a feeling of serenity and wellbeing.⁵ But ultimately, the practice of mantras has a spiritual purpose, to attune ourselves to our divine nature. Dr. Harold Coward described this practice as follows: "By concentrating one's mind on a mantra, the devotee invokes the power inherent in divine intuition and so purifies his consciousness"⁶

Prayers recited out loud or in silence can be considered as the manifestation of the "Creative Word," they have been a vital part of all religious teaching, and proven to be a powerful means of affecting change in oneself and others through its positive suggestions. One such story comes from within our medical community. A report published in the Journal of Reproductive Health, October of 2001, states that women at an in vitro fertilization clinic in Korea had a higher pregnancy rate when unknown to the patients, total strangers were asked to pray for their success. The researchers found that women who were prayed for became pregnant twice as often as those who did not have this benefit. The team of researchers was lead by Dr. Rogerio A. Lobo, who is Columbia's chairman of obstetrics and gynecology.

Music and sound can embody a variety of approaches during pregnancy and birth. The inclusion of prayers, chants and mantras in the Prenatal Project of India form part of a greater whole, honoring their ancient cultural traditions. In such a case it is best not to isolate the parts for we can better comprehend the whole by keeping its integrity. Our western way of thinking inclines us to analyze and separate the parts of a system forgetting at the end to look at the whole context once more. In regard to nurturing and preparing future parents for conception, pregnancy, labor and delivery we need to start thinking again of synthesis, as we all know that the stages from conception to birth and thereafter are closely linked. The program of the Prenatal Project of India is a beautiful example complete in itself that needs to be viewed as such and that is our justification for presenting it here in its entirety.

The power of sound is still unexplored in our consciousness when it comes to application for purposeful means. All sounds whether it is our voiced exhalation, a word, phrase, chant, mantra, or song can become a powerful influence and energy for achieving a desired result, each carrying a specific frequency or vibration. The quality of the vibration will depend on the intensity, desire and will of the one producing it. Because most of us are not fluent with the forms discussed in this introduction, we have found modern equivalent ones such as affirmations and toning practices to

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create personal vibrational tools for ourselves. Regardless of the form, the intent is to align our physical selves with the more spiritual energies of life.

There are several prenatal stimulation programs around the world but few focus on the spiritual aspect of pregnancy and for this we are grateful to the Swami of India and his vision. We believe that culture plays an important role in nurturing the unborn baby. One cannot exactly transpose ideas from one culture to another without taking into account their belief systems, religion, life style, etc. However, we can learn from one another and find corresponding ways of support for pregnant couples and their babies as they enter this world.

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3 Dewhurst-Maddock, Op.cit., p. 92.

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5 Stark, Mary, editor. Booklet accompanying the CD, *The Gayatri Mantra*. Galaxy Publications & Recordings. Quebec, Canada, 1994.

6 Ibid.

A Prenatal Project in India

Gajanan S. Kelkar

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The Prenatal Project of India is a program used to instill 'good moral values' during the prenatal period. It is based on the Vedic concept of 'Prenatal Education,' and is designed with modern scientific concepts and instrumentation. This prenatal project is viewed as a service oriented program, to cater to the needs of society to foster good values. Manashakti Research Center (REST) New Way, Lonavla is a unique center in India that has developed this project and has been implementing it for the last 35 years.

Outline of the Manashakti (REST) New Way.

The name 'Manashakti' derives from the Sanskrit word 'Manas' meaning 'Mind,' and 'Shakti' which indicates 'Power.' Hence, 'Mana Shakti' suggests 'Mind Power.' 'Manashakti' is a public charitable trust having diverse services and research branches. The founder of this trust was a thinker, Swami Vijnananand, who established the "New Way," and lived from 1918 to 1993 when he took Samadhi. This is a special term used to differentiate normal death from a willful separation of mind from the body. Apart from bequeathing the basic principles he was instrumental in creating more than 60 electronic machines that were developed at the Research Center.

Brief Introduction to "Manashakti REST New Way" Center

Manashakti REST (Research Education Sanatorium Trust) New Way is a public charitable trust engaged in research and social service oriented programs. As the name indicates, the research is directed towards 'peace of mind' by studying various facets of the mind. The Swami has authored over 250 books in five languages. He also wrote over twenty-nine papers, and articles, which appeared in the Times, Blitz, Indian Express, Free Press and many other publications. Scientists, thinkers, doctors, and educators of international repute were associated with his research.

Manashakti REST New Way has for its mission the dissemination of knowledge for the welfare of all members of society. The work is available for the benefit of all religions, castes, creed and sexes.

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The Manashakti Trust does not accept any donations, or grants, nor does it charge any fee for its education / knowledge.

Activities of "Manashakti REST New Way"

I. Study Seminars (Ranging from 3 days to 1 month, all ages)

II. Machine Tests

III. Publications/Books

IV. Performance of social/cultural rituals

V. Outstation programs

1. Study Seminars

Twenty-nine different types of study courses are conducted by the Trust at Lonavla. The courses cover the entire life of an individual and deals with problems ranging from the stages of pre-birth to post death. The study courses address specific age groups and subjects, children of 1-7 years, then age 8 to 14, 15 to 21 and finally from 22 to 28 years of age. The study courses for parents of respective age groups are conducted simultaneously. There is a special course for aspiring parents who receive instruction regarding good values for nurturing the fetus in the pre-birth stage during the nine months.

The study courses for adults are divided into various subjects in order to help them to be free from ailments, tension, envy, etc., and promote success in their work or profession as well as in their private lives. The subjects also cover topics which provide answers to the various queries a human being might normally have, such as life objectives, meditation, the concept of mantra, God, Salvation, and Rebirth.

All the study courses are based on a scientific, logical and well-structured syllabus. The remedies suggested are easy to follow, inexpensive, practical for the home without any significant aids or tools. The study courses, both for children and adults have been conducted for years and are immensely popular in the region of Maharashtra (India).

Machine Tests



The machine tests conducted by the Research Center are quite unique. Most of these tests are conducted on the thought level. The main object of these tests is to assess the energy expenditure of an individual and to try to attain coordination with the inner energy quanta. The Research Center thus strives for tension-free success at every stage in life. The equipment needed for these tests is developed in the Center, with the use of high-tech knowledge. Some of these tests are computerized. All the tests and equipment have been developed under the guidance of Swami Vijnananand, based on his long-standing research and profound study of the 'Mind'.

Prenatal Program - Sanskar - Sanskar in Sanscrit means good or positive values.

An Introduction

Before going into details of how good values are assimilated at the Research Center, it is important to have a glimpse of the historical heritage of this concept.

The Indian History of Prenatal Sanskar

The story of Abhimanyu is well known in the Mahabharata. Abhimanyu, the son of Arjuna, learned how to enter the Chakravyuha (the strategic arrangement of warriors to entrap and defeat the enemy) when he was in his mother's womb. He had heard and remembered the narration of the technique by Krishna to Subhadra during her pregnancy.

Before the birth of Buddha, his mother, Mahamaya had followed certain specific rituals. In the month of Ashadh, she celebrated the seven-day festival and gave alms to the poor. She did penance by giving up some of her pleasures. After the festival, Mahamaya had a dream in which, Bodhisatva, by the name of Sumedh, asked

permission to take birth in her womb. She happily consented. Later, a brilliant son was born to her in the pleasant environments of Lumbini. He became Lord Buddha.

Before Krishna was born, his mother, Devaki had a dream that Lord Vishnu had entered her body.

When Pralhad's mother was pregnant with him, she used to listen to devotional songs. Therefore, even though Pralhad took birth in a Rakshasa family, he became a devotee of Lord Vishnu.

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The mother of the freedom fighter, Savarkar used to read the courageous stories from the Ramayana, and Maharana Pratap to her son when he was in her womb.

Rishi Udalak was a great saint. He had an able disciple called Kahod. The rishi gave his daughter, Sujata in marriage to Kahod. Once when Sujata was pregnant, Kahod was reciting some shlokas. The baby in the womb realized the recitation was incorrect and asked him to correct it. Kahod was livid with rage. He put a curse on his son so that he would be born bent in eight places. The child, Ashtavakra was born bent in eight places. The father's angry thoughts affected the baby.

When tabla maestro, Zakir Hussain was in his mother's womb, his father, Ustad Allah Rakha used to beat lightly with his fingers on his mother's abdomen.

Goal of the Prenatal Project

- I. To welcome the baby with good thoughts.
- II. Imparting sanskar to the fetus.
- III. Improve the emotional health of the parents.
- IV. Increasing the active participation of the father during pregnancy.
- V. Increasing the courage and confidence of mother during labor.

The intention of "The New Way" behind this project is to mould the future generation and society at large. There is no intent of personal gain. This is the work of a nation, of building humanity . Along with the welfare of the child, the parents will be able to reduce tension in their lives. The project aims at building healthy, intelligent, honest, responsible individuals and a united society.

Prenatal Program

Tests and Procedures

The above goals are achieved through a series of stages as suggested below.

Stage I Temperament coordination test of both partners before marriage.

Stage II - Post marriage adjustment test.

Stage III Three day study course to be taken any time before or during pregnancy (preferably before conception).

Stage IV - Stroboscope test for improving the concentration of the parents. (during the first six months of pregnancy)

Stage V Fetuscope test (after six months of pregnancy)

Stage VI Post delivery personality test for parents.

Stage I: Pre-marital temperament and coordination tests for both partners.

The efforts are made to bring into the world a "whole child," not only at conception but long before then, at the time of selecting one's partners. There should be compatibility between both partners at the mind level. Hence, efforts are taken by the New Way to match those partners desiring a baby. A happy, satisfied pair will definitely have the right temperament during the pregnancy period. Therefore, a psychological test is conducted of aspiring parents and remedial measures are suggested to modify their personalities.

Stage II: Post-marriage adjustment test.

During the first year of marriage both of the partners are new to their environment taking time to understand one another and adjusting to this situation. If there is no proper adjustment for some reason during the first year itself, the gap goes on increasing and even after twenty years of married life the possibility of two minds coinciding with each other gets more remote. This test is useful for the attainment of a happy and contented married life as and when required.

Stage III: Three day study course.



A three day study course on prenatal sanskar is carried out at the main Center. The focal points of this course are the communication with the fetus, in order for him to absorb good values (sanskar) and the education of the parents in regards to their thinking and behavior during the prenatal period. Videos of the development of the baby in the womb, lectures by experienced doctors on nutrition and behavior during pregnancy also form part of the curriculum.

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Stage IV: The stroboscope test

A stroboscope is an instrument that is normally used in the industry to measure the speed of moving objects. Dr Walter Grey, the famous neurologist, first used it for brain experiments in epileptic patients. It was realized that intentional concentration on light has great potential for improving the energy potential of an individual. In the pre-natal program, the stroboscope is used to increase the concentration of the parents making use of the biofeedback principle.

From the stroboscope, a flickering white light is emitted at a particular frequency in the alpha range (8 to 13 per second). This test is generally done in a group setting. All the participants are told to think about their future child, their goal and to concentrate on the light. The Stroboscope emits white light, but when the group looks at it with a particular intention, every participant sees a different color according to his or her goal and inner personality. This is because each person absorbs only that part of the light, which he requires.

Only visible light is used. There is no ultra violet or infra red radiation emitted from the stroboscope. Individuals affected by epilepsy or those who suffer from visual problems are advised not to take part in this test. Since its inception in 1993, more than seven thousand parents have taken advantage of the benefits it offers.

The principle behind the stroboscope test

Flickering seems to alter the brain wave activity of the whole cortex instead of just those areas associated with vision. The brain responds by falling into the same frequency as that of the flickering light. There is a breakdown of some of the physiological barriers between different regions of the brain, resulting in better synchronization, mental clarity, and better intellectual functioning.

Each participant gains energy due to the principle of "resonance" since the objective of each individual is the same. Secondly, the important property of the flicker of light (in the range 'alpha' in this case) has the capacity to carry a transfer intention or intelligence that has been modulated by the person.

The resultant color is given for concentration. The color is chosen by each individual subconsciously and is useful for the coordination of logical and emotional thinking necessary to achieve the goal. Color and emotion are closely linked. Concentration on the prescribed color causes optimization of mental energy, improving mental clarity and concentration.

Instructions at home for the stroboscope test

Take a 3" by 3" plain white paper. Draw a circle of one centimeter in diameter in the center and color it with the respective color that you saw during the test. At a fixed time everyday concentrate on this chromo color point. You should follow this practice for a minimum of three months to increase your concentration.

Stage V: The fetuscope test

This test is taken after six completed months of pregnancy when development of the main organs is near completion and the fetal heart rate can be measured easily. The thought impressions of Swami Vijnananand are directed toward the fetus. The objective is mainly to transmit good values to the baby. Also certain questions are asked of the parents regarding their expectations of their unborn child and the variation in their pulse rate is recorded.

The intention behind using the fetuscope is as follows. The mind has an effect on the body, and the fetal mind is responsive. The mind itself cannot be measured. We can only measure its effect on the body through various mechanisms such as pulse and heart rate, breathing, skin and brain resistance, etc. Pulse and fetal heart rate measurements are easily recorded. Emotions cause change in the pulse. The basic emotions of fear, rage, courage and peace are present in every human being right from conception just as they are present in other organisms of nature in various stages of development. Parental and fetal emotions are measured in the test.

The heart rate is a good indicator of the fetal personality. By monitoring it we can determine how a particular child reacts to stress and fright, and hence learn something about its personality. In one study, a recording of the fetal heart rate was done and the results were divided into low and high reactors. Low reactors were ones with a continued steady heart rate. There was little disruption by any external noise. Fifteen years later these children were still rarely upset by the unexpected. These researchers found they remained in control of their emotions and behavior. The babies which showed high fluctuations to noise in utero were as teenagers still highly emotional.

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Procedure

Any pregnant woman who has completed six months of pregnancy can participate in this test along with her husband, parents and in-laws. The parents are asked certain questions regarding their expectations of this child. The fetus is directly addressed during the test. A tape with the voice of Swami Vijnananand is played in which the fetus is welcomed, encouraged and requested to improve its good qualities and take a decision to live a well-balanced fruitful life and not to have small selfish, self-serving motives only, in its attitude towards life. Resting and pulse rates of the parents and the fetal heart rate, before and after the test, are taken for recording the mental impressions.

The direction of the fetal heart rate variation may be opposite to that of the maternal pulse variation, that is, the maternal pulse rate may increase whereas the fetal heart rate may decrease at the same time or vice-versa. This proves the separate personality of the fetus from that of his or her mother. Depending on the pulse variation the parents are given chromo concentration points on which they are told to concentrate every day. Concentration is suggested on the prescribed color to bring the pulse variation back to normal.

Concentration on the candle flame with an inner wish for improving the qualities of the child is done. Prayer, chromo-concentration and personal counseling is given to the parents regarding the importance of direct and indirect communication with the fetus. Advice is also given regarding preparation for the delivery and communication of thought impressions by the mother to the child during breastfeeding.

The principle behind this test



The main requirement to transmit "good values" is first to establish communication with the baby in the womb. Thoughts and feelings of the parents affect the baby. The researcher (Swami Vijnananand) directs intentional, selfless, good thoughts towards the baby. Even before the thought is expressed, it remains in an unexpressed form in the mind. At that time, its wavelength is the shortest and its energy is at the maximum level. Intentional, directed, selfless, unspoken thoughts lead to maximum sanskar in the baby.

The thought radiation being imparted to the baby has the following essential

points:

- I. The baby should know that he or she is wanted in the family and the world. There is a hearty welcome to the baby by the parents and other well-wishers.
- II. There is a rational appeal to the baby for choosing a correct path in life, without the imposing ideas of father or mother or even the well-wisher. The baby is given freedom of selecting his own.
- III. The researcher or well-wisher is detached and without a specific selfish interest.

The intention-motion-reaction principle is used in the test. Intention is the basis of any motion or action. Intention causes a marked difference in the effect of the action. When the intention is selfless, the ability to transmit energy increases. Thoughts radiated with good intention produce desired effects.

Instructions for the fetuscope test at home

The parents are told to recite a prayer daily for their unborn baby. The prayer includes verbal thoughts, welcoming the baby and appeal to the baby to become a 'good personality' or 'ideal child'. Along with this, parents also recite the 'Gayatri Mantra', which has the power of making sacrifices. The mother and father go through literature that elevates the emotions of 'courage' and 'peace'. They also concentrate and meditate on the specific color symbol suited to their inner personality.



Prayer said by the parents:

"We pray in the name of the Highest Truth. We believe that everyone stands by his own causality, self or karma. To the extent to which the karma of all three of us has conjoined, my prayer should contribute to, and ameliorate this child. Though I do not wish any change in the chosen course of this child, I harbor a natural desire for the good of this child. Little baby we welcome you!"

"Come to enjoy a fruitful and realized life. On our part we would like you to be .. and develop . skills if you have no objection. In pursuance of indication from you, namely ..., we shall try to offer facilities for the same. Else let this prayer work to that end as much as it can. We submit this prayer for the good

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of yourself, our family, our nation, mankind and the world as a whole. Let this step purify all of us to attend to what we desire and deserve. May the Good Spirit in us help all of us." (In the dotted spaces, the parents can suggest their wish to the baby).

Stage VI: Post delivery personality test for the parents.

After birth, in the learning process, the temperaments of both parents play a major role in the overall development of the baby. It is observed that the child first acquires the temperamental weaknesses of the parents. Hence a personality test of the parents is conducted after three months of delivery and up to two years.

Conclusion



This program has been implemented for more than 35 years and we have found many astonishing and positive results. More than six thousand parents have taken part in the project and they are quite satisfied with the outcome. In more than 70% cases of the delivered babies adopting this procedure, we have found that the 'courage' temperament

has increased. The baby is more alert, attentive, receptive and intelligent.

This project has become a tool for social revolution in order to spread good values in our society. The baby in the womb is affected by the thoughts and emotions of his parents. Therefore, it becomes essential for them to avoid negative thoughts, bad habits and to maintain a cheerful atmosphere.

The process continues after delivery. Thus, you will find a gradual but steady change in the social environment as well as a strong coherent society based on unity and sacrifice.

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Music Aids Development in the Womb

By Gabriel F. Federico, M.T., Buenos Aires, Argentina*

(Translated by Giselle Whitwell)

At the moment of birth babies have already accumulated a host of experiences and memories shared with their mothers (and fathers). Together, they enjoyed both pleasant and unpleasant sensations. If we think about rhythm and its different manifestations in utero, we can find it expressed in several ways. Rhythm exists in the spontaneous movements of the fetus, in intrauterine breathing movements, heart rate, sucking and kicking, in states of alertness and quiet, and partly in reaction to what is heard, for example the mother's heart, breathing variations, and activities.

Fetal Audition

The shape of the human ear is a metaphor for the design and shape of the human embryo. The fetus receives sound information from the outer regions of the mother through its own auditory system. With support from touch, taste, and smell, hearing plays a prominent role in connecting us to the outside world while we are in the womb. Hearing is naturally complex and stimulation varies when the fetus changes positions in the uterus. Both sound vibrations and perceptions change. If liquid is a different conductor of sound than bone medium, will not this also demand changes in intrauterine hearing? In an eight-month-old fetus in the cephalic (head) position, there will be much more sound from bone conduction. Sound vibration will also be affected by the location of the hipbones of the mother. This cavity will augment, by a chain of vibrations, the responses of the small bones of the middle ear of the fetus. At this gestational stage the fetal middle ear is already full size.

Similarly, fetuses that are in the breech position will receive more intense intrauterine sound. This is the result of the proximity of their auditory system to the sounds of the mother's heartbeat, as well as the circulatory sounds of the placenta, among other noises and sounds. In the breech position, the

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vibratory conduction is more muffled and will need a higher volume so the fetus could equally sense it, as compared to the fetus in the cephalic position.

Prenatal Brain Stimulation

We have to think that the intrauterine environment of the fetus is deeply affecting personality development. It is known that at the moment of birth the newborn baby has nearly all the neurons needed for life. Thus, the womb is the place where the brain develops and begins working. This stimulation takes place with the exchange of experiences between the fetus and the environment in which it is immersed. The development of the brain will be enhanced if we can offer the appropriate stimuli for this to happen. It will depend much on the quality of what the mother will transmit to her baby whether the imprinting will be made in a positive or negative way.

An example of what a mother could transmit to her unborn child follows. One day, I had an appointment with a 10-month-old baby, a constantly crying child. Nothing seemed to help him. The parents tried all means to quiet him down, including the music of Mozart. Herein lay the real meaning of the crying! The mother, at a later appointment, reflecting on her pregnancy, had used the music of Mozart to relax during the last months of her pregnancy. However, during this same period, two months before the baby's birth, her own father had died in a car accident! Consequently, the baby had been nourished with the mother's anguish and associated the music of Mozart with this sad situation.

The mother thought she was "relaxing" but in reality, while she was listening to Mozart, she was crying about the death of her father. Unconsciously she was internalizing her anguish, and not wanting to share it with anybody else. Though without realizing it, she was sharing this experience with her unborn child. As time went by, the mother recovered from her loss but this type of music had left its mark on her baby. This was the reason that whenever he heard Mozart, he cried. I taught the parents how to work with their baby. Slowly he started to quiet down but he continued to be much affected by the music of Mozart as well as being very sensitive to all types of music.

Hearing at Birth

At birth, the sound environment impacts the neurovegetative system. The baby has to make a great effort to adapt to this extra-uterine sound. From birth the bombardment of the sound environment continues to grow. If babies who were prenatally stimulated hear familiar music, they usually turn their heads in the direction where the music is coming from. Such babies can change their facial expressions while listening to these rhythmic sound variations, perhaps even smile and increase their sucking. Their pupils might dilate and eyes begin to stare for 4 to 10 seconds. They will stretch their small fingers and toes, trying to catch the stimulus. Cardiac rate will probably slow down a bit and breathing become more regular.

These babies will not necessarily respond to repetitive sounds, but will probably respond to sounds with melodious variations. They will be able to distinguish the intensity, tone, and pitch of sounds and be more alert and sensitive when this stimulus is present. The abdomen will relax. Their crying will not convey misery but be more like the very small sounds of a kitten. They will recognize voices, especially mother's.

If we must take into account all these manifestations of sound, we will naturally organize the first extra-uterine month of life in a special way. This first month of life is characterized by adaptation, not only by the new mother but by her baby. They continue to bond, know, and understand each other in a different way than before. We have to sympathize that babies must adapt to the new environment of the hospital. After this environment a new one will be presented, the family home. Home is, of course, where baby and mother made their original adjustment to each other, but now this is complicated by expanded physical sensations and the potential for interactions with others. These new adaptations are eased if babies have the opportunity to spend ample time with the mother alone.

In this new period at home we can observe the advantages of the previous prenatal stimulation. Music will help to organize this developmental stage also. If we play as background music what was played during the pregnancy, while the baby is resting (but not sleeping), these melodies will recall intrauterine listening, giving a feeling of security and trust. It is suggested not to sing the same song while feeding and bathing, lest the different feelings be confused. It is possible that one night if babies hear the same song they will be unable to interpret if this means they will be fed or bathed!

The Birth of My Son Nicholas

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As with any new life, Nicolas brought lots of happiness to all his family members especially to his parents and brother Matías. His delivery was very beautiful and fast, with only three pushes. He was placed between us in the hospital room. During his birth I was with Natalia, my wife, holding her and speaking to her tummy to help her. I believe that the presence of the father during delivery is very important. Babies are conceived by two people and these same two people need to be there to receive them during their birth. We did not make use of an epidural, which helped Natalia to have a faster recovery.

In the delivery room we were hearing music and doing relaxation exercises. Right at the moment of birth I was helping Natalia, giving her strength. When the baby's little head appeared, he immediately opened his eyes. What was amazing is that he did not cry, he made some soft sounds and moved his little arms, all without crying. The first image he saw was that of his mother and father together. Obviously, we started talking and singing to him. Fortunately, our desire was respected to be the only ones speaking during labor and delivery.

As it happened, during the birth of Nicolas there were three other births taking place simultaneously, and for this reason we were left with only a nurse to weigh, clean and measure the baby, while Natalia expelled the placenta. This was an unforgettable experience. I felt a very close contact in the exchanges with my baby through our eyes and in the way he responded to my voice, as I sang to him all the time.

Nicolas was stimulated with music during his gestation and we were able to have many different prenatal experiences. We could appreciate the results even before our baby was one month old. One of the prenatal experiences we designed was the use of a pair of small, fine quality loud speakers that were placed on Natalia's tummy. We played different kinds of music on a varied day/evening schedule. For example, I used Bach's music every morning while waking up, used different selections when Natalia was going to sleep, and still other pieces for our prenatal stimulation exercises.

Our baby responded from the very first moment of life to all the music we had used, but particularly to the music heard during the relaxation exercises; these pieces soothed him the most. I think this is so because it brings back memories of this time when we always sang this music together. Also, it was the music I used during the labor and was the first heard immediately after birth. When we played Bach, the music for awakening, we found that Nicolas would be very alert, would open his eyes and look for the source where the sounds were coming from. We saw a very special effect with the music played when Natalia was getting ready to sleep. This music had a pleasant relaxing effect on Nicolas; I believe it is because Natalia's body was so relaxed when she was falling asleep. When the baby is uncomfortable now we play this music which helps him relax and he goes to sleep easily. An important thing we realized is how the music facilitated the family's adaptation and preparation for the arrival of Nicolas.

After the first month of life the music for getting him to sleep was no longer needed, neither was the music to regulate the hours for breastfeeding or to keep him alert. Today, seven months after having stimulated our son in this way, we enjoy his presence very much. From the first month after birth, Nicolas has slept between ten to twelve hours, which has permitted us to get our rest and therefore enjoy family life much more. He continues growing without any problems and is fed in the most natural way at the breast of his mother.

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The Maternal Womb: The First Musical School for the Baby

by Ruth Fridman

Editor's Note: Prof. Ruth Fridman has been a pioneer in revealing the important effects of the first sounds that babies hear including the sound of mothers singing to them in the womb, at birth and as infants. In this paper she reminds us of her inspirational work with pregnant mothers she teaches to compose lullabies to sing to their babies. Her many presentations, travels, books, and song books are included in the impressive list of career milestones at the end of this article. Ruth is the current President, International Music Society for Prenatal Development (IMSPD). Please direct any correspondence to her at Coronel Diaz 1564, 1425 Buenos Aires, Argentina or via email to: ruthf@ciudad.com.ar.

In 1971 I began to tape sonorous rhythmic intonated expressions of many infants. It interested me how early infants could begin to sing, to repeat melodies and tap rhythms. I had the feeling that these manifestations had a special origin, that the cultural environment was not the only cause. As I had several ideas about it, I started taping the voices of babies who were full term, premature, or significantly retarded. I recorded their expressions from their birth up to fourteen months old. The taping took place in a children's hospital of Buenos Aires. As I listened to the babies' cries, I realized that if I separated the cry from the sounds included in it, it could be labeled as "musical". Analysis through electronic devices confirmed my hypothesis. Baby cries had the proper characteristics of sound: frequency, timbre, and intensity. When reviewing the bibliography about infant sounds, I did not find any systematic study of the first mass of sounds and their sonorous rhythmic structure in relation to musical activity. Infants' most elementary vocal rhythmic schemes make up the physiological matrix for future language and music acquisition.

The analysis of infant cries led me to study their expressions from the very instant of their birth. I first undertook a longitudinal study of three newborns up to their first year of life. After this I studied triplets and a Cesarean-born child. The main feature of the first group was that one of the babies sang properly when she was 9 months and 7 days old. The processes used with these infants has been described in my book *The Beginnings of Musical Behavior* (1974).

My work with infants from their birth on made me realize how important music is during the gestational period. I started teaching music to pregnant women. Both, the mother and the unborn baby benefited.

What is the advantage of the musical stimulus? Mothers discovered personal characteristics they were unaware of as I encouraged them to create lyrics and tunes for their unborn babies. Through a questionnaire, I learned about their musical knowledge and preferences, as well as their doubts, fears, and hopes (Copies of this questionnaire are available from the author). As a result of my research, I decided to work with pregnant women. I was greatly moved by their anxieties, fears, and doubts. I also felt that if a pregnant woman sang to her baby as I had done with my two children, she would establish a closer bond with this baby.

A video made at the Fernandez Hospital and at the San Martin Education and Cultural Center, reveals the mother's emotion, expression and interest in creating short songs. They did it shyly but with great tenderness. Many of the lyrics revealed their fear of losing the baby, or that it might be defective, and other worries. I had not expected to find these problems. Since I could not help, I suggested they consult a therapist. (I was afraid they would reject my suggestion and stop attending my classes but fortunately this did not happen.)

The experience I had at the hospitals was very productive, in spite of the limited time and space I was given to work there. Pediatricians and neonatologists supported my work, but not the obstetricians and midwives. I will never forget a couple who attended the second class at the Fernandez Hospital bringing a guitar and a quena (Indian reed flute). The man sang the song they had composed for their

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unborn baby, and the woman introduced the song by playing the quena. I also remember when the mothers came to show me their newborn babies, they reported how they used music at the birth of their babies. This was also true of the single women.

Every pregnant woman is a different world. I invited each to dream about their unborn babies, to imagine their unborn babies little bodies, to imitate the movements babies made inside the womb, to draw pictures for them, and to pamper them with words. They created both a musical and a spoken language as I encouraged them to tell their babies where they were and what they were doing at the time, commenting on whether it was warm or cold, and such. It was quite an experience for them!

The inner language of feelings, which is present in every human being, became a powerful form of expression for these mothers, different from formal language. I remember when I had a similar experience with my two children, and how it brought me closer to the human being inside me. I believe the advantage of these activities is that they establish a prenatal bond which contains tenderness on the part of the parents to be, a promise of protection, and the wish to see and hold the baby in their arms. Pregnant parents created these songs naturally, songs that would stay with them the rest of their lives, invented in a period of love, anguish and expectancy. It is of great significance for babies to hear music, to hear parents talking to them, and to be gently massaged during the gestation period. The mother's emotional expressions benefit both herself and her baby. When pregnant women sing, the unborn babies answer by moving their bodies. They are little acrobats when they have enough space. These rhythmic movements of the unborn are certainly very important to motor development. And according to some experts, fetal movements provide an activity which contributes to the development of psychic functions as well.

I worked most enthusiastically at the San Martin Cultural Center where women attended my classes of their own free will. At first, they came out of curiosity but they listened with great interest. These classes were also attended by male parents, doctors, and professionals who wanted to learn about musical training of mothers-to-be. In my opinion, these musical experiences should be offered at every maternity hospital and would improve the mental and emotional health of both parents and children. The last trimester of gestation is especially important and parents must make the most of this period of rapid growth.

At times I worked with babies in incubators. All the sounds they had heard in the womb and were familiar, were now replaced by the noises of the incubators. The previous experience of natural sounds was lost. Therefore, I advised parents to record their voices and songs for their babies in incubators. Although nowadays, a radio is sometimes placed in incubators as a stimulus, I think the parent's voices are best.

Mothers quickly demonstrated that music was not the property of elite members of society or those with advanced education. My students at the San Martin Education and Cultural Center and at the hospitals came from all different socioeconomic classes and different cultural levels. However, each of them was able to create songs and to communicate with her baby in a personal and genuine way. Each of them found their own way and their own rhythm as they progressed through pregnancy. Not only did they realize they had conceived a human being but many of them discovered a way of communication they had never thought of before. In music, mothers would say things they would not express verbally.

Although lack of communication, lack of essential stimuli, and other maladaptive problems are inevitable in some cases, I believe sincerely that babies and parents could avoid or resolve many of their difficulties if they were offered prenatal music classes at maternity hospitals. Beside the experiences I have shared briefly with you here, I can confirm by observing the babies from their birth onward that music was a formative element in their lives. When a baby has been stimulated by his mother with music, by the fifth month the baby already shows affective memory towards sound. At only nine months old, one of these babies was singing the song his mother had systematically sung throughout his prenatal days.

Finally, I am hopeful that the scientific contributions of neuroscience, genetics, and psychology will help to illuminate the nature of the very early musical responsiveness which appears to be an innate function of all human beings.

Milestones in the Career of Prof. Ruth Fridman

1930-1940. Studies in the American Grammar and High School, Buenos Aires, Argentina

1936. Graduation, Prof. of Music, with honors, City School of Music, Buenos Aires

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- 1950-1962. Advanced studies in musical composition with Professors J. Ficher, J. Bautista, E. Leuchter and Juan Carlos Paz, Buenos Aires
1957. A founder and member of Young Composers of Argentina
1964. Advanced studies in ethnomusicology with Prof. Carlos Vega, Buenos Aires.
1966. Cuentos musicales (Twelve musical stories). Buenos Aires: Eudeba Editors
- 1966 and in 1970. Invited by the Dept. of Culture and Education, Hungary, to visit nurseries, state schools, and study the music methodology of Zoltan Kodaly.
- 1967, Advanced studies in ethnomusicology with Prof. Isabel Aretz, University of Salvador, Buenos Aires.
1968. Record. Cantemos con mama.(Let's sing with mama!). Buenos Aires: Columbia Records.
- 1968 Canciones para crecer(Songs to grow on). Buenos Aires: Ricordi
1969. Canciones para la mama: la maestra y los ninos (Songs for the mother, the teacher and the children.). Buenos Aires: Centro Editor
1970. Music and society. Paper presented to the International Society for Music Education, Moscow.
1972. Fulbright Grant. Lectured on The sonorous rhythmic expressions of infants at the University of Connecticut and Cornell University. Addressed the Linguistics Circle, and the Center for Cognitive Systems, Peabody College, Nashville, Tennessee and lectured in the psychology department, University Of California, Berkeley, CA.
- 1973-1990. Taught groups of pregnant women at different hospitals of Buenos Aires.
1973. The first cry of the newborn: Basis for the child's future musical development. Journal of Research in Music Education. 21, 264-269.
1974. Musical activities in babies. Paper presented at the First Brazilian Congress of Music Therapy. San Pablo, Brazil.
1974. The beginnings of musical behavior. Buenos Aires: Paidos Publishing Company.
1974. Affective communication through sonorous expression in relation to mental health and future musical activity. Paper presented to the 11th International Society for Music Education (ISME), Perth, Australia. In Challenges in music education (pp. 94-97). Dept. of Music, University of Western Australia.
1974. Lecturer, 14th International Congress of Pediatrics, Buenos Aires. 1975. Proto-rhythms of musical and articulated languages. Paper presented to First International Congress of Music and Communication, Mexico City.
1975. Composed music for piano, voice and string quartet, performed by different artists in Buenos Aires.
1975. Early responses to music. New Zealand Journal of Speech Therapy, pp. 12-16.
1975. Sonorous rhythmic expression of babies. Paper presented to the Council for Educational Research, New Zealand.
1975. The genesis of musical activity in human beings. Paper presented to First Brazilian Congress of Artistic Education, San Pablo, Brazil.
1975. Affective communication through language. Paper presented to the First International Conference of the Organization for Pre-School Children (OMEPE), Rio de Janeiro, Brazil.
1975. Early responses to music. Journal of Speech Therapy, pp. 12-16. New Zealand.
1976. Calesita de canciones para jugar (Merry-go-round of songs for play). Buenos Aires: Paidos
1976. Calesita de canciones para cantar (Merry-go-round of songs to sing). Buenos Aires: Paidos
1977. Affective-sonorous communication related to language development: An analysis of the first rhythmic vocal schemes of the newborn. San Pablo, Brazil: Center of Brazilian Research.
1977. Vocal rhythms of the newborn: The first day of life, with Dr. Antonio Battro. In: Estudos Cognitivos (Cognitive Studies). San Pablo, Brazil: UNESP
1977. La musica para el nino por nacer amar (Music for the unborn child). Salamanca, Spain: Amaru Ediciones.
1977. The birth of musical intelligence. With Dr. Antonio Battro. Medicine and Hygiene, 40, 3642-3645.

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1977. Affective-sonorous communication related to speech therapy. *Speech Therapists Journal*, New Zealand.
1977. Proto-rhythms of musical and articulated languages. Presentation to 2nd World Congress of Music Therapy, Buenos Aires.
1980. Proto-rhythms: From nonverbal to language and musical acquisition. In: Mary R. Key, (Ed.), *The relationship of verbal and nonverbal communication*. (pp. 71-79). Paris, The Hague, and New York: Mouton Publishers.
1980. Fellowship, Finland Ministry of Education, Department of Pediatrics, Central University of Helsinki, directed by Dr. Ole Wasz-Hockert. Lectures at different universities of Finland.
1980. My research at the Sibelius Academy of Helsinki. Presented to School of Music and Dance, Mexico City.
1980. Lecturer, Karolinska Institute, Department of Pediatrics, Stockholm. Invited by Dr. John Lind and Prof. Jan Winberg, Stockholm, Sweden.
1981. Nuevas técnicas para neonatos prematuros en incubadoras (New techniques for premature infants in incubators). Presented to 3rd World Scientific Congress of Music Therapy, San Juan, Puerto Rico.
1981. La musicoterapia en el desarrollo humano educación de la familia (Music therapy in the development of the family). Presented to 3rd World Scientific Congress of Music Therapy, San Juan, Puerto Rico.
1982. Invited lecture, 1st Latin-American Congress of Biodanza (Biological Dance), Rio de Janeiro, Brazil.
1982. Estudios sobre el llanto normal y patológico del recién nacido. (Studies of the normal and pathologic cry of newborns). Presented to Argentine Society of Music Therapy (ASAM), Buenos Aires.
1982. My work and experiences in Finland. Presentation to Argentine Society of Music Therapy (ASAM), Buenos Aires.
- 1983-1990. Worked with pregnant women in different hospitals in the city of Buenos Aires
1983. My musical experiences with pregnant women. Presented to Department of Pediatrics, The Italian Hospital, Buenos Aires
1983. Invited Lecturer. Folk Arts Communication and Education (FACE.), Festival of Twitas and La Mama , Cultural Plan for World Communications, annual conference held at the United Nations, New York.
1983. Analysis of spontaneous creative musical expression by an infant 18 months old. Paper presented to the 4th International Congress of Music Therapy, Paris, France
1988. Lecturer. Baby expressions, Music Conservatory Juan Jose de Castro, La Lucila, Buenos Aires.
1988. Video. Songs for unborn babies. Presented to the 18th. Congress of the International Society for Music Education, Canberra, Australia.
1988. The birth of musical intelligence. Buenos Aires: Guadalupe Editors. 1988. Elected President, International Music Society for Prenatal Development (IMSPD) at Brisbane, Australia.
1988. Seminar. On baby expressions. Oran Hospital, Salta, Argentina.
1990. Music in human beings. *Journal of Music Therapy*, 1 (4), 9-14. Music Therapy Association of Buenos Aires.
1991. Proto-rhythms: Basis for music and language expression. *Pre-and Peri-Natal Psychology Journal*, 6 (2), 181-198.
1992. Some aspects of music for the unborn child. *Newsletter of the International Music Society for Prenatal Development*, No. 5.
1996. Is there prenatal intelligence? A paper based on David Chamberlain's interpretation of multiple intelligences in the works of Steinberg and Gardner (1992). Presented to the 2nd Congress of Music Therapy, San Pablo, Brazil. Published in *Revista Brasileira*, volume 1 (1), 67-79, 1996.
1998. Seminar, School of Music, La Serena, Chile
1999. Medal given by Compositores Unidos de la Argentina (Young Composers of Argentina) for being one of the founders of the organization in 1957.

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2000. Director, experimental research project to study the effect of music in pregnancy. In collaboration with faculty at University of Salvador, Buenos Aires.

Music and Perinatal Stress Reduction

by Fred J. Schwartz, M.D.

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Abstract: The author uses his experience as an anesthesiologist involved in music medicine to discuss the psychophysiology of perinatal stress. The use of music as an adjunct to medical care for mother and child in the prenatal and postnatal period, as well as the implications for improved outcome and medical cost savings are addressed. The importance of the fetal auditory environment as a conduit for communication and learning is also examined.

From the viewpoint of the anesthesiologist, consciousness is manipulated both chemically and psychotherapeutically to result in decreased pain, altered recall, and a decreased stress response. One of the common elements in my work has been the use of stress reduction techniques during various states of consciousness. I have found that both anesthesia sedation and general anesthesia can open up pathways in the mind to healing therapies. Music and guided imagery can also have powerful healing qualities. When used together during anesthesia, these audio therapies can be used to complement the stress reducing properties of anesthesia and promote faster healing.

Some of the benefits of music in the labor and delivery suite that complement anesthesia are that it speeds up labor and decreases the amount of pain. It also decreases the stress response to labor which is beneficial to both mother and newborn. Couples coming to a delivery suite frequently perceive it as a foreign and unfamiliar environment. The act of choosing a musical program for childbirth allows a couple to exert some control over their environment. Music is very personal in that a particular piece may have a connection with certain past experiences and emotions. This acoustical painting of the hospital environment has been shown to make it less hostile and less anxiety provoking for patients. Since pain and enjoyment emerge as two distinct, though related dimensions of the birth process, music can express both the struggle and the joy of the occasion. The beauty here is that the benefits of the music can be utilized during natural childbirth, with childbirth under epidural anesthesia, and if need be during Cesarean section. Music can help the newborn know that a special event is happening and when the newborn comes into this world the music along with the familiar sound of voices is indeed special.

Music is particularly useful during Cesarean sections. Most anesthetics for C-sections are performed under epidural or spinal anesthesia. The pregnant mother is anesthetized from the chest down. Usually no intravenous sedatives or narcotics are given to the mother until the baby is born, because these can cause sedation or respiratory depression in the newborn. There is often some degree of discomfort for mother before the baby is born, when the uterus is manipulated. Music is an effective way to decrease the discomfort here. I try to get a feel for what the couple and their unborn child find soothing. If they do not have an idea of what they want to hear, I usually suggest classical music or new age music. To me, this type of music fits beautifully with C-sections. To give you an idea of the contrast of requests I have had I will relate to you a Friday evening when there were 3 C-sections in a row. The first 2 were done to Beethoven Piano Sonatas. Our last couple was asked what they and their baby wanted to hear, and the mother replied, "My baby only likes rock and roll, but you have to play it real loud." She picked Bruce Springstein's "Born in the USA" and this did seem fitting for the occasion.¹

An exaggerated stress response has negative effects during pregnancy and childbirth, just as it is detrimental in most disease processes. Most of the physiologic effects of stress are mediated through stress hormones called catecholamines. In the pregnant patient, elevated levels of these stress hormones cause decreased effectiveness of uterine contractions (Simkin, 1986). Some of these patients end up needing C-sections because of this. Intense anxiety has been associated with fetal death in the third trimester (Myers & Myers, 1979). More commonly, the extremely anxious patient in

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labor will have high catecholamine levels which decrease placental blood flow and can cause fetal distress. This is further compounded if the laboring patient hyperventilates, which can further decrease placental blood flow.

Music's ability to slow respiratory rates and decrease the stress response is beneficial during labor. It has been shown to have the ability to shorten labor (Winokur, 1984). Even when the course of labor does not speed up when music is utilized, the perceived length of labor decreases (Clark, McCorkle & Williams, 1981). Other studies have shown that when music is played, pain is decreased (McKinney, 1990, Hanser, Larson & O'Connell, 1983).

During my wife's first pregnancy, I began to think about the environment of our unborn child. I knew that the fetus could respond to music and sound in the womb and I became fascinated with the implications of the constant exposure of the fetus to placental blood flow sounds. Some earlier studies had been done by psychologist Lee Salk (1973), who noticed that most new mothers exhibited a natural preference for holding their infants on the left side of their chest near the heart. Dr. Salk analyzed a number of popular books containing a large number of photographs and artistic representations of infants and adults. Almost 80% of these showed mothers holding their infants on the left side of their chests. This preference extended across all cultures. Balancing groups for left and right-sided dominance, Dr. Salk then replicated this left-sided preference in a large group of new mothers and babies (and used these heart sounds to calm newborns in the hospital nursery). He reasoned there was an imprinting of placental sounds in utero so that sounds after birth remind the baby of the womb experience. This would explain some of the rhythmic similarities of modern music to intrauterine rhythms.

Others have connected the similarities between womb sounds and the "nonsense sounds" that mothers use in talking to their babies. Some of these calming sounds are hush, hush (English) shah (Yiddish), ushuru (Ethiopian), and Insh'allah (Egyptian). Perhaps the similarities to womb sounds also explain the spiritual use of similar sounds in different religions, i.e. "Om" in Buddhism), "Shalom" in Hebrew, Tibetan overtone chanting, and Gregorian chants.

Ultrasound studies have shown that at 16 weeks gestation the fetus can respond to outside sound (Hepper, 1994, Shahidullah & Hepper, 1992). The sounds of the blood flow through the placenta can be heard at a very loud level in the womb. For the lower sound frequencies below 500 Hz, mean sound levels are 80 decibels with peaks to 95 decibels (Gerhardt & Abrams, 1996). This is about as loud as it gets on a crowded dance floor on a Saturday night. A good deal of attention has been given to the so called Mozart Effect where exposure to this music briefly increased spatial IQ in college students (Rauscher, Shaw & Ky, 1995), as well as work with preschool children showing that music training can enhance language development, spatial, and mathematical abilities (Rauscher, et al, 1997). Evidence points to the fact that similar learning benefits extend far back into the prenatal period, and that the sounds and rhythms in the womb may contain information important to the development of the fetal brain (Devlin, Daniels & Roeder, 1997, Shetler, 1989). The newborn can differentiate a recording of his own mother's prenatal womb sounds from a recording of another mother (Righetti, 1996). The newborn can also differentiate emotional content in the recording of his prenatal womb sounds and respond with changes in movement and heart rate (Righetti, 1996).

There is a vast amount of potential information available to the fetus that can be given in the playing of just one musical note or in singing or talking a single syllable. The content of this sound is both informational and emotional and can be used by the fetus in profound ways. The synaptic network in the fetal brain as well as the infant brain undergoes learning-dependent reorganization. This process involves synaptic "pruning" or regression of neural circuits, as well as synaptic sprouting in the developing brain. This is consistent with the observation of psychologists that infants and children may have enhanced behavioral abilities that they lose later in life (Johnston, 1995). Since fetal hearing is probably the major component of this learning-dependent synaptic pruning and sprouting, the fetus is participating in a second and third trimester auditory amphitheater that is perhaps more important than any later classroom. We have only begun to explore the connection between sound and neurobiological development in the fetus and newborn.

My interest in the fetal audio environment led to a musical collaboration with Burt and Joe Wolff. We produced a musical recording of womb sounds and female vocal sounds' called Transitions(tm) and a subsequent series of womb sound recordings for pregnancy, childbirth and children.² It was clear to us that this type of music was very soothing to the newborn, and especially for the premature baby.

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A subsequent study showed that stimulation with the Transitions(tm) womb sound music was helpful in the care of mechanically ventilated, agitated premature babies with low oxygen levels. Significant increases in oxygen saturation as well as decreased levels of agitation were found with the use of music (Collins & Kuck, 1991).

Another study showed that when lullaby music was played in the neonatal intensive care unit (NICU) that there were less episodes of oxygen desaturation (Caine, 1991). No doubt that some of the high-decibel sounds from alarms and equipment in the NICU are harmful to the neonate. In one study a group of premature babies were insulated from their audio environment with earmuffs (Zahr & Traversay, 1995). These infants had higher oxygen saturations and spent more time in sleep compared to control group infants. Other studies have shown a doubling of daily weight gain when premature babies in the NICU were given music therapy (Caine, 1991, Coleman, Pratt & Abel, 1996). Additional studies using music with premature babies have shown a 3- to 5-day earlier discharge from the NICU (Caine, 1991, Coleman, Pratt & Abel, 1996, Standley, 1996).

Increased stress response consumes precious calories. It is now clear that the use of music therapy not only has a beneficial effect on the growth and development of premature babies, but may lead to cost savings in their medical care--a significant problem in modern society. In the United States alone, the extra cost of intensive care for these low birth weight infants is over \$1,000. per day or over 3.5 billion dollars a year. Later added costs of special education and continued medical expense for these children are even larger than the initial costs for their NICU care (Lewit, et al, 1995). Many of these babies suffer hearing and visual impairment, mental retardation, cerebral palsy or learning disabilities. Ultimately, the uncountable costs are paid by human beings who are not able to realize their full potential. So it appears that with a relatively small expenditure for music in our neonatal ICU's we could decrease the time in the NICU by over 3 days and save over \$3,000. for every premature baby.

Premature birth is the predominant cause of low birth weight and neonatal mortality in the United States (Wegman, 1996). In the US almost one in one hundred babies dies shortly after birth. (Paneth, 1995). This is the highest mortality rate of all the industrialized countries. Despite our best efforts, the consequences of premature labor will continue to be a huge problem for society. Despite a large investment in research and programs to prevent premature birth, the incidence of prematurity in the US has not decreased (Paneth, 1995).

A number of risk factors have been associated with prematurity and low birth weight (See Table 1). Many of these factors are interrelated. In the United States, a large amount of premature births occur in adolescents, a group with higher rates of poverty, lack of prenatal care, poor nutrition, stress, tobacco use, alcohol intake, and drug abuse (Shiono & Berman, 1995, Hedegaard, Henriksen & Niels, 1996).

To gain more insight into premature birth it is interesting to look at some of what we know about how labor is initiated. Thousands of years ago, Hippocrates believed that the baby decides when the birth process begins--a fact that has been confirmed by research today (Nathanielsz, 1995). Evidence points to fetal initiation of labor about 2 to 3 weeks before birth. In the fetal brain, the hypothalamus increases secretion of CRH (corticotrophin releasing hormone) and this stimulates the pituitary to release ACTH (adrenocorticotrophin). This stimulates the fetal adrenal cortex to secrete cortisol. The placenta reacts by producing more estrogen and less progesterone which eventually triggers the contractions of labor.

Since we know that the fetus is involved in initiating labor, it is interesting to wonder why the fetus would initiate premature birth. We know that pregnancies filled with stress are more inclined to conclude prematurely. Use of tobacco and cocaine also increase the stress response in the mother and this is probably true for the fetus as well. There is a biologic explanation for the fetus being able to react to maternal stress by initiating labor. In the human species, our fight or flight stress response was often effective for our survival. In modern times, the stress response is seen as a catalyst for disease. It stands to reason that for biologic survival of the species there would be a mechanism to allow initiation of labor under stressful conditions. Especially in the past, it was much more common for the pregnant woman and fetus to be exposed to the risk of cataclysmic death from the environment or infectious diseases and epidemics. In these situations, some of these premature babies might survive. For the mother, delivery of the baby would allow her to direct her energies toward survival and future childbearing. Despite a large amount of research dedicated to prevention of preterm labor, the incidence of prematurity in the US has not decreased (Paneth, 1995).

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Table I

Factors Associated with Low Birth Weight

Age below 18 years
Drug and alcohol use
Previous preterm delivery
Infection
Tobacco use
Lack of prenatal care
Maternal stress
Poverty

A number of factors have been associated with the risk of prematurity and low birth weight (Table 1). Many of these factors are interrelated. In the United States, a large amount of these premature births occur in the adolescents, who as a group have higher rates of poverty, lack of prenatal care, poor nutrition, stress, tobacco use, alcohol intake, and drug abuse (Shiono & Berman, 1995, Hedegaard, Henriksen & Niels, 1996).

To gain more insight into premature birth it is interesting to look at some of what we know about how labor is initiated. Thousands of years ago, Hippocrates believed that the baby decides when the birth process begins. There is now good evidence to show that the fetus does initiate labor (Nathanielsz, 1995). Evidence points to fetal initiation of labor about 2 to 3 weeks before birth. In the fetal brain, the hypothalamus increases secretion of CRH (corticotrophin releasing hormone) and this stimulates the pituitary to release ACTH (adrenocorticotrophin). This stimulates the fetal adrenal cortex to secrete cortisol. The placenta then produces more estrogen and less progesterone and this eventually sets off the contractions of labor.

Since we know that the fetus is involved in initiating labor it is interesting to speculate on why the fetus would initiate premature birth. We do know that pregnancies that contain a lot of stress are more inclined to be concluded prematurely. Tobacco and cocaine use increase the stress response in the parturient, and this likely is true also in the fetus. There is a biologic explanation for the fetus being able to react to a maternal stress response by initiating labor. In the human species, our fight or flight stress response was often effective during primitive times for our survival. Although in modern times this response has become more of a catalyst for disease. It stands to reason that for biologic survival of the species there would be a mechanism to allow initiation of labor under stressful conditions. In the past, it was much more common for the pregnant woman and fetus to be exposed to the risk of cataclysmic death from the environment or infectious diseases and epidemics. In these situations, some of these premature babies might survive. For the mother, delivery of the baby would allow her to direct her energies toward survival and future childbearing.

As far as other possible mechanisms for initiation of labor, there could be some hormonal transfer from the mother to the fetus through the placenta. Or perhaps a lack of certain nutrients either from poor maternal diet or decreased supply of these nutrients via decreased placental blood flow. Perhaps there is a kind of dialogue that goes on during pregnancy between the mother and her unborn baby that is interrupted in some way by maternal stress. What about the transfer of emotions (or lack of) from the mother to the fetus? It is obvious that the expression of love, nurturing and acceptance is expressed by the mother to the fetus by her voice; through the wide gamut of tonality, rhythm and inflection produced by her talking and singing. It is very possible that this vocal information (or lack of) has an effect on the fetal initiation of labor. It is intuitive that there is a profound interplay of information and emotion involved in this sacred and precious dialogue.

Another possibility is that fetal hearing of the maternal blood flow sounds may in some way cause the fetus to initiate premature labor. Is there some way in which the fetal brain processes changes in womb sound rhythms? Biologic rhythmicity is a fundamental aspect of healthy human beings. For example, the rhythm of our heart beat is not like a metronome but contains a beat-to-beat variability. As we age the variability of our biologic rhythms decrease. And when we reach death, there is no rhythm or variability. The fetus in distress usually has a decreased variability of the fetal heart rate. These changes are sometimes used diagnostically to make clinical decisions during pregnancy and childbirth. Since the predominant rhythmic component of fetal intrauterine hearing is the sound of the mother's blood flow pulsing through the placenta, is it not likely that the fetal brain uses this sound

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and rhythmic information in deciding to initiate labor? We know that maternal stress often manifests in a hyperactive sympathetic nervous system and a decrease in maternal heart rate variability (Ekholm, et al, 1996). So perhaps the fetus perceives decreases in maternal heart rate variability and uses this information as part of the initiation of preterm labor.

Another possible cause for preterm labor is an exaggerated maternal apprehension for the safety of the baby as well as the worry that Braxton Hicks contractions are foreboding a premature labor (Cheek, 1995). This will usually provoke a call to the midwife or obstetrician and bedrest and other treatments to prevent preterm labor. This will often increase the patient's anxiety even more and lead to continuing painful Braxton Hicks contractions. The quality of telepathic communication from the mother to the fetus will reveal anxiety and be picked up by the fetus. This may provoke initiation of the labor cascade by the fetus. Hypnosis during this time has been successful in prolonging the pregnancy (Cheek, 1995, Omer, Friedlander & Palti, 1986).

What appears to be a common attribute here is that an exaggerated maternal stress response can lead to the initiation of preterm labor. Besides the documented clinical use of hypnosis in the treatment of preterm labor, meditation has been documented to decrease stress hormone levels in various clinical situations (Sudsuang, Chentanez & Veluvan, 1991). Music alone has been shown to diminish stress-induced increases in stress hormones (Spintge & Droh, 1987). Music combined with guided imagery also decreases stress hormone levels (McKinney, Tims, Kumar & Kumar, 1997; McKinney, et al, 1997 and Bonny, ND). Music therapy has also decreased maternal stress for pregnant adolescents (Liebman & MacLaren, 1991).

My interests led me to develop a tape of guided imagery with music to affect the maternal-fetal dialog, The Transitions Maternal and Fetal Wellness Program(tm) (Schwartz & McDonald, 1996). By using this tape, I hoped to positively influence some of the risk factors related to preterm labor and low birth weight. The tape was designed to reduce overall stress, strengthen communication between mother and fetus, and to get mother to center on the here and now. Messages gently alert the mother to the dangers of alcohol, drugs, and smoking, and to the importance of nutrition and exercise.³

Initial anecdotal reports from a group of low socioeconomic mothers have indicated higher birth weights in the mothers exposed to this guided imagery and music (Hetty Watters, 1997). A large multi-center study is being initiated to explore these benefits to various populations. Maternal and neonatal variables will include gestational age, birth weight, APGAR scores, duration of labor, birth complications, the cost of medical care, and maternal and paternal fetal attachment. We know the medical benefits of this type of therapy but proving this in further studies is necessary before we will see large scale use of these therapies.

Notes

1. Despite this particular mother's own preference for loud rock music, other research reveals the fetal child prefers quieter passages of Mozart and Vivaldi, consonant music over dissonant music, and, obviously, lullabies (For example, Clements, 1977; Montemurro, 1996; Zentner and Kagen, 1998).

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