

Study the prenatal learning psychology essay



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It is widely accepted that a child's learning ability begins during those very same prenatal months. Educators, scientists, criminologists and physicians alike have long ago acknowledged the vital importance of a healthy and enriched prenatal environment as it pertains to the long term development and learning ability of a child. An age-appropriate prenatal curriculum strengthens a child's ability to learn during the developmental period when the advantages will be most significant for the child. In the prenatal months, the brain is at its most receptive stage of learning. The prenatal baby's hearing is fully developed by the 18th week of pregnancy. Independent studies have demonstrated that, for the duration of the pregnancy, the baby can actually compare and contrast simple sounds. By encouraging this simple 'auditory exercise' during this crucial period, these studies have demonstrated that the child may realize significant long-term developmental benefits.

Key words: prenatal, learning, development

1. Learning and memory in fetuses

Every mother knows that her child's physical development begins during the crucial prenatal months. Taking a prenatal vitamin to enrich a child's nutritional environment is the standard-of-care for providing an optimal environment during a child's earliest physical development. From thumb sucking, to cry-like behavior, to dreaming, and smiling, new four-dimensional ultrasound technology has shown us more than we ever imagined possible about human life in the womb. Now as studies continue to unfold the mysteries of life in the womb, discoveries in learning and memory are changing the way many see the fetus. These are stunning reminders of the

capabilities of the unborn-precious souls who are so often denied their right to life. Studies over the years have started to reveal more about the neurological development of humans before they are born, but researchers are still trying to figure out when memory begins and how long it can last. fetuses were observed to have a short-term (10-min) memory from at least 30 weeks GA onward, which also appeared independent of fetal age. In addition, results indicated that 34-week-old fetuses are able to store information and retrieve it 4 weeks later (Nijhuis, 2009).

The new study tested how fetuses in nearly 100 pregnant women responded to a specific stimulus, in this case, a “vibroacoustic stimulation”, which is a very low sound that makes a vibration. The researchers observed the reaction using an ultrasound. When the fetus first receives the stimulation, it is startled. But after repeated trials of the same stimulation, 30 seconds apart, the fetus gets used to the sound and doesn’t react. This lessened response to a repeated stimulus is called habituation, a process that both humans and animals are known to experience. For example, you might become habituated to the sound of your heater at nighttime, hearing it at first, but growing used to the noise after a while and falling asleep. Habituation is a form of learning and a form of memory,” Nijhuis and his colleagues used the habituation tests to examine memory in fetuses 30 to 38 weeks old. They found that 30-week-old fetuses had a “memory” of 10 minutes - if the fetuses received a second round of sound stimulation 10 minutes after the initial test, it took them a lot less time to become habituated to the noise during their second session, and they stopped responding after only a few stimuli, he said (Nijhuis, 2001).

The researchers also found that 34-week-old fetuses were able to “store information and retrieve it four weeks later,”. The team came to this conclusion after performing the habituation tests at 34 weeks and then again at 38 weeks. The scientists compared the response of the 38-week-old fetuses who had been tested before with that of fetuses who had not been tested before (Nijhuis, 2009). Another studies have shown that The earliest habituation response has been demonstrated at 22-23 weeks of gestational age and seems to occur earlier in females than in males)Hepper, 1996).

One of the most successful paradigm used to investigate fetal learning and memory is that of “exposure” learning. One study looked at the ability of the fetus to learn a TV theme tune, “Neighbors”, frequently heard by the mother during her pregnancy. In the first experiment newborn infants (2-4 days of age) of mothers who watched Neighbors during pregnancy (and heard the theme tune) became alert stopped moving and their heart rate decreased (orienting) upon hearing the tune. These same individuals showed no such reaction to other, unfamiliar tunes. Newborns of mothers who did not watch the TV program during pregnancy showed no reaction to the tune. There was no exposure to the TV tune after birth, the last exposure occurring before birth. Hence individuals must have learned the information about the tune prenatally and retained it 2-4 days until tested postnatally. This suggests that the ability to recognize familiar stimuli commences between 30 and 37 weeks of gestation. The study does indicate that the fetus is able to learn and remember familiar auditory stimuli in the womb, retain this information over the birth period and that this learning is specific to the familiar stimulus. Other studies have confirmed the ability of the fetus to learn familiar

auditory stimuli in utero (Hepper, 1996). It was proved that there was a relationship between aspects of functional brain development and habituation in fetuses (Fukushima, 2004). Another study has shown that Habituation is the decrement in response to repeated stimulation. Fetal habituation performance may reflect the functioning of the central nervous system (CNS) prenatally. the ongoing maturation of the fetal CNS does appear to be reflected in fetal habituation performance (Noleen, Mc Corry, Hepper, 2007).

Prenatal memory may be important for the development of attachment and other maternal recognition. There is much evidence that the fetus learns the speech characteristics of its mother prenatally and prefers its mother's voice to other female voices after birth. It may be that by learning to recognize its mother prenatally the newborn infant has a "familiar" stimulus in its environment after birth to respond to. As well as enabling recognition of the mother this may also mark the beginnings of attachment.. However this prenatal priming may ensure and promote both the recognition of the individual's mother and the development of attachment. Although further evidence is required it may be that the individual learns about its mother's smell prenatally and this too would similarly promote maternal recognition and attachment.

Fetal memory may serve a "practice function". There is much evidence of other behaviors starting before the time they are needed. Fetal breathing is one example of this. These movements beginning at 10-11 weeks of gestation, are similar to those exhibited after birth to enable breathing . Yet there is no air in the womb. A similar example is presented by eye

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movements; coordinated eye movements occur in the womb in the absence of all but the most limited visual stimuli. It has been considered that behaviors that are crucial to a certain stage of development are practiced prior to this time to ensure they functioned efficiently when needed . A memory in utero may be important for the establishment of breast feeding. The mother's diet flavours both the amniotic fluid and her breast milk . The fetus may learn about the flavour of the amniotic fluid via its swallowing of this fluid which begins at 12 weeks of gestation . When presented to the breast for the first time, the newborn recognizes the colostrums as familiar due to the presence of the same tastes that have been present in the amniotic fluid. This may enhance the individual's willingness to suck and promote breast feeding. Recent evidence suggests the fetus can learn tastes experienced only prenatally and through such learning acquires a preference for these tastes. Furthermore, preliminary observations at my lab indicate those mothers who experience the greatest change in diet between before and after birth have the greatest difficulty in establishing breastfeeding (Hepper, 1996).

2. Language-Learning Begins Before Birth

According to a new study, even infants who are just a few days old have regional accents, which are detectable in their cries. Babies are able to memorize their mothers' speech patterns while still in the womb, and can later mimic the melody patterns in their own vocalizations. Also new studies have shown that newborns' cry melody is shaped by Their native language. Human fetuses are able to memorize auditory stimuli from the external world by the last trimester of pregnancy, with a particular sensitivity to melody

contour in both music and language Newborns prefer their mother's voice over other voices and perceive the emotional content of messages conveyed via intonation contours in maternal speech (motherese) Their perceptual preference for the surrounding language and their ability to distinguish between prosodically different languages and pitch changes are based on prosodic information, primarily melody. Adult-like processing of pitch intervals allows newborns to appreciate musical melodies and emotional and linguistic prosody Although prenatal exposure to native-language prosody influences newborns' perception, the surrounding language affects sound production apparently much later . Here, we analyzed the crying patterns of 30 French and 30 German newborns with respect to their melody and intensity contours. The French group preferentially produced cries with a rising melody contour, whereas the German group preferentially produced falling contours. The data show an influence of the surrounding speech prosody on newborns' cry melody, possibly via vocal learning based on biological predispositions. In the study, Wermke and her partners recorded the cries of newborn babies from France and Germany to find out whether there was a noticeable difference in their speech patterns. The two locations were chosen because there's a dramatic variance in the countries' languages: " In French, there are a great many words where the stress lies towards the end, producing a rising melody, while in German it is usually the other way round (Wermke, 2009).

The Baby Plus curriculum is a series of 16 naturally derived sounds that resemble a mother's heartbeat. The rhythm of the sounds increases incrementally as the pregnancy progresses. The Baby Plus sonic pattern

introduces your child to a sequential learning process, built upon the natural rhythms of their own environment. This “ auditory exercise” strengthens learning ability during the developmental period when the advantages will be most significant and enduring for a child. Baby Plus is the first educational tool designed for prenatal use that has been proven effective. Baby Plus children have an intellectual, developmental, creative, and emotional advantage from the time they are born)Logan, 2003).

3. Unborn babies respond to mother’s mood and Emotional Development in fetus

Scientists have discovered that unborn babies respond to their mother’s mood while she is watching a movie, becoming quiet and still if the film is sad and very lively if the film is happy)Shinohara, 2010). Kazuyuki Shinohara and colleagues in the Department of Neurobiology and Behavior of Nagasaki University in Japan showed 10 pregnant volunteers a cheery 5-minute clip from the Julie Andrews musical *The Sound of Music*. Another 14 watched a tear-jerking 5 minutes from the 1979 Franco Zeffirelli film *The Champ*, in which a boy cries at the death of his father. Each clip was sandwiched between two “ neutral” film clips so that the team could measure any changes in fetal movements against a baseline. The women listened to the movies using headphones to guarantee that only the effect of the mothers’ emotions was being measured and that their unborn babies were not being influenced by the movie’s soundtrack. The team counted the number of arm, leg and whole body movements via ultrasound and found that during the happy film clip the unborn babies moved their arms significantly more than when the pregnant women watched the neutral clips. However, the unborn

babies of the women watching the sad clip moved their arms significantly less than normal. These findings suggest that induced emotions in pregnant women primarily affect arm movements of their fetuses, and that positive and negative emotions have the opposite effects on fetus movement. “Chronic stress exposure for pregnant women affects fetal development, resulting in preterm birth and low birth weight. In addition to stress, persistent negative maternal emotions during pregnancy such as anxiety, depression, and anger also exert an influence on fetal and later development of a child,” (Shinohara, 2010). Fetuses of mothers who show high rates of depression, anxiety and stress weigh less and are smaller than average at midterm, according to a recent study from the University of Miami School of Medicine. Psychobiologist Miguel Diego and colleagues found that the stress hormone cortisol seems to be one potential mechanism for transmitting a mother’s stress to her unborn baby. “Maternal distress is accompanied by biochemical changes, such as increased cortisol, that can both directly and indirectly affect the fetus,” (Diego, 2006).

Research suggests that high stress levels experienced by the mother during pregnancy can increase the chances that the child will have schizophrenia later in life. Higher stress levels during pregnancy has also been linked to lower child IQ . research at Imperial College London, revealed that pregnant women who are stressed double the risk of their babies having lower than average IQs. Professor Glover, who conducted the study, followed the progress of almost 70 women and their children. The children of women who were believed to have suffered greater levels of stress during pregnancy scored around 90 in subsequent tests, compared to an average score of 100

for children whose mothers were deemed to have experienced less stress during pregnancy. Lower IQ level of children is also associated with a higher risk of schizophrenia later in life. Moreover, stress during pregnancy is linked to many other factors that increase risk for schizophrenia, such as lower birth weight of child (a known risk factor for schizophrenia), and it is also known that increased levels of stress can lower the immune system; which opens a woman up to infections (that are also known risk factors for schizophrenia (Glover, 2007)).

Scientists have spent the last decade looking at whether pregnancy stress affects baby's wellbeing. Experts are trying to pinpoint if being stressed in pregnancy can have an effect independent of other factors which are commonly linked with it, such as early delivery or postnatal stress. The Avon Longitudinal Study of Parents and Children (ALSPAC) involves 14, 000 women who enrolled in the early 1990s when pregnant and their children. With detailed information on genetic, environmental and personal factors, it is hoped to help scientists shed light on all sorts of health problems, including the effect of stress in pregnancy. Professor Vivette Glover, an expert in the effects of stress in pregnancy at Imperial College, London, and her team studied information on almost 7500 of these women and their children. This showed strong associations between antenatal anxiety and behavioral and emotional problems in children as young as four years old. Stress in pregnancy could be responsible for as many as 10-15% of all cases of emotional or behavioral problems, including attention-deficit hyperactivity disorder', says Professor Glover. In the UK, this means stress in pregnancy could be responsible for up to 80, 000 babies born every year going on to

develop one of these conditions. There could be a direct effect of maternal mood on fetal brain development, which affects the behavioral development of the child (Glover, 2002).

The life of twins has also opened some unexpected vistas in the exploration of learning and memory in the womb. In the National Geographic special *In the Womb: Twins, Triplets, and Quads*, a twin brother and sister were spotted through ultrasound technology playing cheek-to-cheek on either side of the placenta. A year after birth, their favorite game was to take positions on opposite sides of a curtain, laughing and giggling as they touched and played through the divider. In another case of twins, one baby showed more aggressive behavior in utero. Kicking, pushing, and hitting the other, who would retreat to the far side of the womb. Four years later, whenever a fight breaks out between the twins, the quieter one still retreats to his room and closes the door (Earley, 2009).

Humans have a deep-seated urge to be social, and new research on the interactions of twins in the womb suggests this begins even before babies are born. Researchers from the University of Padova in Italy have been studying pregnancies involving twins. Leader of the team, psychologist Umberto Castiello, explained that newborns appear to be already “wired” to interact socially with other humans soon after birth, and previous research has demonstrated that within only a few hours after birth babies can imitate gestures of people around them and make other social interactions. Studying twins in the womb made it possible to see investigate the pre-wired hypothesis and see if socialization was already apparent while still in the womb. The study used four-dimensional ultrasonography to make 3D videos

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of twins at 14 and 18 weeks of gestation. The five pairs of twins were found to be reaching for each other even at 14 weeks, and making a range of contacts including head to head, arm to head and head to arm. By the time they were at 18 weeks, they touched each other more often than they touched their own bodies, spending up to 30 percent of their time reaching out and stroking their co-twin. The twin fetuses were taped for 20 minutes each time, and the video recordings were digitized for offline analysis of the hand movements. Kinematic analyses of the recordings showed the fetuses made distinct gestures when touching each other, and movements lasted longer - their hands lingered. They also took as much care when touching their twin's delicate eye region as they did with their own. This type of contact was not the same as the inevitable contact between two bodies sharing a confined space or accidental contacts between the bodies and the walls of the uterus, and there was no increase in the frequency in these types of contacts in the four weeks. The findings clearly demonstrate it is deep within human nature to reach out to other people (Castiello, 2010).

4. Benefits of Prenatal Stimulation (Music)

Prenatal stimulation through music heard regularly while in the womb might provide some babies with a sense of confidence and relaxation after they're born. Prenatal stimulation is a method that uses stimuli such as sounds (mother's voice and musical ones), movement, pressure, vibrations, and light to communicate with a developing baby prior to birth. While in the womb, Baby learns to recognize and respond to different stimuli, which leads to encouragement of physical, mental, and sensory development.

Stimulation exercises will allow Baby to communicate with her mother

through her movement in the womb, establish a relationship between specific stimuli (such as voices) and, most importantly, help develop her memory (Van de Carr, Lehrer 1996).

Accurate information has become available to researchers through the use of ultrasound, in utero monitors, and fiber optic television, which provide a fascinating look at life developing inside the womb. Studies by two of the leading early childhood researchers, have detailed that babies who have been stimulated while in the womb exhibit advanced visual, auditory, language, and motor development skills. The researchers even say that the babies sleep better, are more alert to their environment and surroundings, and are far more content, compared to babies without prenatal stimulation (Verny, 2000).

In another study a prospective randomized control trial was conducted using an exposure learning model in 20 normal term pregnancies. Music was played to ten fetuses via a headphone on the maternal abdomen. Ten controls had the headphone without sound. All fetal studies took place within 72 h prior to elective delivery. All 20 newborns were exposed to the same music on days 3-5. For the first hour of study, exposed fetuses had higher mean heart rates (FHR) and spent more time exhibiting high FHR variation compared to unexposed fetuses. These effects were carried over into the neonatal period with prenatally exposed newborns manifesting more state transitions and spending a higher proportion of time in awake states when exposed to the same music stimulus. Prenatal music exposure alters the fetal behavioral state and is carried forward to the newborn period. This

suggests that a simple form of fetal programming or learning has occurred (James and Spencer, 2002).

5. Conclusion

The newest findings support the fetus learning in uterus. What fetus experiences in mother uterus, prepare the fetus for living in external world. The latest researches indicate that the mother uterus could be considered for an environment of early childhood learning. In regards to the findings, child training could be started before birth, because fetus in mother uterus is an active learner.