

Babies Are So Clever!

This is the first in a series of articles about baby learning and development. However, you won't find advice on nutrition, feeding, safety or hygiene. The aim of each article is to explain how babies learn, develop or acquire language and to demonstrate why sensory experiences, tummy time and early nurturing are so important. Babies have an amazing capacity to learn, but because parents or practitioners may not know what to look for, skills and capabilities may go unnoticed. This article reveals just how clever babies are and offers parents and practitioners a significant and remarkable opportunity to enjoy the learning potential of these incredible beings right from the start!

One of the most exciting advances in child development has been the discovery that babies actually learn *before* they are born. Even more amazing is the fact that during the first year, babies learn more than at any other time in their lives. By the first birthday, the baby's brain has doubled in volume as a direct result of the trillions of connections made between the brain cells. This is why it is so important to introduce a rich variety of sensory experiences at every possible opportunity.

Prenatal learning

It's hard to believe that the baby has the capacity to learn about the outside world before birth. However, with the benefit of ultrasound and non-invasive techniques, foetal reactions to the multitude of different sounds and tastes that echo or pass through the womb can be monitored and assessed.

What does the unborn baby hear?

Hearing is the easiest of the senses to assess. Modern ultrasound scanning has shown that from 25 weeks onwards, the foetus responds with rhythmic swimming or kicking movements to sounds and vibrations from the outside world. We have all seen how newborn babies turn their heads in the direction of a sound, but what is amazing is that the prenatal baby already displays this skill. In the last trimester, the baby's brain busily processes the rich orchestra of gurgles, swishes and beats that can be heard through the amniotic fluid and the sense of hearing becomes increasingly refined. It is perhaps not surprising that the sense of hearing is remarkably well developed at birth. No wonder the sound of the vacuum cleaner or washing machine soothes and settles the newborn baby!

Rhythm and Music

Music plays a significant role in foetal development. At 38 weeks gestation, the baby forms a memory of the sound patterns that echo through the womb and reacts with exquisite sensitivity to strange rhythms and tones. If the mother relaxes to a favourite song, it will have an immediate and calming effect on the baby. Even after birth, hearing a familiar tune can settle and soothe a fretful baby. There is some evidence to suggest that classical music penetrates the wall of the uterus more easily than pop music. However, Mozart and Bach have sound patterns of a frequency similar to the mother's voice, which is probably the reason why newborn babies appear to express a preference for these composers!

Preparation for Language

It's hard to believe that babies are tuned in to the rhythms and patterns of language even before they are born. The baby listens to the mother's voice and recognises differences in the length and style of sounds that make up words and sentences. Tuning in to conversations is an important step in later language development. Hearing the intonations and patterns of other languages can also instigate an immediate reaction in the foetus. The baby's heartbeat may quicken and kicking may become more vigorous. Incredibly, babies are born with the ability to distinguish every one of the individual speech sounds that make up the entire range of human languages. However, it is the special sound of the mother's voice that plays a vital role in the bonding process when mother and baby meet for the first time.

Development of sight

As early as 25 weeks gestation, the eyelids open and close and at 33 weeks, the baby becomes sensitive to changes in luminosity. Bright light filtering through the wall of the uterus offers a new sensory experience, and the baby may respond with active kicking. The response to light shows that vision and eye muscle co-ordination is beginning to develop even in the darkness of the womb. However, shapes and forms may only be seen after birth. Even so, babies seem to arrive in the world with a preference for looking at faces or face-like objects, the most important being the mother's. After birth, it will be another eight months before vision is fully developed and the baby begins to see like an adult. However, it takes several years to fully strengthen the eye muscles. Any activity that involves movement is therefore excellent for visual development!

Prenatal Taste

Foods, vitamins and minerals that are needed for growth and development pass from the mother's bloodstream into the baby's. By 6 months gestation, the taste buds have developed and the baby can tell whether the amniotic fluid tastes bitter, sweet or sour. This is the beginning of taste preferences for certain foods, which the baby may later recognise in the breast milk. Indeed, if the mother dramatically changes her diet, the baby may refuse to feed as the taste will be unfamiliar.

Amazingly, the baby makes clever associations between the taste of a substance and the effect it has on her mother. For example, if the mother drinks a strong cup of coffee, the baby's heart rate and breathing will also increase. Even more surprising is the fact that the baby responds in the same way to decaffeinated coffee. The association between taste and a specific physical response suggests that babies are much cleverer than we once thought!

There is increasing evidence to suggest that the brain forms a memory of early nutritional experiences and that these can have a subsequent impact on IQ and temperament. Nutrition during pregnancy is also thought to be a probable cause of Attention Deficiency Hyperactivity Disorder (ADHD). There is even some evidence to suggest that breast-fed babies are less predisposed to ADHD than bottle fed babies.

Prenatal Smell

The olfactory bulbs that govern the baby's sense of smell continue to grow, even after the completion of brain cell development. The brain registers the many different chemical compounds that pass through the amniotic fluid or flow through the capillaries of the nasal mucosa.

After birth, the sense of smell strengthens the bond between the mother and infant. Research has shown that the baby and mother recognize each other based solely on scent. The postnatal baby is highly sensitive to specific odours such as the smell of breast milk, the mother's perfume or the smell of a comforter, special blanket or soft toy, which provide psychological comfort and security. By the end of the first year, the baby can detect over 10,000 different odours. Pleasant smells such as the scent of fresh flowers or the aroma of a cake being baked can actually boost the immune system and make the baby feel much happier.

What does the unborn baby feel?

As the baby becomes increasingly attuned to her environment, changes in the mother's emotions can trigger complex physical responses. For example, maternal stress can make the baby agitated and unsettled. However, when the mother's endorphin levels rise, the baby will experience a sense of calm and contentment. Stress-related experiences in the womb have been linked to ADHD and problems of perception, thinking, and memory. Traumatic events after birth may also be indelibly imprinted in memory. For example, babies that are frightened by loud noises often fear them throughout adulthood.

Do babies play inside the womb?

Life inside the womb can be very stimulating and there are plenty of interesting things to discover. The umbilical cord and the hands and feet act as ready made play things. Even if discovery occurs by chance, it is possible that the brain forms an early sensory map of the body. Babies also suck their thumbs and in so doing, the tongue registers in fine detail size, smell, taste, texture and shape. Thumb sucking prepares the baby for the business of feeding, so it is probably no surprise that babies seem to know exactly what to do when they first come into contact with the nipple! The baby's mouth has more nerve endings than any other part of her body. It is through mouthing that the baby becomes familiar with the sensory world.

The baby even responds to simple interaction games with the parent. For example, if the mother gently exerts pressure on her abdomen, the baby may reciprocate with vigorous kicking movements. Such experiences play an important role in preparing the baby's brain for the explosion of learning that takes place in the first year of life.

Brain development and learning

From the moment of conception, the foetal brain undergoes rapid change. Every minute 250,000 new brain cells are formed. By the seventh month the process of brain formation is complete and the baby possesses a staggering 100 to 200 billion brain cells! The brain is continuously working, growing and preparing the baby for life in the outside world. It's amazing to think that the newborn baby has already acquired an incredible store of knowledge gained from a range of experiences inside the womb.

The newborn's brain already functions better and faster than the most sophisticated computer. If each layer of the brain was unfolded, it would probably cover the area of a football pitch! Billions of brain cells (neurons) fire several hundred times per second sending electrical impulses from one neuron to the next, like a huge international information exchange system receiving and sending signals. Over time, the brain progressively fine tunes some of the electrical pathways, with primitive reflexes such as the rooting and startle reflex being dispensed with and the pathways that govern speech and motor co-ordination being retained.

However, it is during the first year of life that the brain constructs the foundations of the baby's intellectual future. This is the period when the baby actually structures her own brain as a result of the multitude of experiences she encounters. Every time the baby hears, sees, smells, tastes or feels something new, neural connections form between the brain cells at a remarkable rate. No wonder babies spend so much of their time sleeping!

Breakthrough research has revealed the extraordinary abilities of babies. It has also shown that experiences during pregnancy and the first year of life profoundly influence intelligence, creativity, language, memory, reasoning, problem-solving, and incredibly, later reading and math skills. Everything the baby experiences will affect the growth and development of the brain and form the foundation for all future learning. That's why it is so important to provide the best conditions for learning from conception to the end of the first year of life!

Key points

- Learning begins before birth
- An explosion of learning occurs from the moment of birth
- Babies learn more in the first year than at any other time in their lives
- Providing a multitude of sensory experiences is crucial for the development of IQ
- *Everything* the baby experiences will have an effect on future learning and development.

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