

# **Physical & Motor Development**

## **(Infancy & Pre school years)**

Infants (birth to age 1) and toddlers (ages 1 to 2) grow quickly; bodily changes are rapid and profound. **Physical development** refers to biological changes that children undergo as they age. Important aspects that determine the progress of physical development in infancy and toddlerhood include physical and brain changes; development of reflexes, motor skills, sensations, perceptions, and learning skills; and health issues.

The first 4 weeks of life are termed the **neonatal period**. Most babies weigh between 5 1/2 and 10 pounds, and are between 18 and 22 inches long. Male babies are generally slightly heavier and longer than female babies. Neonates born weighing less than 5 1/2 pounds are of **low birthweight**. Infants who arrive before their due date are **preterm** or **premature**, and these babies may or may not have a low birthweight. Babies who arrive on or shortly after their due date are **full-term**. Infants who arrive 2 or more weeks after their due date are **postmature**. Both premature and postmature babies are at higher risk of complications such as sickness, brain damage, or death, than are full-term babies.

Physical growth is especially rapid during the first 2 years. An infant's birthweight generally doubles by 6 months and triples by the infant's first birthday. Similarly, a baby grows between 10 and 12 inches in length (or height), and the baby's proportions change during the first 2 years. The size of an infant's head decreases in proportion from 1/3 of the entire body at birth, to 1/4 at age 2, to 1/8 by adulthood.

Fetal and neonatal brain developments are also rapid. The lower, or **subcortical**, areas of the brain (responsible for basic life functions, like breathing) develop first, followed by the higher areas, or **cortical** areas (responsible for thinking and planning). Most brain changes occur prenatally and soon after birth. At birth, the neonate's brain weighs only 25 percent of that of an adult brain. By the end of the second year, the brain weighs about 80 percent; by puberty, it weighs nearly 100 percent of that of an adult brain.

## Reflexes and motor skills

Because infants cannot endure on their own, newborns have specific built-in or prewired abilities for survival and adaptive purposes. **Reflexes** are automatic reactions to stimulation that enable infants to respond to the environment before any learning has taken place. For instance, babies automatically suck when presented with a nipple, turn their heads when a parent speaks, grasp at a finger that is pressed into their hand, and startle when exposed to loud noises. Some reflexes, such as blinking, are permanent. Others, such as grasping, disappear after several months and eventually become voluntary responses. Common infant motor reflexes appear in Table 1.

**TABLE 1 Common Infant Motor Reflexes**

<b><i>Reflex</i></b>	<b><i>Stimulus/Action</i></b>
Blinking	In response to a puff of air, the infant closes both eyes.
Babinski	In response to stroking the side of its foot, the infant twists its foot inward and fans out its toes.
Grasping	In response to an object pressed against its palm, the infant attempts to grasp the object.
Moro	In response to a shock or loud noise, the infant arches its back and throws its arms outward.
Rooting	In response to stroking its cheek, the infant turns its head toward the touch and attempts to suck.
Stepping	In response to holding the infant so that its feet barely touch a surface, the infant "walks."
Sucking	In response to inserting a finger or nipple into its mouth, the infant begins rhythmically sucking.
Babkin	In response to stroking its forehead, the infant turns its head and opens its mouth.
Plantar	In response to touching the ball of the foot, the infant curls its toes under.

**Motor skills**, or behavioral abilities, develop in conjunction with physical growth. In other words, infants must learn to engage in motor activities within the context of their changing bodies. At about 1 month, infants may lift their chins while lying flat on their

stomachs. Within another month, infants may raise their chests from the same position. By the fourth month, infants may grasp rattles, as well as sit with support. By the fifth month, infants may roll over, and by the eighth month, infants may be able to sit without assistance. At about 10 months, toddlers may stand while holding onto an object for support. At about 14 months, toddlers may stand alone and perhaps even walk. Of course, these ages for each motor-skill milestone are averages; the rates of physical and motor developments differ among children depending on a variety of factors, including heredity, the amount of activity the child participates in, and the amount of attention the child receives.

Motor development follows **cephalocaudal** (center and upper body) and **proximodistal** (extremities and lower body) patterns, so that motor skills become refined first from the center and upper body and later from the extremities and lower body. For example, swallowing is refined before walking, and arm movements are refined before hand movements.

### Sensation and perception

Normal infants are capable of **sensation**, or the ability to respond to sensory information in the external world. These infants are born with functioning **sensory organs**, specialized structures of the body containing sensory receptors, which receive stimuli from the environment. **Sensory receptors** convert environmental energy into nervous system signals that the brain can understand and interpret. For example, the sensory receptors can convert light waves into visual images. The human senses include seeing, hearing, smelling, touching, and tasting.

Newborns are very nearsighted, but visual **acuity**, or ability, develops quickly. Although infant vision is not as good as adult vision, babies may respond visually to their surroundings from birth. Infants are particularly attracted to objects of light-and-dark contrasts, such as the human face. Depth perception also comes within a few months. Newborns may also respond to tastes, smells, and sounds, especially the sound of the human voice. In fact, newborns may almost immediately distinguish between the primary caregiver and others on the basis of sight, sound, and smell. Infant sensory abilities improve considerably during the first year.

**Perception** is the psychological process by which the human brain processes the sensory data collected by the sensory organs. Visually, infants are aware of **depth** (the relationship between foreground and background) and **size and shape constancy** (the consistent size and shape of objects). This latter ability is necessary for infants to learn about events and objects.

# **Social-Emotional Development of Infants and Toddlers**

Emotional well-being during the early years has a powerful impact on social relationships. Children who are emotionally healthy are better able to establish and maintain positive relationships with adults as well as with peers. Social-emotional development is essential to a young child's sense of well-being. Their first relationships help shape who they are, who they become, and their understanding of the world. The important people in young children's lives help lay the foundation for a range of social-emotional skills such as:

- Self-regulation
- Empathy
- Turn-taking and sharing
- Positive relationships with adults and peers

## **• Social-Emotional Milestones**

- Through early relationships and with nurturing, responsive interactions, infants and toddlers learn ways of being in relationships, how to get their needs and wants met, and how to identify and regulate emotions. Because these skills develop together, this area of development is referred to as social-emotional development.

## **6 Months**

- Knows familiar faces and begins to know if someone is a stranger
- Likes to play with others, especially parents
- Responds to other people's emotions and often seems happy
- Likes to look at self in mirror

## **12 Months**

- Is shy or nervous with strangers
- Cries when Mom or Dad leaves
- Has favorite things and people
- Shows fear in some situation
- Hands you a book when he or she wants to hear a story
- Repeats sounds and actions to get attention
- Puts out arm or leg to help with dressing
- Plays games such as “peek-a-boo” and “pat-a-cake”

## **18 Months**

- Likes to hand things to others as play
- May have temper tantrums
- May be afraid of strangers
- Shows affection to familiar people
- Plays simple pretend, such as feeding a doll
- May cling to caregivers in new situations
- Points to show others something is interesting
- Explores alone but with a parent close by

## **24 Months**

- Copies others, especially adults and older children
- Gets excited when with other children
- Shows more and more independence
- Shows defiant behavior (doing what she or he has been told not to do)
- Plays mainly beside other children, but is beginning to include other children, such as in chase games

## **36 Months**

- Copies adults and friends
- Shows affection for friends without prompting
- Takes turns in games
- Shows concern for a crying friend
- Understands the idea of “mine” and “his” or “hers”
- Shows a wide range of emotions
- Separates easily from Mom and Dad
- May get upset with major changes in routine
- Dresses and undresses self

It is helpful to remember that expectations about social-emotional milestones are driven by cultural values and preferences. Theorist Lev Vygotsky said that adults share their cultural values and beliefs with children through daily interactions. Ideas, beliefs and expectations about child development are just some of the ways cultures are unique. Becoming aware of and respecting these differences can help you better understand families' experiences that help shape the infants and toddlers in your care.

## **Connection of Social-Emotional Development to Other Areas of Development**

With our evolving understanding of brain growth and young children's development, we continue to learn about the ways adult caregivers can be supportive and most effective in helping children develop and learn. This growing understanding also includes how adult caregivers can help children develop social-emotional skills. Through nurturing and trusting relationships, infants and toddlers learn about the world. Their brains mature through interactions, and they can learn that the world is safe as adults are responsive to young children's needs. They also learn how to form relationships, communicate, respond to challenges, and how to recognize, experience, and regulate their emotions from relationships with caregivers. When infants and toddlers feel safe and alert, they are more likely to observe, explore, play, interact and experiment with people and objects. These experiences lead young children to learn and remember new things. This foundation for learning depends greatly on the quality of infants' and toddlers' early environments and relationships.

## **Understanding and Supporting the Social-Emotional Development of Infants and Toddlers**

Now that you have read the milestone chart, let's revisit the definition of social-emotional development according to Zero to Three:

*Within the context of one's family, community and cultural background, social emotional health is the child's developing capacity to form secure relationships, experience and regulate emotions and, explore and learn.*





# ***Infancy Cognitive Development***

Babies are not only growing physically during the first 2 years of life, but also cognitively (mentally). Every day while they interact with and learn about their environment they are creating new connections and pathways between nerve cells both within their brains, and between their brains and bodies. While physical growth and change is easily observed and measured in precise terms such as in inches and pounds, cognitive change and development is a little harder to determine as clearly. Therefore, much about what experts know about mental and cognitive development is based on the careful observation of developmental theorists and their theories, such as Piaget's theory of cognitive development and Erickson's psychosocial stages. Bronfenbrenner's ecological model also helps explain infant mental growth to some extent.

According to Piaget, newborns interact with their environment entirely through reflexive behaviors. They do not think about what they're going to do, but rather follow their instincts and involuntary reactions to get what they need: food, air, and attention. Piaget believed that as babies begin to grow and learn about their environment through their senses, they begin to engage in intentional, goal-directed behaviors. In other words, they begin to think about what they want to accomplish, how to accomplish it, and then they do it. This is also when infants develop object permanence, which is the ability to understand that something still exists even if it can't be seen. These two milestones, goal-directed behavior and object permanence, are the highlights and major accomplishments of infant cognitive development.

Piaget separated infancy into six sub-stages, which have been adjusted somewhat over the years as new research and discoveries have occurred. The sub-stages include: reflexive activity, primary circular reactions, secondary circular reactions, coordination of secondary schemes, tertiary circular reactions, and beginning or representational thought. While these sub-stages sound highly confusing and complicated, they will be

explained in more detail in the next paragraphs in order to simplify them and highlight the important aspects of each.

The first sub-stage is reflexive activity, which lasts from birth to approximately 1 month. According to Piaget, while babies are engaging in reflexive actions such as sucking when offered a bottle or the breast, or other reflexes covered earlier in this article, they are learning about their environment and how they can interact with it. Babies don't think about behaving reflexively; they simply act out those reflexes automatically.

The second sub-stage is primary circular reactions, which spans the ages of 1 to 4 months. During this time, babies intentionally repeat actions that bring them pleasure and desired outcomes. In other words, they do things on purpose because it feels good or it gets them what they want. For example, a small infant may suck on her fist because it feels good to her and it soothes her. Researchers believe that babies of this age may also develop expectancy about cause and effect situations. Babies will begin to see that a pattern of events is connected, and begin to expect the second event after they experience the first event. For example, a baby of this age may learn that when they see a bottle, they expect they will soon be fed. Babies' expectancies about the predictability of their environment form the foundation of Erickson's observation that young infants learn to either trust or mistrust their environment. If a baby learns the pattern that they have a need, such as hunger or discomfort, and that need is regularly addressed, they learn to expect their needs to be met and they learn to trust. On the other hand, if babies learn a pattern that they have needs and those needs are not regularly addressed, they will learn to expect that their needs will not be met and they learn to mistrust the world around them.

## **INFANCY COGNITIVE DEVELOPMENT: LANGUAGE DEVELOPMENT**

As infants' brains continue to develop, infants also develop the ability to communicate; to comprehend and produce spoken language. Babies learn language by taking in information through their senses of hearing and sight as they learn to process the meanings behind those sights and sounds. They use their mouths, tongues, and ears as they learn to mimic the sights and sounds of other people in order to create their own sounds and communications. In order to learn from their environment, babies need functional hearing abilities and a well-formed mouth, lips, vocal chords and tongue. They also need a well-formed brain, for it is the brain that provides for the baby's instinct to mirror, copy and mimic facial expressions and movements they encounter. Any questions caretakers have about their baby's ability to hear to use their mouths properly (in a mechanical sense), or to copy and mimic faces and sounds should be brought to the attention of the baby's pediatrician as soon as possible so that any necessary therapy or treatment can be provided at the earliest possible time. Catching problems before they become problems can help to avoid developmental delay.

Babies' and young children's language development is strongly influenced by the language they hear spoken around them and to them. The more babies are exposed to language, the more opportunities they'll have to practice their developing communication skills. This is why it is a good idea to interact with your child regularly, speaking with and reading to him or her whenever possible.

When infants are first born, they do most of their communication through crying. They cry to tell caregivers they are hungry, tired, or uncomfortable; have a dirty diaper; are in pain; or just want some attention and affection. However, infants are already learning about spoken language from birth. As their caregivers talk to them in their field of vision, 8-10 inches from their face, they will copy the mouth movements the caregivers are making. Around age 2 to 3 months, infants begin cooing and making soft, exaggerated vowel sounds to show pleasure or excitement. Babies are able to do this because their larynx (vocal chords) and other parts of their throat change to allow them to make these sounds.

By age 3 to 4 months, babies will add more verbal sounds and start to make the consonant sounds of b, k, m, g, and p. By around age 4 months, babies will begin to put vowel sounds and consonant sounds together to form nonsense words such as "gaga" and "ahpoo" as they start to experiment with how sounds can be linked together. As well around this age, infants can blow through their lips and may blow bubbles to practice using and controlling their lips and mouths. Babies continue to practice making those sounds, as their brains learn how to interpret and process the communications they hear. By around age 5 months, babies are learning the musical sound and speech patterns of their caregiver's native language, which is the language they hear the most. As they continue to practice making sounds, they will begin imitating their first sound patterns. Also around this age, babies are using non-verbal cues to communicate their thoughts and feelings to those around them. They will cling to their caregivers, push them away when upset, and turn their heads when they don't like something. Around age 6 months, they begin to babble. This allows them to connect consonant sounds with vowel sounds in ways that are used in their native language to make distinguishable syllables. Babbling allows children

to imitate the sentence length, intonation, and rhythm of adult speech as they begin to learn how to form verbal thoughts.

As babies enter the second half of the first year, their ability to understand how language works and how to communicate continues to become more sophisticated. By around age 7 months, babies begin taking turns "speaking" with others instead of talking at the same time as others do. They may initiate conversations with others as they begin learning how conversation between people works. Meanwhile, babies will also try to imitate sounds caregivers make, especially animal sounds such as "moo" (English for the cow's sound). By around age 8 months, babies begin to connect sounds they and their caregivers make to actual ideas and thoughts that can be universally understood. For example, when a baby hears the word "milk," she knows she'll be getting her bottle soon; when she says "bub," she'll get her beloved stuffed bear. Also around this age, they build on top of the syllables they started making earlier and now link syllables in more understandable words such as "da-da." Babies continue to add new sounds to their verbal menu, adding new consonant sounds such as t and w.

Near the end of their first year of life, babies begin to put together all the language lessons they've learned so far. Between the ages of 9 to 12 months, babies begin to say their first real words, such as "mama" and "dada." During this period, they may slowly add a few more words to their vocabulary. By age 12 months, some babies may have as few as a 2-3 words in their expressive vocabulary, while others may have a dozen.

It is important to remember that babies' receptive language is much more developed than their expressive language at this point. While babies may speak few words, they are able to comprehend the meaning of hundreds more. They will begin to show this understanding as well. By around age 10 to 11 months, babies may begin communicating by pointing or nodding in agreement or disagreement with what caregivers say. Around age 12 months, babies will begin to show word and sentence comprehension as they point to a dog in the picture when prompted or nod their head when asked if they want a cookie.