

# Child Development

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## Introduction

Child Development, physical, intellectual, social, and emotional changes that occur from birth to adolescence. Although people change throughout their lives, developmental changes are especially dramatic in childhood. During this period, a dependent, vulnerable newborn grows into a capable young person who has mastered language, is self-aware, can think and reason with sophistication, has a distinctive personality, and socializes effortlessly with others. Many abilities and characteristics developed in childhood last a lifetime.

Some developments in behavior and thought are very similar for all children. Around the world, most infants begin to focus their eyes, sit up, and learn to walk at comparable ages, and children begin to acquire language and develop logical reasoning skills at approximately the same time.

These aspects of individual growth are highly predictable. Other aspects of development show a much wider range of individual differences. Whether a child becomes outgoing or shy, intellectually advanced or average, or energetic or subdued depends on many unique influences whose effects are difficult to predict at the child's birth.

A variety of factors influence child development. Heredity guides every aspect of physical, cognitive, social, emotional, and personality development. Family members, peer groups, the school environment, and the community influence how children think, socialize, and become self-aware. Biological factors such as nutrition, medical care, and environmental hazards in the air and water affect the growth of the body and mind.

Economic and political institutions, the media, and cultural values all guide how children live their lives. Critical life events, such as a family crisis or a national emergency, can alter the growth of personality and identity. Most important of all, children contribute significantly to their own development. This occurs as they strive to understand their experiences, respond in individual ways to the people around them, and choose activities, friends, and interests.

Thus, the factors that guide development arise from both outside and within the person.

- Why is the study of child development important? The first reason is that it provides practical guidance for parents, teachers, child-care providers, and others who care for children.

- A second reason is that it enables society to support healthy growth. Understanding early brain development, for example, means that parents can provide better opportunities for intellectual stimulation, and society can reduce or eliminate obstacles to healthy brain growth.
- Third, the study of child development helps therapists and educators better assist children with special needs, such as those with emotional or learning difficulties. Finally, understanding child development contributes to self-understanding. We know ourselves better by recognizing the influences that have made us into the people we are today.

## Historical Perspectives

### Early Views of Children

People have thought very differently about children in different historical eras. In ancient Rome and throughout the Middle Ages, for example, childhood was brief: A boy or girl was considered an "infant" until the age of six, but soon afterward worked alongside adults in the fields, workshop, or home. Children were thought to be born in a state of sin and were viewed as the property of their fathers. Such beliefs contributed to strict discipline of children and neglect of their special needs.

These harsh attitudes softened during the Renaissance and Enlightenment as the humanistic spirit of the times caused a rediscovery of the special qualities of childhood. In paintings, for example, young children were depicted more realistically as they played, nursed, and did other childish things, rather than being shown as miniature adults.

The importance of childhood as a unique period of development was understood more fully in the 17th and 18th centuries, as reflected in the writings of two important European thinkers. The English philosopher John Locke argued that the newborn infant comes into the world with no inherited predispositions, but rather with a mind as a *tabula rasa* (Latin for "blank slate") that is gradually filled with ideas, concepts, and knowledge from experiences in the world.

He concluded that the quality of early experiences, particularly how children are raised and educated, shapes the direction of a child's life. Later, the French philosopher Jean Jacques Rousseau claimed that children at birth are innately good, not evil, and that their natural tendencies should be protected against the corrupting influences of society.

The sympathetic, romantic attitude toward children inspired by Rousseau had an important influence on society. For example, the novelists Charles Dickens and Victor Hugo decried the exploitation of child labor and highlighted the need for educational and social reform.

### **Scientific Study**

In the late 19th century, interest in the characteristics and needs of children produced more systematic efforts to study their development. The modern theory of evolution, conceived by British naturalist Charles Darwin, contributed to this interest by arguing that human behavior is best understood through knowledge of its origins—in both the evolution of the species and the early development of individuals.

Darwin himself studied children's growth by writing one of the first "baby biographies," consisting of careful observations of his children. In the early 1900s, the theory of psychoanalysis focused on the importance of early childhood experiences. American psychologist G. Stanley Hall at Clark University began large-scale investigations of child development through surveys and interviews with the adults who cared for them. For the first time, children warranted scientific attention because of society's interest in their development and well being.

In the 1920s developmental scientists at other American universities began large-scale observational studies of children and their families, including the Berkeley Growth Studies at the University of California, the Fels Growth Study at Antioch College, and the Harvard Growth Studies at Harvard University. Each investigation studied a large number of children repeatedly over many years to identify changes and consistencies in their behavior and thinking.

At Stanford University, psychologist Lewis Terman created the Stanford-Binet Intelligence Scale, which remains one of the most widely used assessments of children's intellectual capabilities (see Intelligence). Terman also started his own long-term study of highly intelligent children. At Yale University, psychologist Arnold Gesell established a research institute devoted to identifying age norms for a wide variety of behaviors and characteristics.

While Gesell believed in the importance of maturation on children's development, other psychologists emphasized the role of learning from environmental influences. One of these, John B. Watson of Johns Hopkins University, advised parents to treat their offspring in an objective, consistent manner to encourage the development of desired characteristics. Watson believed that all human

behaviors could be explained as learned responses to stimuli in the environment, an approach known as behaviorism. This approach to the study of child development remained dominant for the first half of the 20th century.

Although behaviorists contributed much to the study of children, their concepts eventually were viewed as being overly narrow. In the early 1960s scholars began to focus more attention on the work of Swiss psychologist Jean Piaget, who had been studying children's cognitive development since the 1920s. Piaget claimed that children construct new knowledge by applying their current knowledge structures to new experiences and modifying them accordingly. His perspective, called constructivism, emphasized the active role children play in their own mental growth as inquisitive thinkers.

Piaget's theories led to other approaches to the study of child development. In the 1960s and 1970s British psychologist John Bowlby and American psychologist Mary Ainsworth introduced the concept of attachment. They proposed that infants and young children form emotional bonds to their caregivers because, throughout human evolutionary history, close attachments to adults promoted the survival of defenseless children.

In the 1970s and 1980s American psychologist Urie Bronfenbrenner sought to describe child development in terms of ecological and cultural forces. In his model, environmental influences on the child extend well beyond the family and peer group, and include schools and other community agencies, social institutions such as the media, political and economic conditions, and national customs.

Other developmental scientists have studied how cultural values guide the skills and attitudes that children acquire as they mature, and how brain maturation influences the development of thinking and feeling.

For a more detailed discussion of child development theories, see the Theories of Child Development section of this article.

## **Basic Questions**

### **Nature and Nurture**

Scholars have long debated the relative importance of nature (hereditary influences) and nurture (environmental influences) in child development. It was once assumed that these forces operated independently of each other. Today developmental scientists recognize that both influences are essential and are mutually influential. For example, how a child responds to parenting—an environmental in-

fluence—is partly determined by the child’s temperament and other inherited characteristics.

Likewise, the environment influences how hereditary characteristics develop and are expressed. During the past century, for example, there have been significant increases in average height because of improved nutrition and medical care, even though individual differences in height are strongly influenced by heredity. The conclusion that strongly inherited characteristics are changeable has important practical implications. For instance, even though many features of personality are based on inherited temperament, the family environment is an important influence on a child’s personality development. Thus, even a child with a difficult temperament can develop positively in a warm and caring family environment.

### **Continuity or Stages**

Does childhood growth occur continuously and gradually, or is it instead a series of distinct stages? People often think of childhood as a sequence of age-related stages (such as infancy, early childhood, and middle childhood), and many developmental theories portray childhood growth in this manner. Such a view recognizes that each period of growth has its own distinct changes, challenges, and characteristics. But many aspects of childhood development are more gradual and continuous, such as the development of physical skills, social abilities, and emotional understanding. Even some milestones that seem to denote a new stage of growth—such as a child’s first word—are actually the outcome of a more gradual developmental process.

### **Stability and Change**

Are a person’s characteristics primarily shaped by early influences, remaining relatively stable thereafter throughout life? Or does change occur continuously throughout life? Many people believe that early experiences are formative, providing a strong or weak foundation for later psychological growth.

This view is expressed in the popular saying “As the twig is bent, so grows the tree.” From this perspective, it is crucial to ensure that young children have a good start in life. But many developmental scientists believe that later experiences can modify or even reverse early influences; studies show that even when early experiences are traumatic or abusive, considerable recovery can occur. From this vantage point, early experiences influence, but rarely determine, later characteristics.

Like other basic questions about development, whether early experiences are a determining force or fading influence has practical implications. For example, belief in the importance of early experi-

ences is the basis of efforts to strengthen early childhood education programs, especially for children from disadvantaged backgrounds, to reduce later difficulties in school achievement.

### **Theories of Child Development**

A theory is an organized set of principles that is designed to explain and predict something. Over the years, psychologists and other scientists have devised a variety of theories with which to explain observations and discoveries about child development.

In addition to providing a broader framework of understanding, a good theory permits educated guesses—or hypotheses—about aspects of development that are not yet clearly understood. These hypotheses provide the basis for further research. A theory also has practical value. When a parent, educator, therapist, or policymaker makes decisions that affect the lives of children, a well-founded theory can guide them in responsible ways.

Theories can also limit understanding, such as when a poor theory misleadingly emphasizes unimportant influences on development and underestimates the significance of other factors. It is therefore essential that theories are carefully evaluated and tested through research, whose results often lead to improvements in theoretical claims. In addition, when theories are compared and contrasted, their strengths and limitations can be more easily identified.

There are four primary theories of child development: psychoanalytic, learning, cognitive, and sociocultural. Each offers insights into the forces guiding childhood growth. Each also has limitations, which is why many developmental scientists use more than one theory to guide their thinking about the growth of children.

### **Psychoanalytic Theories**

At the end of the 19th century, Austrian physician Sigmund Freud developed the theory and techniques of psychoanalysis; it formed the basis for several later psychoanalytic theories of human development. Psychoanalytic theories share an emphasis on personality development and early childhood experiences. In the psychoanalytic view, early experiences shape one’s personality for an entire lifetime, and psychological problems in adulthood may have their origins in difficult or traumatic childhood experiences.

Psychoanalytic theories emphasize the role of unconscious, instinctual drives in personality development. Some of these drives are sexual or aggressive in quality, and their unacceptability to the conscious mind causes them to be repressed in the

unconscious mind. Here, they continue to exert a powerful influence on an individual's behavior, often without his or her awareness.

Most psychoanalytic theories portray development as a series of stages through which all children proceed. According to Freud, child development consists of five psychosexual stages in which a particular body region is the focus of sensual satisfactions; the focus of pleasure shifts as children progress through the stages.

During the oral stage, from birth to age 1, the mouth, tongue, and gums are the focus of sensual pleasure, and the baby develops an emotional attachment to the person providing these satisfactions (primarily through feeding). During the anal stage, from ages 1 to 3, children focus on pleasures associated with control and self-control, primarily with respect to defecation and toilet training.

In the phallic stage, from ages 3 to 6, children derive pleasure from genital stimulation. They are also interested in the physical differences between the sexes and identify with their same-sex parent. The latency phase, from ages 7 to 11, is when sensual motives subside and psychological energy is channeled into conventional activities, such as schoolwork. Finally, during the genital stage, from adolescence through adulthood, individuals develop mature sexual interests.

An American psychoanalyst, Erik Erikson, proposed a related series of psychosocial stages of personality growth that more strongly emphasize social influences within the family. Erikson's eight stages span the entire life course, and, contrary to Freud's stages, each involves a conflict in the social world with two possible outcomes.

In infancy, for example, the conflict is "trust vs. mistrust" based on whether the baby is confident that others will provide nurturance and care. In adolescence, "identity vs. role confusion" defines the teenager's search for self-understanding. Erikson's theory thus emphasizes the interaction of internal psychological growth and the support of the social world.

Psychoanalytic theories offer a rich portrayal of personality growth that emphasizes the complex emotional—and sometimes irrational—forces within each person. These theories are hard to prove or disprove, however, because they are based on unconscious processes inaccessible to scientific experimentation.

### **Learning Theories**

Learning theorists emphasize the role of environmental influences in shaping the way a person develops. In their view, child development is guided

by both deliberate and unintended learning experiences in the home, peer group, school, and community.

Therefore, childhood growth is significantly shaped by the efforts of parents, teachers, and others to socialize children in desirable ways. According to learning theories, the same principles that explain how people can use a bicycle or computer also explain how children acquire social skills, emotional self-control, reasoning strategies, and the physical skills of walking and running.

One kind of learning occurs when a child's actions are followed by a reward or punishment. A reward, also called a reinforcer, increases the probability that behavior will be repeated. For example, a young child may regularly draw pictures because she receives praise from her parents after completing each one.

A punishment decreases the probability that behavior will be repeated. For example, a child who touches a hot stove and burns his fingertips is not likely to touch the stove again. American psychologist B. F. Skinner devoted his career to explaining how human behavior is affected by its consequences—a process he called operant conditioning—and to describing the positive and constructive ways that reinforcement and punishment can be used to guide children's behavior.

Another kind of learning, classical conditioning, occurs when a person makes a mental association between two events or stimuli. When conditioning has occurred, merely encountering the first stimulus produces a response once associated only with the second stimulus. For example, babies begin sucking when they are put in a familiar nursing posture, children fear dogs whose barking has startled them in the past, and students cringe at the sound of school bells that signal that they are tardy.

Classical conditioning was first studied by Russian physiologist Ivan Pavlov in the early 1900s and later by American psychologist John B. Watson.

A third kind of learning consists of imitating the behavior of others. A boy may acquire his father's style of talking, his mother's tendency to roll her eyes, and his favorite basketball player's moves on the court. In doing so, he also acquires expectations about the consequences of these behaviors. This type of learning has been studied extensively by American psychologist Albert Bandura. His social learning theory emphasizes how learning through observation and imitation affects behavior and thought.

Learning theories provide extremely useful ways of understanding how developmental changes in behavior and thinking occur and, for some children, why behavior problems arise. These theories can be studied scientifically and practically applied. Critics point out, however, that because of their emphasis on the guidance of the social environment, learning theorists sometimes neglect children's active role in their own understanding and development.

### **Cognitive Theories**

Understanding how children think is crucial to understanding their development because children's perceptions of life events often determine how these events affect them. For example, a five-year-old who believes that her parents' marital problems are her fault is affected much differently than an adolescent who has a better understanding of marriage and relationships. Cognitive theorists focus on the development of thinking and reasoning as the key to understanding childhood growth.

The best-known theory of cognitive development was developed by Swiss psychologist Jean Piaget, who became interested in how children think and construct their own knowledge. Based on his studies and observations, Piaget theorized that children proceed through four distinct stages of cognitive development: the sensorimotor stage, the preoperational stage, the concrete-operational stage, and the formal-operational stage.

During the sensorimotor stage, which lasts from birth to about age 2, understanding is based on immediate sensory experience and actions. Thought is very practical but lacking in mental concepts or ideas. In the preoperational stage, which spans the preschool years (about ages 2 to 6), children's understanding becomes more conceptual.

Thinking involves mental concepts that are independent of immediate experience, and language enables children to think about unseen events, such as thoughts and feelings. The young child's reasoning is intuitive and subjective. During the concrete-operational stage, from about 7 to 11 years of age, children engage in objective, logical mental processes that make them more careful, systematic thinkers.

Around age 12 children attain the formal-operational stage, when they can think about abstract ideas, such as ethics and justice. They can also reason about hypothetical possibilities and deduce new concepts.

According to Piaget, children progress through these four stages by applying their current think-

ing processes to new experiences; gradually, they modify these processes to better accommodate reality. This occurs not through direct instruction, but rather through the child's own mental activity and internal motivation to understand.

Information-processing theories are based on similarities between the human mind and a computer, both of which are high-speed information-processing devices. These theories describe cognitive growth as the gradual acquisition of more sophisticated strategies for organizing information, solving problems, storing and retrieving knowledge, and evaluating solutions. Like Piaget, information-processing theorists believe that children acquire these skills through their everyday efforts to understand and master intellectual challenges.

Cognitive theories provide insights into how a child's mental processes underlie many aspects of his or her development. However, critics argue that Piaget underestimated the sophistication of the cognitive abilities of young children. Information-processing theorists have also been faulted for portraying children as little computers rather than as inventive, creative thinkers.

### **Sociocultural Theory**

Many developmental scientists believe that children do not proceed through universal stages or processes of development. To sociocultural theorists, children's growth is deeply guided by the values, goals, and expectations of their culture. In this perspective, children acquire skills valued by their culture—such as reading, managing crops, or using an abacus—through the guidance and support of older people. Thus, developmental abilities may differ for children in different societies, and development cannot be separated from its cultural context.

One of the pioneers of sociocultural theory was Russian psychologist Lev Vygotsky, whose writings in the 1920s and 1930s emphasized how children's interaction with adults contributes to the development of skills. According to Vygotsky, sensitive adults are aware of a child's readiness for new challenges, and they structure appropriate activities to help the child develop new skills.

Adults act as mentors and teachers, leading the child into the zone of proximal development—Vygotsky's term for the range of skills that the child cannot perform unaided but can master with adult assistance. A parent may encourage simple number concepts, for example, by counting beads with the child or measuring cooking ingredients together, filling in the numbers that the child cannot remember. As children participate in such experiences daily with parents, teachers, and others,

they gradually learn the culture's practices, skills, and values.

Sociocultural theory highlights how children incorporate culture into their reasoning, social interaction, and self-understanding. It also explains why children growing up in different societies are likely to have significantly different skills. Theorists like Vygotsky are sometimes criticized, however, for neglecting the influence of biological maturation, which guides childhood growth independently of culture.

### **Research Approaches**

Studying children presents many challenges. Young children cannot easily put their understanding into words, and their attention span is limited, so scientists must find creative ways of discovering what they know. In addition, all human development involves change, so scientists must study how behavior and thinking change over time to derive conclusions about childhood growth.

Developmental scientists often study children in their everyday settings—at home, at school, on the playground, in a child-care center, or in the neighborhood—because they seek to understand children's behavior in these natural contexts. Furthermore, children act more typically in these settings.

For some research questions, however, the controlled environment of a laboratory is required—particularly when children's responses to experimental procedures must be carefully studied. Sometimes laboratories are designed to resemble a living room at home so that children feel more comfortable and respond more typically.

There are many methods researchers use to learn about how children act and think. They can simply observe children without intruding on their actions. They can interview children face-to-face or use questionnaires to survey older children about their thoughts, knowledge, and reactions. Researchers may also learn about children by collecting information from others who know them well, such as their parents.

These secondary source reports can be quite informative when children are too young to give reliable information about themselves. Sometimes scientists administer psychological tests—such as tests of intelligence or memory ability—to evaluate what children can do (see Psychological Testing). On occasion, researchers conduct case studies of specific individuals, usually children who have unusual characteristics or exceptional experiences, in the hope of generalizing their findings to a larger population.

Experiments are carefully designed procedures, usually conducted in a laboratory setting, that measure children's reactions to specific events. Because their conditions are so carefully controlled, experiments are well suited to understanding the causes of behavior and development. The experimenter manipulates one factor in a situation, keeping all other variables constant, to determine the effect of that manipulation.

An experiment could be designed, for example, to study how the facial expressions of mothers influence their infants when an unfamiliar adult suddenly appears. In one experimental condition, the mother might be instructed to look cheerful, and in another condition she might be instructed to look frightened. By observing the infant's reaction to the stranger in each condition, and keeping all other aspects of the situation the same, the experimenter could determine the effect of the mother's facial expression.

Collection of physiological data is common in many experiments. For example, experimenters may measure heart rate to determine whether children are excited or emotionally aroused, monitor the brain waves of infants to detect changes in mental state, or track the eye movements of babies to determine exactly how long they gaze at particular objects.

To learn about how children change over time, scientists use one of two basic research designs: longitudinal research and cross-sectional research. In longitudinal research, the same children are repeatedly observed and tested as they age, enabling researchers to identify the later consequences of early influences on them. However, such studies take years to complete, are expensive, and run the risk that the subjects (or researchers) will die, drop out of the study, or become unavailable.

In cross-sectional research, different groups of children are observed at each of several ages. This enables scientists to study development more quickly and easily, but the long-term effects of early influences cannot be identified because each child is studied at only one point in time.

In conducting research, developmental scientists must take care to ensure that their studies are objectively designed with procedures that children can understand, and that children are free from stress or coercion when they participate. Considerable thought and creativity are required to balance the needs and perspectives of children with the goals of the scientific study.

### **Prenatal Development and Birth**

Human development begins with conception, the fertilization of an egg by a sperm. Over the next

nine months, astounding advances in physical growth occur. The fertilized egg becomes a complex newborn capable of surviving (with assistance) outside of the womb.

The prenatal months are not only a time of dramatic developmental changes, but also the most hazardous period of the life course. A developing being is the most vulnerable to harm during periods of very rapid growth. However, hazards to prenatal development can be reduced through the mother's conscientious care of herself and her developing child.

### **Stages of Prenatal Growth**

The nine months of prenatal development are usually divided into three stages. These are the germinal period, the embryonic period, and the fetal period.

During the germinal period, which lasts from conception until day 14, the fertilized egg, called a zygote, undergoes rapid cell division and growth. At the same time, its cells begin to differentiate and cluster to assume specialized roles. For example, some cells begin to form the support structures of the placenta, which will provide food and oxygen to the fetus, while others begin to form structures of the developing human.

Another significant achievement of the germinal stage is implantation of the cell mass, now called the blastocyst, into the inner wall of the mother's uterus, where it will remain for the duration of prenatal development. Implantation also triggers hormonal changes in the mother's body that enables it to nurture the developing human.

The embryonic period lasts from day 14 through the eighth week. During this time, major structures and organ systems begin to form. During the fourth week, for example, the brain begins to develop, a primitive heart starts to beat, and the eyes, ears, and mouth begin to form. By eight weeks after conception, the embryo has most of its basic organ systems, facial features have formed, and even fingers and toes have appeared. See Embryology.

During the fetal period, from the ninth week until birth, major organs grow in size and complexity, the muscular and nervous systems develop, and the sex organs form. By the fourth or fifth month, mothers can begin to feel the fetus moving within them. The fetus startles in response to sudden, loud noises outside the womb, and its hiccupping can be detected.

Brain development is dramatic. Nearly all nerve cells that the brain will use throughout life are formed, and brain regions become specialized in

function. As birth approaches, the fetus grows significantly in size and adds protective fat stores in preparation for life outside the womb.

### **Hazards to Prenatal Development**

Although the mother's protective womb and the structures of the placenta provide considerable protection to the developing human organism, there are many potential hazards to prenatal growth. These hazards can have a devastating impact on the embryo or fetus, especially in the early months of development, when organ systems and body structures are the most unstable and vulnerable. Substances that can harm the embryo or fetus and cause birth defects or death are called teratogens (pronounced ter-AT-oh-jins).

Two factors are important in determining the impact that a particular teratogen might have on the developing human. First, the timing of exposure determines how the body is harmed or if, in fact, any damage occurs at all. Physical systems that are especially vulnerable early in prenatal growth, such as the heart and major limbs, may not be significantly affected later in development when they have matured more.

Second, the amount of exposure determines the extent of harm that may occur. The frequency and severity of exposure to teratogens often directly predicts the extent of damage to the fetus. Moreover, hazards can interact with one another, so that limited exposures to several potential harms can have a compounding effect.

There are many kinds of potential harms. Viruses and bacteria that cause disease in the mother can cross the placental barrier to infect and damage the fetus. These include the human immunodeficiency virus (HIV) and the organisms that cause syphilis and other sexually transmitted infections. German measles (rubella) in the mother in early pregnancy can cause severe defects in the fetus, such as blindness, deafness, heart problems, and brain damage.

Certain medicinal drugs, such as aspirin and antidepressants, may harm the fetus, and maternal use of psychoactive drugs like heroin, cocaine, and marijuana can cause long-term behavioral problems or learning disabilities in the child. Moderate or heavy consumption of alcoholic beverages during pregnancy can cause serious damage to the fetus, including fetal alcohol syndrome, and use of tobacco can impair fetal growth and lead to other complications.

The mother's exposure to lead, mercury, polychlorinated biphenyls (PCBs), and other industrial chemicals—through, for example, drinking contaminated water or eating fish from polluted wa-

ters—can harm prenatal growth and cause birth defects because these substances are absorbed by the fetus.

Finally, nutritional deficiencies in the mother's diet can harm the growing fetus. Folic acid deficiency, for example, can lead to neural tube defects such as spina bifida. As knowledge of potential hazards to prenatal development grows, expectant mothers and their partners can better develop healthy habits that increase their chances of having a healthy baby.

### **The World of the Newborn**

The full-term newborn, or neonate, has remarkable competencies for surviving in the outside world. Many of these are reflexes—automatic or involuntary responses. The sucking reflex, for example, causes newborns to begin to suck on anything touching their lips, and the rooting reflex causes them to turn their heads toward anything that touches the cheek and to attempt to suck on it.

A surprisingly strong grasping reflex causes newborns to clasp their hands around anything put in their palms. In addition, newborns are highly attentive to the events around them. They look toward moving objects and listen closely to the sound of voices—especially their mother's voice, which they heard inside the womb. These characteristics deepen parents' emotional attachments to their newborns.

Caring for a newborn can be challenging, however, because it takes time for the child to become physiologically organized for life outside the womb. Parents observe this in the newborn's erratic sleeping patterns, unexplained fussiness, and unpredictable behavioral states—for example, changing from focused attention to deep sleep almost unexpectedly.

Adapting to life with a newborn is especially difficult for parents if the child is premature (born too early) or of low birth weight, because such newborns can require days or weeks of hospitalization until they are ready to go home. Advances in medical technology have increased the survival rates of children born very early. Most hospitals now allow parents to become involved in the care of their newborn so that family relationships can begin to form.

### **Infancy**

Although birth is the culmination of months of prenatal development, people commonly regard infancy, from birth to age two, as a time of beginnings. Infancy is when personality, social attachments, thinking, and language first take shape. In two short years, the helpless newborn grows into a

toddler with an impressive range of physical, cognitive, and social skills.

### **Physical Development**

The child grows faster in infancy than at any later time. Physical size increases and body proportions change as the top-heavy newborn evolves into a toddler with a body more closely resembling an adult. These changes in body proportions help to account for significant improvements in motor coordination, balance, and physical dexterity during infancy.

By the age of two, children can walk, run, jump in place, pick up small objects with their fingers, and build towers with blocks. Improvements in sensory ability also contribute to these accomplishments. Changes in the eye, ear, and other sense organs, together with developments in brain organization, enable two-year-olds to see, hear, and respond with greater discrimination than ever before.

The brain grows significantly in size and complexity in infancy. Although most of the brain's neurons (nerve cells) develop prenatally, organization and interconnection of these neurons depends significantly on experiences after birth. Normal visual stimulation, for example, organizes the infant brain's visual pathways to facilitate proper sight and perception.

Hearing everyday sounds and speech organizes the brain regions related to sound and language. Thus, ordinary experiences over a broad period of time naturally provoke the developing brain to organize itself. There is no evidence that special or rare experiences are required for the brain's growth, or that enhanced early stimulation will yield improvements in brain capacity. However, infants who are deprived of normal stimulation and care are at risk of impaired brain development.

Normal physical development in infancy requires a nutritionally adequate diet, immunizations to guard against infectious diseases, and protections from environmental hazards (such as lead-based paints) and from dangerous drugs. Infants also need the vigilant attention of caregivers because accidents are the leading cause of injury and death for the very young. Finally, early vision and hearing screenings are imperative to identify any deficiencies that could deprive the developing brain of essential stimulation.

### **Cognitive Development**

The dramatic pace of brain development in infants helps to explain their hunger for stimulation. Infants crave novelty and become bored with familiarity. They integrate knowledge from different senses, such as looking toward the source of an

interesting sound. They can make sophisticated inferences about an object's shape, size, and physical properties just by watching its actions. These characteristics illustrate one of the most important features of cognitive development: Young children do not passively wait to be taught about the world's mysteries. The young mind is remarkably active and self-organizing.

Infants' cognitive abilities develop rapidly. After only a few months infants can mentally group similar objects into a simple category, such as round, square, soft, or flat. They also show special interest in objects that look or feel different from familiar ones. Early in the first year, infants appreciate object permanence—the concept that objects and people continue to exist even when they cannot be seen.

Infants' long-term memory for specific events is very fragile at a few months of age. However, studies have demonstrated that infants can retrieve memories when given appropriate cues, such as sounds and objects that were present at the original event. By eight or nine months of age, the memory abilities of infants have improved. For example, they can imitate behavior they witnessed a day earlier. By the end of the first year, infants can discriminate between male and female faces (based on features like hair length) and between different categories of animals (understanding, for example, that a parakeet is more like a hawk than a horse).

Cognitive growth is also motivated by infants' fascination with "making things happen" through their own efforts, by which they learn about causes and effects. Parents observe their baby's mealtime experiments with gravity (dropping food on the floor), physical force (pushing a toy against the baby food jar), and movement (pulling on a tablecloth to reach the milk). Beneath these apparently casual activities is an active mind that is learning about the consequences of actions.

Infancy is also when the basics of language development occur. At birth, infants have a natural ability—surpassing that of adults—to hear the differences between speech sounds in any of the world's languages, even sounds they have never previously heard. They lose this capacity by the end of the first year, when their speech perception becomes specific to the language sounds they hear at home. By this time, their babbling has also started to become language-specific, as babies practice the speech sounds they hear and will use.

An infant's first recognizable word, usually spoken around the first birthday, is preceded by several months during which he or she clearly comprehends many simple sentences and expressions. For example, a ten-month-old baby who is

asked, "Where's Mommy?" will usually look in her direction. A baby's first words are not used very precisely.

Depending on context and inflection, for example, a single word, "Daddy," may refer to a specific person, many people (all male adults), an inquiry ("Where is Daddy?"), an explanation ("Daddy's there"), or have other meaning. Vocabulary growth is slow early in the second year, but by 18 months a typical toddler's vocabulary begins to explode. New words are learned weekly, and later, daily. By the end of the second year, most toddlers combine words into simple phrases and sentences, such as "More juice."

A toddler's everyday social interaction with caregivers provides rich opportunities for language development. Adults' "baby talk"—marked by a high and varied pitch, simple words, and a slower rate of speech—is well suited to early language learning. When caregivers talk to toddlers about shared experiences, they contribute to vocabulary growth, conversational skills, and understanding and memory of events.

### **Social and Emotional Development**

Close relationships with people are vital for the infant's personality and social growth. Even newborns seem to appreciate the importance of people. They pay special attention to faces and voices, and social stimulation provokes greater interest and emotion than does interaction with objects.

In early infancy, social relationships are important for helping to manage the baby's emotions and temperamental individuality. Young infants exhibit a variety of emotions—including joy, distress, surprise, interest, and sadness—but have difficulty managing these feelings, and rely on caregivers to soothe and regulate emotional arousal. As they later develop a broader emotional repertoire, they turn to adults for cues about situations that might be scary or dangerous, such as encountering an unfamiliar adult. In this way, emotional development is guided by parents and other caregivers.

Young children vary in their temperamental qualities. Inborn characteristics like mood, adaptability, activity level, and "soothability" affect the child's responses to situations, emotional tendencies, and tolerance of stress. Caregivers influence personality development by how they respond to a baby's temperament. Sensitive caregivers who can adapt their childrearing practices to the child's individuality—such as providing a high-activity-level child with plenty of opportunities to expend energy—encourage more positive, constructive personality characteristics, regardless of temperament. By contrast, when caregivers cannot accommodate to a child's temperamental qualities,

children may develop behavioral difficulties because their emerging personality conflicts with social expectations and demands.

As infants mature in the early months, they participate more with their parents in face-to-face play that has no other purpose than mutual delight. This coordinated interaction of gazing, smiles, vocalizations, movement, and touch is built on the baby's recognition of the parents as familiar people, and the parents' awareness that their child responds in special ways to them alone. By the end of the first year, infants have developed emotional attachments to their parents (and other regular caregivers) and rely on them for security and confidence, especially in unfamiliar settings.

Attachments can vary in their degree of security for the baby. Secure attachments arise from sensitive, responsive care and provide a foundation of trust that an infant may generalize to other relationships. Insensitive or inconsistent care may instead cause infants to develop insecure attachments that are characterized by uncertainty or distrust in the attachment figure. Secure attachments are thus an important foundation for social and personality development arising from the baby's experience of early care. Sensitive, responsive care remains a continuing need throughout childhood.

Social relationships in infancy also influence the growth of self-awareness and self-understanding. A baby's awareness of the responses of other people contributes to a dawning sense of individuality. In the second year, toddlers become capable of self-recognition in a mirror and begin to adopt others' evaluations of them when feeling proud or guilty (for example, "Me big!" after a mother has applauded her child's success at using a spoon). In these and other ways, close relationships help very young children begin to understand who they are.

### **Early Childhood**

The word infancy comes from the Latin word *infans*, meaning "without speech." Although children are indeed speaking words by age two, early childhood (ages two to six) is when language revolutionizes children's thinking, remembering, and understanding of emotions, self, and the social world. Once regarded as "egocentric," preschoolers are now viewed by developmental scientists as deeply interested in how others' beliefs, feelings, and desires compare with their own.

### **Physical Development**

Between ages two and six, children with adequate nutrition and health care typically grow 8 cm (3 in) and add nearly 2 kg (4.4 lbs) annually, but the range of variation for normal height and weight is broad. Rapid physical development is combined

with changes in body proportions, strength, and coordination that enable preschoolers to skip, throw a ball, ride a tricycle, draw with a crayon, and perform other feats that are beyond any toddler.

Children become taller, slimmer, heavier, and less top-heavy and, by age six, their body proportions resemble those of adults. However, their high activity level and exuberance, together with limited judgment, make accident prevention a major concern of caregivers.

As the brain continues to mature throughout early childhood, there are dramatic improvements in thinking, language, memory, emotion regulation, and self-control. For example, early childhood witnesses growth in brain areas governing self-regulation, which is why six-year-olds are so much more skilled than toddlers at sitting still and playing games like "Simon Says." Advances in memory, language, and other abilities are also based on the connection and refinement of brain pathways in early childhood.

### **Cognitive Development**

The mind's growth during early childhood is unmistakable. Preschoolers constantly ask "Why?" They animatedly share the day's events and proudly display their knowledge of animals and other interests. Their mushrooming language ability supports further cognitive growth, giving them access to the knowledge of others and enabling them to share their thoughts and learn more. Adults are inevitably impressed with the fantastic imaginations of preschoolers and with their deep interest in understanding the world, especially people.

The intellectual achievements of early childhood are remarkable, although many abilities remain limited or only partially developed. In the area of memory, preschoolers' recall of specific past experiences is notoriously unreliable and incomplete. For example, they may recall events out of sequence or fail to remember key parts. Yet a skilled questioner can often help preschoolers reveal accurate memories by asking them about specific parts of an experience and helping them reconstruct the event.

One reason why preschoolers sometimes seem to have poor memories is that they often remember only the features of an experience that capture their attention, rather than aspects adults consider relevant. For example, a child who attended a baseball game might remember eating peanuts, standing up, and singing, but not who won the game.

Preschoolers are better at remembering the general sequence of familiar events. For example, four-year-olds understand that going to the grocery store involves getting a shopping cart, selecting food, paying the cashier, and loading the groceries in the car.

Preschoolers are adept at solving practical problems, like moving a step stool in front of the sink to reach the faucet. Most lack the logical reasoning skills that support formal or abstract problem solving. Simple mathematics is beyond them, for example, because of the mental flexibility and abstraction it requires. Nevertheless, they show remarkable solutions to informal challenges.

For example, many five-year-olds can figure out how a bird's nest is constructed, especially with an adult's guidance, by observing its ingredients and imagining where the bird found them. Proper use of numbers comes gradually. At age three, most children have difficulty following basic number rules. They may count an object more than once and may count in the wrong order. By age five, most children have mastered these basic principles of counting.

One of the compelling interests of young children is people—especially what goes on in people's minds. As children mature, they begin to grasp how mental processes work. At age two, children have a simple awareness that intentions guide people's actions. At age three, children can appreciate how beliefs and desires are subjective, private mental experiences that differ between people.

By age five, children realize that thoughts may not accurately reflect reality—people can be mistaken or fooled. As young children continue to grow and develop their “theory of mind,” they can better understand others and themselves, and become more skilled social partners.

Early childhood is a time of amazing strides in language development. By age three, children are already putting words together into simple sentences, mastering grammar, and undergoing a “vocabulary explosion” that will result, by age six, in a vocabulary of more than 10,000 words. Preschoolers acquire new words at a staggering rate—five to six new words daily—as they employ intuitive rules for understanding the word meanings on their first exposure to them.

Young children also show considerable grammatical awareness in how they put words together into sentences. Sometimes this causes children to overextend the meanings of words beyond their appropriate use or to over regularize grammatical rules by applying them to irregular forms. For example, a four-year-old might say “Grandpa bought a

toy for me,” misapplying the rule for adding “ed” to make a verb past tense. When adults demonstrate correct usage—for example, by responding “Really, Grandpa bought a toy for you?”—children master grammar more rapidly.

### **Social and Emotional Development**

The cognitive accomplishments of early childhood—particularly, communication through language and a developing concept of how others think and feel—transform preschoolers' social interaction and self-understanding. By age two or three, a child's emotional repertoire broadens to include self-referential emotions such as pride, guilt, shame, and embarrassment, and the evaluations of others begin to influence the preschooler's self-concept.

The three-year-old's insistence on ‘doing it myself’ also reveals developing self-awareness. Throughout early childhood, preschoolers correct themselves as they are drawing, tying shoelaces, and performing other skills, demonstrating their growing capacity for self-monitoring and their motivation to be competent.

Beginning at age three, moreover, preschoolers begin to remember events in terms of their personal significance. These “autobiographical memories” help to provide a continuous sense of identity throughout life. Awareness of being a boy or a girl is also an important facet of developing identity, as children begin to enact gender roles and stereotypes around age three. By the end of the preschool years, children are adept at describing themselves not only in physical terms (big, fast) but also in psychological terms (friendly, shy).

The emotional attachments of young children to their parents (and other caregivers) remain a cornerstone of psychological well being in early childhood. But as young children develop their sense of self and learn to negotiate, compromise, resist, and assert their own preferences, they are likely to come into conflict with their caregivers. At the same time, caregivers increasingly set limits and expect compliance, based on the child's developing capacities for self-control.

The parents' approach to discipline and to conflict resolution has important effects on the quality of the parent-child relationship and the child's early personality growth. Generally, developmental scientists have found that when parents frequently exercise power and authority to overcome their children's assertiveness, the children comply but are also likely to become angry and frustrated—and to be defiant when the parent is not present.

Often, children of parents who use physical punishment act aggressively toward others. Parental strategies that emphasize communicating firm and consistent expectations and their rationale, as well as listening receptively to the child's views, foster the child's cooperation and a more harmonious parent-child relationship.

An affectionate parent-child relationship, in turn, enhances the child's compliance and cooperation. Young children are motivated to comply with an adult's expectations when they are emotionally committed to maintaining a strong, warm relationship with that person.

Conflicts with others can be valuable sources of social and emotional understanding for young children. Nothing focuses a child's attention on what another is thinking or feeling more than the realization that conflict must be resolved. For example, a young boy who turns to his mother for comfort after a fight with his brother may learn from her why his brother felt as he did. With such guidance, preschoolers can better comprehend and empathize with other people's feelings and perspectives. This knowledge also helps them cope with their own emotions and deal with future conflicts.

### **Middle Childhood**

During middle childhood, from about ages 6 to 12, children acquire heightened capacities for judgment, reasoning, social understanding, emotion management, and self-awareness. At the same time, the social world of middle childhood broadens beyond the family to include the school, neighborhood, peer group, and other influences. Children begin to perceive themselves in multiple roles and relationships besides those of the family, even though family relationships remain central.

### **Physical Development**

In contrast to the rapid physical development of the earlier years, children grow more slowly and gradually during middle childhood. Even so, children who are well nourished gain about 6 cm (2.5 in) in height and 1.8 to 2.3 kg (4 to 5 lb) in weight each year. Children typically become slimmer as their body proportions change.

Muscular growth and better coordination enable children to ride a bicycle, run faster and for longer distances, participate in organized sports, write neatly with a pencil, learn to sew, and acquire other skills that require greater strength, endurance, or precision than younger children can manage. Brain growth contributes to these physical achievements, especially as brain pathways governing sensation, action, and thinking become speedier.

Children vary in physical size, weight, and coordination. During middle childhood, these differences can affect social and personal adjustment as children compare their characteristics and capabilities to those of their peers. Although many variations in physique are attributable to individual differences in rate of maturation and are not necessarily enduring, some can foreshadow potentially long-term difficulties for children.

Childhood obesity, for example, can signal a broader problem if it arises from inactivity (such as watching too much television) or poor eating habits. Moreover, obesity in middle childhood can be damaging and self-perpetuating if it causes a child to be teased and rejected by friends and to develop a self-image as unattractive, inactive, and isolated.

### **Cognitive Development**

It is no accident that throughout most of the world, children begin formal education at age six or seven. The intellectual skills of middle childhood are well suited for school. Children become capable of reasoning logically and systematically, whether about a lunar eclipse, chess, or the motives of story characters. Their thinking is also more fluid and flexible:

A grade-schooler can follow a line of reasoning—say, solving an equation—and, realizing that an error has been made, mentally reverse course and start from the beginning again. A grasp of logical principles helps older children readily understand science, math, and many other subjects. They can concentrate better, and longer, than before.

Older children also begin to master and enjoy their intellect. They become more consciously aware of their mental processes—such as what it takes to memorize a spelling list or remember a specific past event—and can deliberately enlist their cognitive powers to accomplish their goals. For example, they enlist memory strategies that strengthen their recall of experiences and information.

Older children seem to think more quickly than younger children (and many adults) because they know how to do so. They spontaneously monitor and evaluate their progress and thus correct and improve their work. They are more likely to use external aids, such as writing things down, to help them think. These qualities make older children more capable and motivated learners.

Many other cognitive skills also improve. Reading and mathematical ability advances significantly, along with vocabulary and grammatical skills. Many children begin to learn a second language in middle childhood. Children's knowledge of

many specific topics that interest them expands dramatically, whether of planets, dinosaurs, or rock stars.

Capacities to read music and master a musical instrument grow significantly. Although children at this stage are still rather concrete thinkers—that is, abstractions and hypothetical issues are hard for them to understand—they have the intellectual skills to function competently in the adult world.

The cognitive achievements of middle childhood both contribute to school success and are, in part, a result of schooling. Effective classroom instruction strengthens children’s capacity for logical, objective reasoning through well-designed activities that promote active learning. Children also benefit from group projects as peers sharpen each other’s intellectual skills.

However, intellectual growth in middle childhood is not just a result of the growth of the mind in combination with classroom practices; parental support is another crucial ingredient. Parents who value learning, have high expectations for their children’s academic success, and supervise homework and other school-related activities contribute significantly to their children’s cognitive growth and school success.

Because learning is more formalized in middle childhood, achievement is evaluated more objectively and publicly. Schoolchildren receive formal and informal evaluations of their work in the classroom and in school-wide achievement testing. Consequently, children quickly learn how their abilities measure up with their peers and with teacher expectations. In comparing themselves to their peers, older children develop a more balanced view of their intellectual strengths and weaknesses.

In contrast to optimistic preschoolers, who tend to believe they can improve their intellectual skills through effort and practice, older children begin to view their intellectual abilities as relatively permanent traits. They may conclude that they are “good at” some subjects but that they “can’t do” others. These self-evaluations tend to make older children less confident and more self-critical, causing some of them to give up too early when faced with intellectual tasks that are challenging but within their reach.

### **Social and Emotional Development**

Children begin to develop a more complex, balanced self-image in middle childhood. Grade-schoolers view themselves as unique people with distinct strengths and weaknesses in their different roles of family member, student, teammate, and friend. They also begin to perceive themselves as skilled in different domains—such as academic,

social, athletic, and recreational—with capabilities and weaknesses in each. When asked to describe themselves, therefore, older children often provide perceptive judgments that closely match how others view them.

As they move in different social worlds, older children begin to grasp the informal rules for each setting and manage themselves accordingly. Children act differently at home and in the classroom, for example, calibrating their behavior to the expectations of others in each setting.

They also learn to manage their emotions in social settings, looking undisturbed in the face of a peer’s taunting and laughing appropriately at a teacher’s joke. Social understanding develops in other ways also, as older children perceive family members, friends, and others as psychologically complex beings with their own emotions, motives, and perspectives.

Peer relationships become richer and more complicated in middle childhood. Whereas preschoolers master basic social skills as they play with friends, older children begin to face issues of acceptance, fitting in, exclusion, and social comparison in their peer groups. The nature of friendship changes in middle childhood to incorporate psychological closeness as well as shared activities, and friendships thus become more intense and exclusive.

Children create a smaller circle of close friends and are more upset when friendships end. Friendships also coalesce into larger peer groups or clubs with their own norms for dress, vocabulary, hairstyle, activities, and behavior. These norms distinguish those who are included (and excluded) from the group and create strong pressures on group members to conform. At the same time, such groups can help children build self-esteem and social skills.

Socializing in middle childhood requires considerable social understanding and self-awareness, especially when conflict occurs. Older children can negotiate, bargain, cajole, compromise, and redirect conflict—such as through humor—in ways that reflect developing psychological understanding and social maturity. Not all children are so successful, however, and some become rejected by peers because of their aggressive, confrontational behavior.

Developmental researchers have found that peers rejected for aggressiveness are impulsive and deficient in social problem-solving skills, often misinterpreting casual social encounters as hostile and considering few alternatives to reacting confrontationally. They also develop negative reputa-

tions. A rejected child's lack of acceptance can, unfortunately, foreshadow long-term social difficulties if these problems are not remedied in childhood.

The social and cognitive achievements of middle childhood also provoke advances in moral development and altruistic behavior—behavior performed for the benefit of others without expectation of a reward. As American psychologist Lawrence Kohlberg theorized in the mid-1960s, children begin to perceive themselves as responsible to others because of the importance of getting along and of being a good citizen.

They seek to act appropriately because people matter to them, not just to avoid punishment. Children's developing psychological understanding heightens their sensitivity to human needs and contributes to empathy for others. Whereas a preschooler may sympathize with another but not know what to do, older children are more likely to assist a classmate who is attacked by a bully or to raise money to help children in a developing country.

Parents remain central in the expanding social world of middle childhood. Although it is common to view peers as replacing parents in importance to older children, parents continue to support their children's self-esteem, define and reinforce values, promote academic success, enable participation in neighborhood and community activities, and offer a sensitive ear and perceptive judgment. They are reliable cheerleaders as their children face the challenges of middle childhood and adolescence.

## **Beyond Childhood**

The onset of puberty marks the beginning of adolescence. Physical growth and development, including sexual maturation, is an important part of adolescence. But this period of life is also shaped by other changes: entry into middle schools that are larger and more impersonal than elementary schools, peer groups that include older children, and greater independence in extracurricular activities.

Adolescents achieve new cognitive skills permitting highly abstract thinking, engage in new kinds of social intimacy with peers, and embark on a search for identity that results in greater awareness of the self. Adolescence includes risks for psychological turmoil, but most children make their way through this period without undue stress. See Adolescence.

People continue to develop through adolescence and, indeed, throughout adulthood. As people age, they may continue to be influenced by childhood experiences, positively or negatively. The lasting influence of childhood on a person's relationships, self-esteem, and well being is one reason why efforts to improve the lives of children are so important.

Few developmental scientists believe, however, that one's behavior and personality as an adult are inevitably determined by earlier influences. Childhood sets the stage, but a person's traits may be changed by subsequent events and experiences