CHILD PSYCHOLOGICAL SCIENCE SUMMER 2021

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Child Psychological Science Fall 2021

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CHAPTER OVERVIEW

1: Introduction to Child Development

Developmental Psychology, *also known as Human Development or Lifespan Development, is the scientific study of ways in which people change, as well as stay the same, from conception to death.* You will no doubt discover in the course of studying that the field examines change across a broad range of topics. These include physical and other psychophysiological processes, cognition, language, and psychosocial development, including the impact of family and peers.

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1.1: Prelude to Lifespan Development

Originally concerned with infants and children, Developmental Psychology has expanded to include adolescence and more recently, aging and the entire life span. Previously, the message was once you are 25, your development is essentially completed. Our academic knowledge of the lifespan has changed and although there is still less research on adulthood than on childhood, adulthood is gaining increasing attention. This is particularly true now that the large cohort known as the baby boomers are beginning to enter late adulthood. The assumption that early childhood experiences dictate our future is also being called into question. Rather, we have come to appreciate that growth and change continues throughout life and experience continues to have an impact on who we are and how we relate to others. We now recognize that adulthood is a dynamic period of life marked by continued cognitive, social, and psychological development.

Figure 1.1 *Source*

You will also discover that developmental psychologists investigate key questions, such as whether children are qualitatively different from adults or simply lack the experience that adults draw upon. Other issues that they deal with is the question of whether development occurs through the gradual accumulation of knowledge or through shifts from one stage of thinking to another; or if children are born with innate knowledge or figure things out through experience; and whether development is driven by the social context or something inside each child. From the above explanation you may be thinking already that developmental psychology is related to other applied fields. You are very right. The field informs several applied fields in psychology, including, educational psychology, psychopathology, and forensic developmental psychology. It also complements several other basic research fields in psychology including social psychology, cognitive psychology, and comparative psychology. Lastly, it draws from the theories and research of several scientific fields including biology, sociology, health care, nutrition, and anthropology.

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1.2: Lifespan Perspective

Learning Objectives: Lifespan Perspective

- *Explain the lifespan perspective and its assumptions about development.*
- *Differentiate periods of human development.*
- *Explain the issues underlying lifespan development*
- *Identify the historical and contemporary theories impacting lifespan development*

Lifespan Perspective

Paul Baltes identified several underlying principles of the lifespan perspective (Baltes, 1987; Baltes, Lindenberger, & Staudinger, 2006). Lifespan theorists believe that **development is life-long**, and change is apparent across the lifespan. No single age period is more crucial, characterizes, or dominates human development. Consequently, the term lifespan development will be used throughout the textbook.

Development is multidirectional. Humans change in many directions. We may show gains in some areas of development, while showing losses in other areas. Every change, whether it is finishing high school, getting married, or becoming a parent, entails both growth and loss.

Development is multidimensional. We change across three general domains/dimensions; physical, cognitive, and psychosocial. The **physical domain** includes *changes in height and weight, sensory capabilities, the nervous system, as well as the propensity for disease and illness*. The **cognitive domain** encompasses the *changes in intelligence, wisdom, perception, problem- solving, memory, and language.* The **psychosocial domain** focuses on *changes in emotion, self- perception and interpersonal relationships with families, peers, and friends.* All three domains influence each other. It is also important to note that a change in one domain may cascade and prompt changes in the other domains. For instance, an infant who has started to crawl or walk will encounter more objects and people, thus fostering developmental change in the child's understanding of the physical and social world.

Development is multidisciplinary. As mentioned at the start of the chapter, human development is such a vast topic of study that it requires the theories, research methods, and knowledge base of many academic disciplines.

Development is characterized by plasticity. Plasticity *is all about our ability to change and that many of our characteristics are malleable.* For instance, plasticity is illustrated in the brain's ability to learning from experience and how it can recover from injury.

Development is multicontextual. Development occurs in many contexts. Baltes (1987) identified three specific contextual influences.

- *Normative age-graded influences:* An **age-grade** *is a specific age group, such as toddler, adolescent, or senior*. Humans in a specific age-grade share particular experiences and developmental change
- *Normative history-graded influences:* The time period in which you are born (Table 1.1) shapes your experiences. A **cohort** *is a group of people who are born at roughly the same period in a particular society.* These people travel through life often experiencing similar circumstances.
- *Non-normative life influences:* Despite sharing an age and history with our peers, each of us also has unique experiences that may shape our development. A child who loses his/her parent at a young age has experienced a life event that is not typical of the age group.

Generation	Born Between...
Silent Generation	1928 to 1945
Baby Boomers	1946 to 1964
Generation X	1965 to 1980
Millennials	1980 and later

Another context that influences our lives is our social standing, socioeconomic status, or social class. **Socioeconomic status (SES)** *is a way to identify families and households based on their shared levels of education, income, and occupation.* While there is certainly individual variation, members of a social class tend to share similar lifestyles, patterns of consumption, parenting styles,

stressors, religious preferences, and other aspects of daily life. All of us born into a class system are socially located and may move up or down depending on a combination of both socially and individually created limits and opportunities.

Families with higher socioeconomic status usually are in occupations (attorneys, physicians, executives) that not only pay better, but also grant them a certain degree of freedom and control over their job. Having a sense of autonomy or control is a key factor in experiencing job satisfaction, personal happiness, and ultimately health and well-being (Weitz, 2007). Those families with lower socioeconomic status are typically in occupations that are more routine, more heavily supervised, and require less formal education. These occupations are also more subject to job disruptions, including lay-offs and lower wages.

Poverty level is an income amount established by the federal government that is based on a set of income thresholds that vary by family size (United States Census Bureau, 2016). If a family's income is less than the government threshold, that family is considered in poverty. Those living at or near poverty level may find it extremely difficult to sustain a household with this amount of income. Poverty is associated with poorer health and a lower life expectancy due to poorer diet, less healthcare, greater stress, working in more dangerous occupations, higher infant mortality rates, poorer prenatal care, greater iron deficiencies, greater difficulty in school, and many other problems. Members of higher income status may fear losing that status, but the poor may have greater concerns over losing housing.

Today we are more aware of the variations in development and the impact that culture and the environment have on shaping our lives. **Culture** *is the totality of our shared language, knowledge, material objects, and behavior.* It includes ideas about what is right and wrong, what to strive for, what to eat, how to speak, what is valued, as well as what kinds of emotions are called for in certain situations. Culture teaches us how to live in a society and allows us to advance because each new generation can benefit from the solutions found and passed down from previous generations. Culture is learned from parents, schools, churches, media, friends and others throughout a lifetime. The kinds of traditions and values that evolve in a particular culture serve to help members function in their own society and to value their own society. We tend to believe that our own culture's practices and expectations are the right ones. *This belief that our own culture is superior is called* **ethnocentrism** and is a normal by-product of growing up in a culture. It becomes a roadblock, however, when it inhibits understanding of cultural practices from other societies. **Cultural relativity** *is an appreciation for cultural differences and the understanding that cultural practices are best understood from the standpoint of that particular culture.*

Figure 1.2: Think of other ways culture may have affected your development. How might cultural differences influence interactions between teachers and students, nurses and patients, or other relationships? Source.

Culture is an extremely important context for human development and understanding development requires being able to identify which features of development are culturally based. This understanding is somewhat new and still being explored. Much of what developmental theorists have described in the past has been culturally bound and difficult to apply to various cultural contexts. The reader should keep this in mind and realize that there is still much that is unknown when comparing development across cultures.

Lifespan vs. Life expectancy: At this point you must be wondering what the difference between lifespan and life expectancy is, according to developmentalists. **Lifespan**, or longevity, *refers to the length of time a species can exist under the most optimal conditions*. For instance, the grey wolf can live up to 20 years in captivity, the bald eagle up to 50 years, and the Galapagos tortoise over 150 years (Smithsonian National Zoo, 2016). The longest recorded lifespan for a human was Jean Calment who died in 1994 at the age of 122 years, 5 months, and 14 days (Guinness World Records, 2016). **Life expectancy** *is the predicted number of years a person born in a particular time period can reasonably expect to live* (Vogt & Johnson, 2016).

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1.3: Conceptions of Age

How old are you? Chances are you would answer that question *based on the number of years since your birth, or what is called your* **chronological age**. Ever felt older than your chronological age? Some days we might "feel" like we are older, especially if we are not feeling well, are tired, or are stressed out. We might notice that a peer seems more emotionally mature than we are, or that they are physically more capable. So years since birth is not the only way we can conceptualize age.

Biological age: Another way developmental researchers can think about the concept of age is to examine *how quickly the body is aging, this is your* **biological age**. Several factors determine the rate at which our body ages. Our nutrition, level of physical activity, sleeping habits, smoking, alcohol consumption, how we mentally handle stress, and the genetic history of our ancestors, to name but a few.

Psychological age: *Our psychologically adaptive capacity compared to others of our chronological age is our* **psychological age**. This includes our cognitive capacity along with our emotional beliefs about how old we are. An individual who has cognitive impairments might be 20 years of age yet has the mental capacity of an 8 year-old. A 70 year-old might be travelling to new countries, taking courses at college, or starting a new business. Compared to others of our age group, we may be more or less adaptive and excited to meet new challenges. Remember you are as *young* or *old* as you feel.

Figure 1.3: You are as young as you feel! Source

Social age: Our **social age** *is based on the social norms of our culture and the expectations our culture has for people of our age group*. Our culture often reminds us whether we are "on target" or "off target" for reaching certain social milestones, such as completing our education, moving away from home, having children, or retiring from work. However, there have been arguments that social age is becoming less relevant in the 21st century (Neugarten, 1979; 1996). If you look around at your fellow students in your courses at college you might notice more people who are older than the more traditional aged college students, those 18 to 25. Similarly, the age at which people are moving away from the home of their parents, starting their careers, getting married or having children, or even whether they get married or have children at all, is changing.

Those who study lifespan development recognize that chronological age does not completely capture a person's age. Our age profile is much more complex than this. A person may be physically more competent than others in their age group, while being psychologically immature. So, how old are you?

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1.4: Periods of Development

Table 1.2 reflects unique aspects of the various stages of childhood and adulthood that will be explored in this book. So while both an 8 month old and an 8 year old are considered children, they have very different motor abilities, social relationships, and cognitive skills. Their nutritional needs are different and their primary psychological concerns are also distinctive. The same is true of an 18 year old and an 80 year old, both considered adults.

Table 1.2: Age Periods of Development

Age Period	Description
Prenatal	*Starts at conceptions, continues through implantation in the uterine wall by the embryo, and ends at birth*
Infancy and Toddlerhood	*Starts at birth and continues to two years of age*
Early Childhood	*Starts at two years of age and continues until six years of age*
Middle and Late Childhood	*Starts at six years of age and continues until the onset of puberty*
Adolescence	*Starts at the onset of puberty until 18*
Emerging Adulthood	*Starts at 18 until 25*
Early Adulthood	*Starts at 25 until 40-45*
Middle Adulthood	*Starts at 40-45 until 60-65*
Late Adulthood	*Starts at 65 onward*

Prenatal Development: Conception occurs and development begins. All of the major structures of the body are forming and the health of the mother is of primary concern. Understanding nutrition, teratogens (or environmental factors that can lead to birth defects), and labor and delivery are primary concerns.

Infancy and Toddlerhood: The first two years of life are ones of dramatic growth and change. A newborn, with a keen sense of hearing but very poor vision is transformed into a walking, talking toddler within a relatively short period of time. Caregivers are also transformed from someone who manages feeding and sleep schedules to a constantly moving guide and safety inspector for a mobile, energetic child.

Figure 1.4. *Source.*

Early Childhood: This period is also referred to as the preschool years and consists of the years which follow toddlerhood and precede formal schooling. As a two to six-year-old, the child is busy learning language, is gaining a sense of self and greater independence, and is beginning to learn the workings of the physical world.

Middle and Late Childhood: The ages of six to the onset of puberty comprise middle and late childhood, and much of what children experience at this age is connected to their involvement in the early grades of school. Now the world becomes one of learning and testing new academic skills and by assessing one's abilities and accomplishments by making comparisons between self and others.

Adolescence: Adolescence is a period of dramatic physical change marked by an overall growth spurt and sexual maturation, known as puberty. It is also a time of cognitive change as the adolescent begins to think of new possibilities and to consider abstract concepts such as love, fear, and freedom. Ironically, adolescents have a sense of invincibility that puts them at greater risk of dying from accidents or contracting sexually transmitted infections that can have lifelong consequences.

Emerging Adulthood: The period of emerging adulthood is a transitional time between the end of adolescence and before individuals acquire all the benchmarks of adulthood. Continued identity exploration and preparation for full independence from

parents are demonstrated. Although at one's physiological peak, emerging adults are most at risk for involvement in violent crimes and substance abuse.

Early Adulthood: The twenties and thirties are identified as early adulthood. Intimate relationships, establishing families, and work are primary concerns at this stage of life.

Middle Adulthood: The forties through the mid-sixties is referred to as middle adulthood. This is a period in which aging becomes more noticeable and when many people are at their peak of productivity in love and work.

Figure 1.5. Source.

Late Adulthood: Late adulthood is sometimes subdivided into two categories: The young-old who are from 65-84 years and the oldest-old who are 85 years and older. One of the primary differences between these groups is that the young-old are still relatively healthy, productive, active, and the majority continue to live independently. With both age groups the risks of diseases such as, arteriosclerosis, cancer, and cerebral vascular disease increases substantially.

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1.5: Issues in Lifespan Development

Nature and Nurture: Why are you the way you are? As you consider some of your features (height, weight, personality, being diabetic, etc.), ask yourself whether these features are a result of heredity or environmental factors-or both. Chances are, you can see the ways in which both heredity and environmental factors (such as lifestyle, diet, and so on) have contributed to these features. For decades, scholars have carried on the "nature/nurture" debate. For any particular feature, those on the side of **Nature** *would argue that heredity plays the most important role in bringing about that feature.* Those on the side of **Nurture** *would argue that one's environment is most significant in shaping the way we are.* This debate continues in all aspects of human development, and most scholars agree that there is a constant interplay between the two forces. It is difficult to isolate the root of any single behavior as a result solely of nature or nurture.

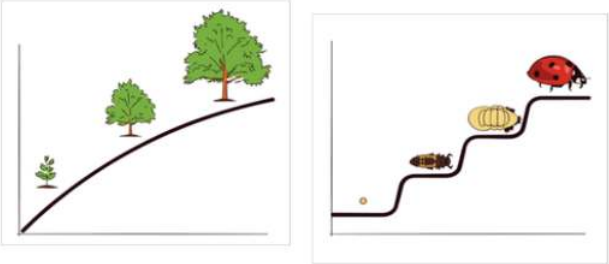

Figure 1.6: The tree represents continuous development, while the ladybug represents discontinuous/stage development. Source.

Continuity versus Discontinuity: Is human development best characterized as a slow, gradual process, or is it best viewed as one of more abrupt change? The answer to that question often depends on which developmental theorist you ask and what topic is being studied. The theories of Freud, Erikson, Piaget, and Kohlberg are called stage theories. **Stage theories or discontinuous development** *assume that developmental change often occurs in distinct stages that are qualitatively different from each other, and in a set, universal sequence*. At each stage of development, children and adults have different qualities and characteristics. Thus, stage theorists assume development is more discontinuous. Others, such as the behaviorists, Vygotsky, and information processing theorists, *assume development is a more slow and gradual process known as* **continuous development**. For instance, they would see the adult as not possessing new skills, but more advanced skills that were already present in some form in the child. Brain development and environmental experiences contribute to the acquisition of more developed skills.

Active versus Passive: How much do you play a role in your own developmental path? Are you at the whim of your genetic inheritance or the environment that surrounds you? Some theorists see humans as playing a much more active role in their own development. Piaget, for instance believed that children actively explore their world and construct new ways of thinking to explain the things they experience. In contrast, many behaviorists view humans as being more passive in the developmental process.

Stability versus Change: How similar are you to how you were as a child? Were you always as out-going or reserved as you are now? Some theorists argue that the personality traits of adults are rooted in the behavioral and emotional tendencies of the infant and young child. Others disagree, and believe that these initial tendencies are modified by social and cultural forces over time.

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1.6: Historical Theories on Development

Preformationist View: Well into the 18th century, children were merely thought of as little adults. **Preformationism**, *or the belief that a tiny, fully formed human is implanted in the sperm or egg at conception and then grows in size until birth*, was the predominant early theory. Children were believed to possess all their sensory capabilities, emotions, and mental aptitude at birth, and as they developed these abilities unfolded on a predetermined schedule (Thomas, 1979). The environment was thought to play no role in determining development**.**

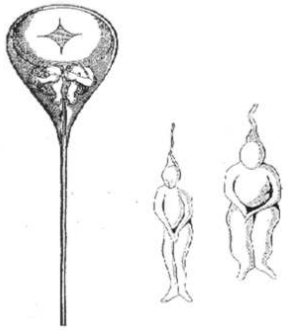
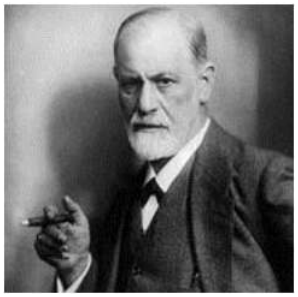


Figure 1.7: A tiny person inside a sperm. Source.

John Locke (1632-1704): Locke, a British philosopher, refuted the idea of innate knowledge and instead proposed that children are largely shaped by their social environments, especially their education as adults teach them important knowledge. He believed that through education a child learns socialization, or what is needed to be an appropriate member of society. Locke advocated thinking of a child's mind as a **Tabula Rosa** or blank slate, and whatever comes into the child's mind comes from the environment. Locke emphasized that the environment is especially powerful in the child's early life because he considered the mind the most pliable then. Locke indicated that the environment exerts its effects through associations between thoughts and feelings, behavioral repetition, imitation, and rewards and punishments (Crain, 2005). Locke's ideas laid the groundwork for the behavioral perspective and subsequent learning theories of Pavlov, Skinner and Bandura.

Jean-Jacques Rousseau (1712-1778): Like Locke, Rousseau also believed that children were not just little adults. However, he did not believe they were blank slates, but instead developed according to a natural plan which unfolded in different stages (Crain, 2005). He did not believe in teaching them the correct way to think, but believed children should be allowed to think by themselves according to their own ways and an inner, biological timetable. This focus on biological maturation resulted in Rousseau being considered the father of developmental psychology. Followers of Rousseau's developmental perspective include Gesell, Montessori, and Piaget.

Arnold Gesell (1880-1961): Gesell spent 50 years at the Yale Clinic of Child Development, and with his colleagues he studied the neuromotor development of children. Gesell believed that the child's development was activated by genes and he called this process maturation (Crain, 2005). Further, he believed that development unfolded in fixed sequences, and he opposed efforts to teach children ahead of schedule as he believed they will engage in behaviors when their nervous systems had sufficiently matured.



1.8: Sigmund Freud from Wikimedia

Sigmund Freud (1856-1939): Freud has been a very influential figure in the area of development. Freud emphasized the importance of early childhood experiences in shaping our personality and behavior. In our natural state, we are biological beings. We are driven primarily by instincts. During childhood, however, we begin to become social beings as we learn how to manage our

instincts and transform them into socially acceptable behaviors. His view of development and psychopathology dominated the field of psychiatry until the growth of behaviorism in the 1950s. His assumptions that personality forms during the first few years of life and that the ways in which parents or other caregivers interact with children have a long-lasting impact on children's emotional states have guided parents, educators, clinicians, and policy-makers for many years.

Freud's theory has been heavily criticized for several reasons. One is that it is very difficult to test scientifically (Crews, 1998). How can parenting in infancy be traced to personality in adulthood? Freud focuses on the darker side of human nature and suggests that much of what determines our actions is unknown to us. Despite these criticisms, Freud's theory has heuristic value in providing a framework from which to elaborate and modify subsequent theories of development. Many later theories, particularly behaviorism and humanism, came about as challenges to Freud's views.

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1.7: Contemporary Theories on Development

Erikson and Psychosocial Theory: Now, let's turn to a less controversial psychodynamic theorist, Erik Erikson. Erikson presents eight developmental stages that encompass the entire lifespan. For that reason, Erikson's psychosocial theory forms the foundation for much of our discussion of psychosocial development.

Figure 1.9: Erik Erikson.

Erikson (1950) proposed a model of lifespan development that provides a useful guideline for thinking about the changes we experience throughout life. Erikson broke with Freud's emphasis on sexuality as the cornerstone of social-emotional development and instead suggested that social relationships fostered development. Erikson proposed that *each period of life has a unique challenge or crisis that the person who reaches it must face, referred to as* **psychosocial crises**. According to Erikson, successful development involves dealing with and resolving the goals and demands of each of these psychosocial crises in a positive way. (These crises are usually called *stages*, although that is not the term Erikson used.) If a person does not resolve a stage successfully it may hinder their ability to deal with later stages. For example, the person who does not develop a sense of trust (Erikson's first stage) may find it challenging as an adult to form a positive intimate relationship (Erikson's sixth stage). Or an individual who does not develop a clear sense of purpose and identity (Erikson's fifth stage) may become self-absorbed and stagnate rather than working toward the betterment of others (Erikson's seventh stage). However, most individuals are able to successfully complete the eight stages of his theory (See Table 1.3).

Table 1.3: Erikson's Psychological Stages.

Age Range	Psychosocial crisis	Positive resolution of crisis
Birth to 12 to 18 months	Trust versus Mistrust	The child develops a feeling of trust in his or her caregivers.
18 months to 3 years	Autonomy versus shame/doubt	The child learns what he or she can and cannot control and develops a sense of free will.
3 to 6 years	Initiative versus Guilt	The child learns to become independent by exploring, manipulating, and taking action.
6 to 12 years	Industry versus inferiority	The child learns to do things well or correctly according to standards set by others, particularly in school.
12 to 18 years	Identity versus role confusion	The adolescent develops a well-defined and positive sense of self in relationship to others
19 to 40 years	Intimacy versus isolation	The person develops the ability to give and receive love and to make long-term commitments
40 to 65 years	Generativity versus stagnation	The person develops an interest in guiding the development of the next generation, often by becoming a parent

Age Range	Psychosocial crisis	Positive resolution of crisis
65 to death	Ego integrity versus despair	The person develops acceptance of his or her life as it was lived.

Erikson's theory has been criticized for focusing so heavily on stages and assuming that the completion of one stage is prerequisite for the next crisis of development. His theory also focuses on the social expectations that are found in certain cultures, but not in all. For instance, the idea that adolescence is a time of searching for identity might translate well in the middle-class culture of the United States, but not as well in cultures where the transition into adulthood coincides with puberty through rites of passage and where adult roles offer fewer choices.

Learning Theory: Also known as **Behaviorism**, *is based on the premise that it is not possible to objectively study the mind, and therefore psychologists should limit their attention to the study of behavior itself.* The most famous behaviorist was Burrhus Frederick (B. F.) Skinner (1904– 1990), who expanded the principles of behaviorism and also brought them to the attention of the public at large. Skinner used the ideas of stimulus and response, along with the application of rewards or *reinforcements*, to train pigeons and other animals. In addition, he used the general principles of behaviorism to develop theories about how best to teach children and how to create societies that were peaceful and productive (Skinner, 1957, 1968, 1972).

The behaviorists made substantial contributions to psychology by identifying the principles of *learning*. Although the behaviorists were incorrect in their beliefs that it was not possible to measure thoughts and feelings, their ideas provided new insights that helped further our understanding regarding the nature-nurture debate as well as the question of free will. The ideas of behaviorism are fundamental to psychology and have been developed to help us better understand the role of prior experiences in a variety of areas of psychology.

Social Learning Theory, developed by Albert Bandura (1977), calls our attention to the ways in which many of our actions are not learned through conditioning, as suggested by Skinner; rather, *they are learned by watching others.* Young children frequently learn behaviors through imitation. Especially when children do not know what else to do, they learn by modeling or copying the behavior of others.

Bandura (1986) suggests that there is interplay between the environment and the individual. We are not just the product of our surroundings, rather we influence our surroundings. *There is interplay between our personality and the way we interpret events and how they influence us. This concept is called* **reciprocal determinism**. An example of this might be the interplay between parents and children. Parents not only influence their child's environment, perhaps intentionally through the use of reinforcement, etc., but children influence parents as well. Parents may respond differently with their first child than with their fourth. Perhaps they try to be the perfect parents with their firstborn, but by the time their last child comes along they have very different expectations, both of themselves and their child. Our environment creates us and we create our environment.

Other social influences: TV or not TV? Bandura et al. (1963) began a series of studies to look at the impact of television on the behavior of children. Bandura began by conducting an experiment in which he showed children a film of a woman hitting an inflatable clown or "bobo" doll.

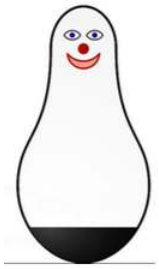

Figure 1.10: The Bobo Doll. Source.

Then the children were allowed in the room, where they found the doll and during their play they began to hit it. The children also demonstrated novel ways of being aggressive toward the doll that were not demonstrated by those children who did not see the aggressive model. Bandura's research raised concerns about the impact of violence on young children. Since then, considerable research has been conducted on the impact of violent media on children's aggression including playing video games.

Cognitive Theory: The **cognitive theories** *focus on how our mental processes or cognitions change over time*. Three important theories are Jean Piaget's, Lev Vygotsky's, and Information-processing.

Jean Piaget (1896-1980) was one of the most influential cognitive theorists in development. He was inspired to explore children's ability to think and reason by watching his own children's development. He was one of the first to recognize and map out the ways in which children's intelligence differs from that of adults (Piaget, 1929). He became interested in this area when he was asked to test the IQ of children and began to notice that there was a pattern in their wrong answers. He believed that children's intellectual skills change over time and that maturation, rather than training, brings about that change. Children of differing ages interpret the world differently. Piaget theorized that children progressed through four stages of cognitive development (Table 1.4).

Table 1.4: Piaget's Stages of Cognitive Development.

Stage	Approximate age range	Characteristics	Stage attainments
Sensorimotor	Birth to about 2 years	The child experiences the world through the fundamental senses of seeing, hearing, touching, and tasting.	Object permanence
Preoperational	2 to 7 years	Children acquire the ability to internally represent the world through language and mental imagery. They also start to see the world from other people's perspectives.	Theory of mind; rapid increase in language ability
Concrete operational	7 to 11 years	Children become able to think logically. They can increasingly perform operations on objects that are real.	Conservation
Formal operational	11 years to adulthood	Adolescents can think systematically, can reason about abstract concepts, and can understand ethics and scientific reasoning.	Abstract logic

Piaget has been criticized for overemphasizing the role that physical maturation plays in cognitive development and in underestimating the role that culture and experience plays. Looking across cultures reveals considerable variation in what children are able to do at various ages. Research has shown considerable overlap among the four stages and that development is more continuous.

Lev Vygotsky (1896-1934) was a Russian psychologist who wrote in the early 1900s but whose work was discovered by researchers in the United States in the 1960s and became more widely known in the 1980s (Crain, 2005). His **sociocultural theory** *emphasizes the importance of culture and interaction in the development of cognitive abilities*. Vygotsky differed with Piaget in that he believed that a person not only has a set of abilities, but also a set of potential abilities that can be realized if given the proper guidance from others. Vygotsky developed theories on teaching that have been adopted by educators today.

Information Processing is not the work of a single theorist, but based on the ideas and research of several cognitive scientists *studying how individuals perceive, analyze, manipulate, use, and remember information*. This approach assumes that humans gradually improve in their processing skills; that is, development is continuous rather than stage-like. The more complex mental skills of adults are built from the primitive abilities of children. We are born with the ability to notice stimuli, store, and retrieve information. Brain maturation enables advancements in our information processing system. At the same time, interactions with the environment also aid in our development of more effective strategies for processing information.

Urie Bronfenbrenner (1917-2005) developed the **Ecological Systems Theory**, *which provides a framework for understanding and studying the many influences on human development* (Bronfenbrenner, 1979). Bronfenbrenner recognized that human interaction is influenced by larger social forces and that an understanding of these forces is essential for understanding an individual. The individual is impacted by several systems including:

- **Microsystem** *includes the individual's setting and those who have direct, significant contact with the person, such as parents or siblings*. The input of those is modified by the cognitive and biological state of the individual as well. These influence the person's actions, which in turn influence systems operating on him or her.
- **Mesosystem** *includes the larger organizational structures, such as school, the family, or religion.* These institutions impact the microsystems just described. The philosophy of the school system, daily routine, assessment methods, and other characteristics can affect the child's self-image, growth, sense of accomplishment, and schedule thereby impacting the child, physically, cognitively, and emotionally.
- **Exosystem** *includes the larger contexts of community*. A community's values, history, and economy can impact the organizational structures it houses. Mesosystems both influence and are influenced by the exosystem.
- **Macrosystem** *includes the cultural elements,* such as global economic conditions, war, technological trends, values, philosophies, and a society's responses to the global community.
- **Chronosystem** *is the historical context in which these experiences occur.* This relates to the different generational time periods previously discussed such as the baby boomers and millennials.

In sum, a child's experiences are shaped by larger forces such as the family, schools, religion, culture, and time period. Bronfenbrenner's model helps us understand all of the different environments that impact each one of us simultaneously. Despite its comprehensiveness, Bronfenbrenner's ecological system's theory is not easy to use. Taking into consideration all the different influences makes it difficult to research and determine the impact of all the different variables (Dixon, 2003). Consequently, psychologists have not fully adopted this approach, although they recognize the importance of the ecology of the individual. Figure 1.11 is a model of Bronfenbrenner's Ecological Systems Theory.

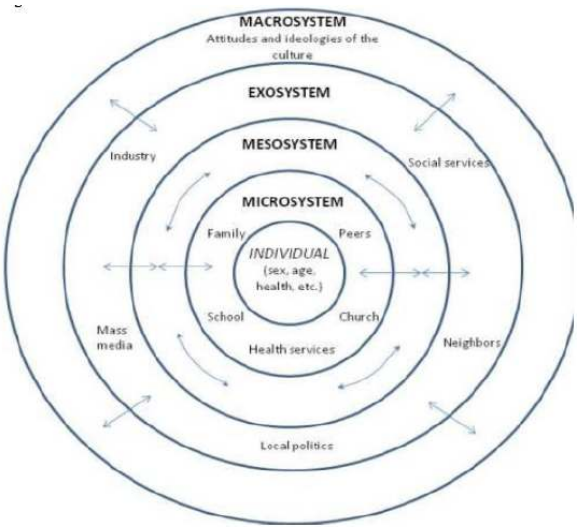

Figure 1.11. Source.

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1.8: Research Methods

Learning Objectives

- Define the scientific method
- Compare research methods noting the advantages and disadvantages of each.
- Explain research involving time spans
- Explain ways to conduct ethical research

An important part of learning any science, including psychology, is having a basic knowledge of the techniques used in gathering information. The hallmark of scientific investigation is that of following a set of procedures designed to keep questioning or skepticism alive while describing, explaining, or testing any phenomenon. Science involves continuously renewing our understanding of the subjects in question and an ongoing investigation of how and why events occur. The scientific method is *the set of assumptions, rules, and procedures scientists use to conduct research*.

A **research design** is *the specific method a researcher uses to collect, analyze, and interpret data*. Psychologists use three major types of research designs in their research, and each provides an essential avenue for scientific investigation. **Descriptive research** is *research that describes what is occurring at a particular point in time*. **Correlational research** is *research designed to discover relationships among variables and to allow the prediction of future events from present knowledge*. **Experimental research** is *research in which a researcher manipulates one or more variables to see their effects*. Each of the three research designs varies according to its strengths and limitations.

Descriptive Research

Case Study: Sometimes the data in a descriptive research project are based on only a small set of individuals, often only one person or a single small group.Theseresearchdesignsareknown as **case studies** *which are descriptive records of one or a small group of individuals' experiencesandbehavior*.Sometimes case studies involve ordinary individuals. Developmental psychologist Jean Piaget observed his own children. More frequently, case studies are conducted on individuals who have unusual or abnormal experiences. The assumption is that by carefully studying these individuals, we can learn something about human nature. Case studies have a distinct disadvantage in that, although it allows us to get an idea of what is currently happening, it is usually limited to static pictures. Although descriptions of particular experiences may be interesting, they are not always transferable to other individuals in similar situations. They are also time consuming and expensive as many professionals are involved in gathering the information.

Observations: Another type of descriptive research is known as observation. When using **naturalistic observation**, *psychologists observe and record behavior that occurs in everyday settings*. For instance, a developmental psychologist might watch children on a playground and describe what they say to each other. However, naturalistic observations do not allow the researcher to have any control over the environment.

Laboratory observation, unlike the naturalistic observation, is *conducted in a setting created by the researcher*. This permits the researcher to control more aspects of the situation. One example of laboratory observation involves a systematic procedure known as the *strange situation test*, which you will learn about in chapter three. Concerns regarding laboratory observations are that the participants are aware that they are being watched, and there is no guarantee that the behavior demonstrated in the laboratory will generalize to the real world.

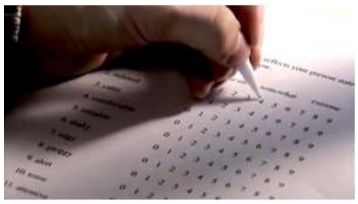

Figure 1.12: How many surveys have you taken? Source.

Survey: In other cases the data from descriptive research projects come in the form of a **survey**, *which is a measure administered through either a verbal or written questionnaire to get a picture of the beliefs or behaviors of a sample of people of interest. The people chosen to participate in the research*, known as the **sample**, are selected to be representative of *all the people that the*

researcher wishes to know about called the **population**. A **representative sample** *would include the same percentages of males, females, age groups, ethnic groups, and socio-economic groups as the larger population.*

Surveys gather information from many individuals in a short period of time, which is the greatest benefit for surveys. Additionally, surveys are inexpensive to administer. However, surveys typically yield surface information on a wide variety of factors, but may not allow for in-depth understanding of human behavior. *Another problem is that respondents may lie because they want to present themselves in the most favorable light, known as* **social desirability**. They also may be embarrassed to answer truthfully or are worried that their results will not be kept confidential. Additionally, questions can be perceived differently than intended.

Interviews: Rather than surveying participants, they can be **interviewed** *which means they are directly questioned by a researcher.* Interviewing participants on their behaviors or beliefs can solve the problem of misinterpreting the questions posed on surveys. The examiner can explain the questions and further probe responses for greater clarity and understanding. Although this can yield more accurate results, interviews take longer and are more expensive to administer than surveys. Participants can also demonstrate social desirability, which will affect the accuracy of the responses.

Psychophysiological Assessment: *Researchers may also record psychophysiological data, such as measures of heart rate, hormone levels, or brain activity to help explain development.* These measures may be recorded by themselves or in combination with behavioral data to better understand the bidirectional relations between biology and behavior. Special equipment has been developed to allow researchers to record the brain activity of very young and very small research subjects. One manner of understanding associations between brain development and behavioral advances is through the recording of event-related potentials (ERPs). ERPs are recorded by fitting a research participant with a stretchy cap that contains many small sensors or electrodes. These electrodes record tiny electrical currents on the scalp of the participant in response to the presentation of stimuli, such as a picture or a sound.

Figure 1.13

The use of ERPs has provided important insight as to how infants and children understand the world around them. Webb, Dawson, Bernier, and Panagiotides (2006) examined face and object processing in children with autism spectrum disorders, those with developmental delays, and those who were typically developing. The children wore electrode caps and had their brain activity recorded as they watched still photographs of faces of their mother or of a stranger, and objects, including those that were familiar or unfamiliar to them. The researchers examined differences in face and object processing by group by observing a component of the brainwaves. Findings suggest that children with autism are in some way processing faces differently than typically developing children and those with more general developmental delays.

Secondary/Content Analysis *involves analyzing information that has already been collected or examining documents or media to uncover attitudes, practices or preferences.* There are a number of data sets available to those who wish to conduct this type of research. For example, the U. S. Census Data is available and widely used to look at trends and changes taking place in the United States. The researcher conducting secondary analysis does not have to recruit subjects, but does need to know the quality of the information collected in the original study.

Conditional Research

In contrast to descriptive research, which is designed primarily to provide static pictures, correlational research involves the measurement of two or more relevant variables and an assessment of the relationship between or among those variables. For instance, the variables of height and weight are systematically related (correlated) because taller people generally weigh more than shorter people.

The **Pearson Correlation Coefficient**, *symbolized by the letter r, is the most common statistical measure of the strength of linear relationships among variables*. The value of the correlation coefficient ranges from $r = -1.00$ to $r = +1.00$. The strength of the linear relationship is indexed by the distance of the correlation coefficient from zero (its absolute value). For instance, $r = -.54$ is a

stronger relationship than r= .30, and r = .72 is a stronger relationship than r = –.57. The direction of the linear relationship is indicated by the sign of the correlation coefficient. Positive values of r (such as r = .54 or r = .67) indicate that the relationship is positive (i.e., the pattern of the dots on the scatter plot runs from the lower left to the upper right), whereas negative values of r (such as r = –.30 or r = –.72) indicate negative relationships (i.e., the dots run from the upper left to the lower right).

When the straight line indicates that individuals who have high values for one variable also tend to have high values for the other variable, as in part (a), the relationship is said to be ***positive correlation***. Examples of positive correlations include those between education and income, and between age and mathematical abilities in children. In each case people who score higher on one of the variables also tend to score higher
on the other variable. ***Negative correlations***, in contrast, as shown in part (b), *occur when high values for one variable tend to be associated with low values for the other varia*ble. Examples of negative correlations include those between the age of a child and the number of diapers the child uses, and between practice and errors made on a learning task. In these cases people who score higher on one of the variables tend to score lower on the other variable.

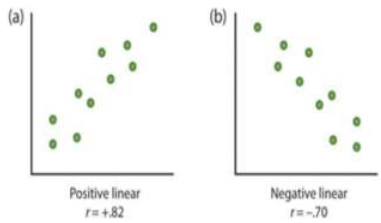

Figure 1.14: Some examples of relationships between two variables as shown in scatter plots. Source.

An important limitation of correlational research designs is that they cannot be used to draw conclusions about the causal relationships among the measured variables. Consider, for instance, a researcher who has hypothesized that viewing violent behavior will cause increased aggressive play in children. He has collected, from a sample of fourth-grade children, a measure of how much violent television each child views during the week, as well as a measure of how aggressively each child plays. The researcher discovers a positive correlation between the two measured variables. Although this positive correlation appears to support the hypothesis, it cannot be taken to indicate that viewing violent television causes aggressive behavior as there are other possible explanations. One alternative is that children who behaved aggressively at school want to watch violent television shows. Still another possible explanation for the observed correlation is that it has been produced by the presence of a *third variable*.

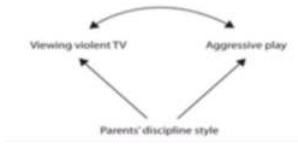

Figure 1.15.

A **third variable** is *a variable that is not part of the research hypothesis but produces the observed correlation between them*. In our example a potential third variable is the discipline style of the children's parents. Parents who use a harsh and punitive discipline style may produce children who both like to watch violent television and who behave aggressively in comparison to children whose parents use less harsh discipline.

For this reason, we are left with the basic limitation of correlational research: **Correlation does not demonstrate causation**! It is important that when you read about correlational research projects, you keep in mind the possibility of third variables.

Strengths and limitations: Correlational research can be used when experimental research is not possible because the variables cannot be manipulated or it would be unethical to use an experiment. Correlational designs also have the advantage of allowing the researcher to study behavior as it occurs in everyday life. We can also use correlational designs to make predictions. For instance, we can predict from the scores on a battery of tests the success of job trainees during a training session. However, we cannot use such correlational information to determine whether one variable caused another variable. For that, researchers rely on an experiment.

Experimental Research

The goal of the **experimental method** is to provide more definitive conclusions about the causal relationships among the variables in a research hypothesis than what is available from correlational research. Experiments are designed to test **hypotheses**, or *specific statements about the relationship between variables***.** Experiments are conducted in a controlled setting in an effort to explain how

certain factors or events produce outcomes. A **variable** is *anything that changes in value*. In the experimental research design, the variables of interest are called the independent variable and the dependent variable. The **independent variable** *in an experiment is the causing variable that is created or manipulated by the experimenter*. The **dependent variable** *in an experiment is a measured variable that is expected to be influenced by the experimental manipulation.*

A good experiment randomly assigns participants to at least two groups that are compared. The **experimental group** receives the treatment under investigation, while the **control group** does not receive the treatment the experimenter is studying as a comparison. For instance, to assess whether violent TV affects aggressive behavior the experimental group might view a violent television show, while the control group watches a non-violent show. Additionally, experimental designs control for **extraneous variables**, or *variables that are not part of the experiment that could inadvertently effect either the experimental or control group, thus distorting the results.*

Despite the advantage of determining causation, experiments do have limitations. One is that they are often conducted in laboratory situations rather than in the everyday lives of people. Therefore, we do not know whether results that we find in a laboratory setting will necessarily hold up in everyday life. Second, and more important, is that some of the most interesting and key social variables cannot be experimentally manipulated because of ethical concerns. If we want to study the influence of abuse on children's development of depression, these relationships must be assessed using correlational designs because it is simply not ethical to experimentally manipulate these variables. Characteristics of descriptive, correlational, and experimental research designs can be found in Table 1.5.

Research design	Goal	Advantages	Disadvantages
Descriptive	To create a snapshot of the current state of affairs	Provides a relatively complete picture of what is occurring at a given time. Allows the development of questions for further study.	Does not assess relationships among variables. May be unethical to participants if they do not know they are being observed.
Correlational	To assess the relationships between and among two or more variables	Allows testing of expected relationships between and among variables and the making of predictions. Can assess these relationships in everyday life events.	Cannot be used to draw interferences about the causal relationships between and among variables.
Experimental	To assess the causal impact of one or more experimental manipulations on a dependent variable	Allows drawing of conclusions about the causal relationships among variables.	Cannot experimentally manipulate many important variables. May be expensive and time consuming.

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1.9: Research Involving Time-Spans

Cross-sectional research *compares samples that represent a cross-section of the population who vary in age.* Participants might be asked to complete a survey or take a test of some physical or cognitive skill. The attitudes or skill levels based on age are compared. In cross-sectional research, respondents are measured only once, and consequently this method is not expensive or time consuming. In addition, because participants are only tested at one point in time, practice effects are not an issue as children do not have the opportunity to become better at the task over time. There is also no need to keep in contact with, or follow-up with, participants over time.

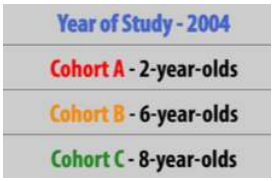

Figure 1.16 Cross-sectional. Source.

However, cross-sectional research does not allow the researcher to look at the *impact of having been born in a certain time-period, which is known as the* **cohort effect**. For example, those born during the depression have very different views about and experiences with the internet than those born in the last twenty years. Different attitudes about the Internet, for example, might not be due to a person's biological age as much as their life experiences as members of a cohort.

Longitudinal research *involves studying a group of people who are the same age, and measuring them repeatedly over a period-of-time.* This type of design allows researchers to study individual differences in development. Longitudinal studies may be conducted over the short term, such as a span of months, or over much longer durations including years or decades. For these reasons, longitudinal research designs are optimal for studying stability and change over time.

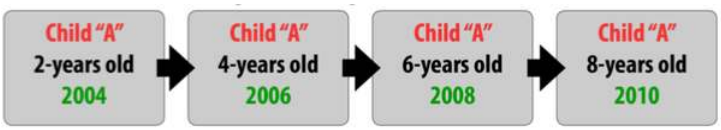

Figure 1.17: Longitudinal research. Source.

Problems with longitudinal research include being very time consuming and expensive. Researchers must maintain continued contact with participants over time, and these studies necessitate that scientists have funding to conduct their work over extended durations. An additional risk is attrition. **Attrition** *occurs when participants fail to complete all portions of a study.* Participants may move, change their phone numbers, or simply become disinterested in participating over time. Researchers should account for the possibility of attrition by enrolling a larger sample into their study initially, as some participants will likely drop out over time. Even with a large sample size, the experimenter never knows if there was something different about the individuals who dropped out versus those that remained in the study.

The results from longitudinal studies may also be impacted by repeated assessments. Consider how well you would do on a math test if you were given the exact same exam every day for a week. Your performance would likely improve over time not necessarily because you developed better math abilities, but because you were continuously practicing the same math problems. This phenomenon is known as a practice effect. **Practice effects** *occur when participants become better at a task over time because they have done it again and again; not due to natural psychological development.*

Sequential research *includes elements of both longitudinal and cross-sectional research designs.* Similar to longitudinal designs, sequential research features participants who are followed over time; similar to cross-sectional designs, sequential work includes participants of different ages. This research design is also distinct from those that have been discussed previously in that individuals of different ages are enrolled into a study at various points in time to examine age-related changes, development within the same individuals as they age, and account for the possibility of cohort effects.

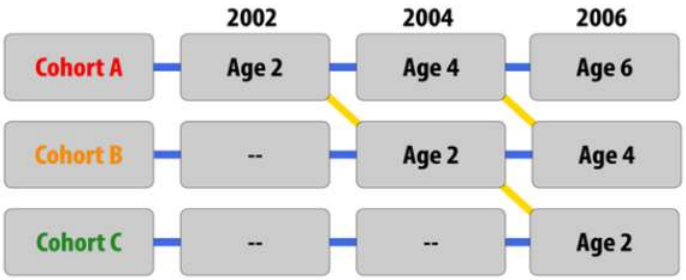

Figure 1.18: Sequential research. Source.

For example, in a study with a sequential design, a researcher might enroll three separate groups of children (Groups A, B, and C). Children in Group A would be enrolled when they are 2 years old and would be tested again when they are 4 and 6 years old. This is similar in design to the longitudinal study described previously. Children in Group B would be enrolled when they are 4 years old and would be tested again when they are 6 and 8 years old. Finally, children in Group C would be enrolled when they are 6 years old and would be tested again when they are 8 and 10 years old. Sequential designs are appealing because they allow researchers to learn a lot about development in a relatively short amount of time. In this example, a four-year research study would provide information about 8 years of developmental time by enrolling children ranging in age from two to ten years old.

Because they include elements of longitudinal and cross-sectional designs, sequential research has many of the same strengths and limitations as these other approaches. For example, sequential work may require less time and effort than longitudinal research, but more time and effort than cross-sectional research. Although practice effects may be an issue if participants are asked to complete the same tasks or assessments over time, attrition may be less problematic than what is commonly experienced in longitudinal research since participants may not have to remain involved in the study for such a long period-of-time. Table 1.6 identifies advantages and disadvantages for each of the described time span research design.

	Advantages	Disadvantages
Longitudinal	• Examines changes within individuals over time • Provides a developmental analysis	• Expensive • Takes a long time • Participant attrition • Possibility of practice effects • Cannot examine cohort effects
Cross-sectional	• Examines changes between participants of different ages at the same point in time • Provide information on age-related change	• Cannot examine change over time • Cannot examine cohort effects
Sequential	• Examines changes within individuals over time • Examines changes between participants of different ages at the same point in time • Can be used to examine cohort effects	• May be expensive • Possibility of practice effects

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1.10: Experimental Research

Conducting Ethical Research

One of the issues that all scientists must address concerns the ethics of their research. Research in psychology may cause some stress, harm, or inconvenience for the people who participate in that research.Psychologistsmayinducestress,anxiety,ornegativemoodsintheir participants, expose them to weak electrical shocks, or convince them to behave in ways that violate their moral standards. Additionally researchers may sometimes use animals, potentially harming them in the process.

Decisions about whether research is ethical are made using established ethical codes developed by scientific organizations, such as the American Psychological Association, and federal governments. In the United States, the Department of Health and Human Services provides the guidelines for ethical standards in research. The following are the American Psychological Association code of ethics when using humans in research (APA, 2002).

- **No Harm:** The most direct ethical concern of the scientist is to prevent harm to the research participants.
- **Informed Consent:** Researchers must obtain **informed consent**, which *explains as much as possible about the true nature of the study, particularly everything that might be expected to influence willingness to participate*. Participants can withdraw their consent to participate at any point.

Infants and young children cannot verbally indicate their willingness to participate, much less understand the balance of potential risks and benefits. As such, researchers are oftentimes required to obtain written informed consent from the parent or legal guardian of the child participant. Further, this adult is almost always present as the study is conducted. Children are not asked to indicate whether they would like to be involved in a study until they are approximately seven years old. Because infants and young children also cannot easily indicate if they would like to discontinue their participation in a study, researchers must be sensitive to changes in the state of the participant, such as determining whether a child is too tired or upset to continue, as well as to what the parent desires. In some cases, parents might want to discontinue their involvement in the research. As in adult studies, researchers must always strive to protect the rights and well- being of the minor participants and their parents when conducting developmental research.

- **Confidentiality:** Researchers must also protect the privacy of the research participants' responses by not using names or other information that could identify the participants.
- **Deception: Deception** *occurs whenever research participants are not completely and fully informed about the nature of the research project before participating in it*. Deception may occur when the researcher tells the participants that a study is about one thing when in fact it is about something else, or when participants are not told about the hypothesis.
- **Debriefing:** At the end of a study **debriefing**, *which is a procedure designed to fully explain the purposes and procedures of the research and remove any harmful aftereffects of participation*, must occur.

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CHAPTER OVERVIEW

2: Nature through Nurture; Heredity and Genetics

Learning Objectives: Heredity

- Define genes
- Distinguish between mitosis and meiosis, genotype and phenotype, homozygous and heterozygous, and dominant and recessive
- Describe some genetic disorders, due to a gene defect, and chromosomal disorders
- Define polygenic and incomplete dominance
- Describe the function of genetic counseling and why individuals may seek genetic counseling
- Define behavioral genetics, describe genotype-environment correlations and genotype-environmental interactions, and define epigenetics

In this chapter, we will begin by examining some of the ways in which heredity helps to shape the way we are. We will look at what happens genetically during conception, and describe some known genetic and chromosomal disorders.

2.1: Heredity
2.2: Genotypes and Phenotypes
2.3: Genetic Disorders
2.4: Chromosomal Abnormalities
2.5: Behavioral Genetics

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2.1: Heredity

As your recall from chapter one, nature refers to the contribution of genetics to one's development. The basic building block of the nature perspective is the gene. **Genes** are *recipes for making proteins*, while proteins influence the structure and functions of cells. Genes are located on the chromosomes and there are an estimated 20,500 genes for humans, according to the Human Genome Project (NIH, 2015). See Box 2.2 at the end of this section for more details on the Human Genome Project.

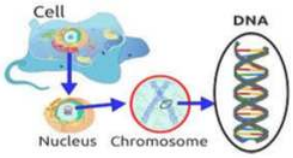

Figure 2.1. Source.

Normal human cells contain 46 chromosomes (or 23 pairs; one from each parent) in the nucleus of the cells. After conception, most cells of the body are created by a process called mitosis. **Mitosis** *is defined as the cell's nucleus making an exact copy of all the chromosomes and splitting into two new cells*. However, the cells used in sexual reproduction, called the gametes (sperm or ova), are formed in a process called meiosis. In **meiosis** *the gamete's chromosomes duplicate, and then divide twice resulting in four cells containing only half the genetic material of the original gamete.* Thus, each sperm and egg possesses only 23 chromosomes and combine to produce the normal 46. See Figure 2.2 for details on both mitosis and meiosis. Given the amount of genes present and the unpredictability of the meiosis process, the likelihood of having offspring that are genetically identical (and not twins) is one in trillions (Gould & Keeton, 1997).

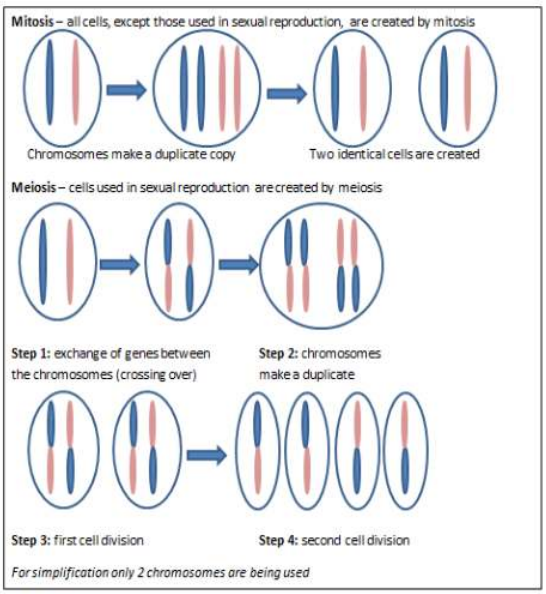

Figure 2.1: Mitosis vs. Meiosis

Of the 23 pairs of chromosomes created at conception, 22 pairs are similar in length. These are called autosomes. The remaining pair, or sex chromosomes, may differ in length. If a child receives the combination of XY the child will be genetically male. If the child receives the combination XX the child will be genetically female.

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2.2: Genotypes and Phenotypes

The word **genotype** *refers to the sum total of all the genes a person inherits*. The word **phenotype** *refers to the features that are actually expressed*. Look in the mirror. What do you see, your genotype or your phenotype? What determines whether or not genes are expressed? Because genes are inherited in pairs on the chromosomes, *we may receive either the same version of a gene from our mother and father, that is, be* **homozygous** for that characteristic the gene influences. *If we receive a different version of the gene from each parent, that is referred to as* **heterozygous.** In the homozygous situation we will display that characteristic. It is in the heterozygous condition that it becomes clear that not all genes are created equal. Some genes are **dominant**, meaning they *express themselves in the phenotype even when paired with a different version of the gene*, while their silent partner is called recessive. **Recessive** genes *express themselves only when paired with a similar version gene*. Geneticists refer to *different versions of a gene as* **alleles.** Some dominant traits include having facial dimples, curly hair, normal vision, and dark hair. Some recessive traits include red hair, being nearsighted, and straight hair.

Most characteristics are not the result of a single gene; they are **polygenic**, *meaning they are the result of several genes*. In addition, the dominant and recessive patterns described above are usually not that simple either. *Sometimes the dominant gene does not completely suppress the recessive gene; this is called* **incomplete dominance**. An example of this can be found in the recessive gene disorder sickle cell disease. The gene that produces healthy round-shaped red blood cells is dominant. The recessive gene causes an abnormality in the shape of red blood cells; they take on a sickle form, which can clog the veins and deprive vital organs of oxygen and increase the risk of stroke. To inherit the disorder a person must receive the recessive gene from both parents. *Those who have inherited only one recessive-gene are called* **carriers** and should be unaffected by this recessive trait. Yet, carriers of sickle cell have some red blood cells that take on the c-shaped sickle pattern. Under circumstances of oxygen deprivation, such as high altitudes or physical exertion, carriers for the sickle cell gene may experience some of the symptoms of sickle cell (Berk, 2004).

Box 2.1 Monozygotic and dizygotic twins

Many students are interested in twins. **Monozygotic** *or identical twins occur when a fertilized egg splits apart in the first two weeks of development.* The result is the creation of two separate, but genetically identical offspring. That is, they possess the same genotype and often the same phenotype. About one-third of twins are monozygotic twins. Sometimes, however, *two eggs or ova are released and fertilized by two separate sperm. The result is* **dizygotic** *or fraternal twins*. These two individuals share the same amount of genetic material as would any two children from the same mother and father. In other words, they possess a different genotype and phenotype. Older mothers are more likely to have dizygotic twins than are younger mothers, and couples who use fertility drugs are also more likely to give birth to dizygotic twins. Consequently, there has been an increase in the number of fraternal twins recently (Bortolus et al., 1999).

Monozygotic Twins (Source) versus Dizygotic twins (Source)

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2.3: Genetic Disorders

Most of the known genetic disorders are dominant gene-linked; however, the vast majority of dominant gene linked disorders are not serious or debilitating. For example, the majority of those with Tourette's Syndrome suffer only minor tics from time to time and can easily control their symptoms. Huntington's Disease is a dominant gene linked disorder that affects the nervous system and is fatal, but does not appear until midlife. Recessive gene disorders, such as cystic fibrosis and sickle-cell anemia, are less common but may actually claim more lives because they are less likely to be detected as people are unaware that they are carriers of the disease. Some genetic disorders are **sex-linked**; *the defective gene is found on the X-chromosome*. Males have only one X chromosome so are at greater risk for sex-linked disorders due to a recessive gene, such as hemophilia, color-blindness, and baldness. For females to be affected by the genetic defects, they need to inherit the recessive gene on both X-chromosomes, but if the defective gene is dominant, females can be equally at risk. Table 2.1 lists several genetic disorders.

Table 2.1 Genetic Disorders

Recessive disorders (homozygous): the individual inherits a gene change from both parents. If the gene is inherited from just one parent, the person is a carrier and does not have the condition.	Cases per Birth
• **Sickle Cell Disease** (SCD) is a condition in which the red blood cells in the body are shaped like a sickle (like the letter C) and affect the ability of the blood to transport oxygen. Carriers may experience some effects but do not have the full condition.	1 in 500 Black births 1 in 36,000 Hispanic births
• **Cystic Fibrosis** (CF) is a condition that affects breathing and digestion due to thick mucus building up in the body, especially the lungs and digestive system. In CF, the mucus is thicker than normal and sticky.	1 in 3500
• **Phenylketonuria** (PKU) is a metabolic disorder in which the individual cannot metabolize phenylalanine, an amino acid. Left untreated, intellectual deficits occur. PKU is easily detected and is treated with a special diet.	1 in 10,000
• **Tay Sachs Disease** is caused by enzyme deficiency resulting in the accumulation of lipids in the nerve cells of the brain. This accumulation results in progressive damage to the cells and a decrease in cognitive and physical development. Death typically occurs by age five.	1 in 4000; 1 in 30 American Jews is a carrier; 1 in 20 French Canadians is a carrier
• **Albinism** is when the individual lacks melanin and possesses little to no pigment in the skin, hair, and eyes. Vision problems can also occur.	Fewer than 20,000 US cases per year

Autosomal Dominant Disorders (heterozygous): In order to have the disorder, the individual only needs to inherit the gene change from one parent.	**Cases per Birth**
• **Huntington's Disease** is a condition that affects the individual's nervous system. Nerve cells become damaged, causing various parts of the brain to deteriorate. The disease affects movement, behavior, and cognition. It is fatal and occurs at midlife.	1 in 10,000
• **Tourette Syndron** is a tic disorder which results in uncontrollable motor and vocal tics as well as body jerking.	1 in 250

• **Achondroplasia** is the most common form of disproportionate short stature. The individual has abnormal bone growth resulting in short stature, disproportionately short arms and legs, short fingers, a large heard, and specific facial features.	1 in 15,000-40,000

Sex-Linked Disorders: When the X chromosome carries the mutated gene, the disorder is referred to as an X-linked disorder. Males are more affected than females because they possess only one X chromosome without an additional X chromosome to counter the harmful gene.	**Cases per Birth**
• **Fragile X Syndrome** occurs when the body cannot make enough of a protein it needs for the brain to grow and problems with learning and behavior can occur. Fragile X syndrome is caused from an abnormality in the X chromosome, which then breaks. If a female has fragile X, her second X chromosome is usually healthy, but males with fragile X don't have a second healthy X chromosome. This is why symptoms of fragile X syndrome are usually more serious in males.	1 in 4000 males 1 in 8000 females
• **Hemophilia** occurs when there are problems in blood clotting, causing both internal and external bleeding.	1 in 10,000 males
• **Duchenne Muscular Dystrophy** is a weakening of the muscles, resulting in an inability to move, wasting away, and possible death.	1 in 3500 males

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2.4: Chromosomal Abnormalities

A **chromosomal abnormality** *occurs when a child inherits too many or two few chromosomes*. The most common cause of chromosomal abnormalities is the age of the mother. As the mother ages, the ovum is more likely to suffer abnormalities due to longer term exposure to environmental factors. Consequently, some gametes do not divide evenly when they are forming. Therefore, some cells have more than 46 chromosomes. In fact, it is believed that close to half of all zygotes have an odd number of chromosomes. Most of these zygotes fail to develop and are spontaneously aborted by the mother's body.

One of the most common chromosomal abnormalities is on pair 21. **Trisomy 21 or Down Syndrome** *occurs when there are three rather than two 21st chromosomes.* A person with Down Syndrome typically exhibits an intellectual disability and possesses certain physical features, such as short fingers and toes, folds of skin over the eyes, and a protruding tongue. There is as much variation in people with Down Syndrome as in most populations, and those differences need to be recognized and appreciated. Other less common chromosomal abnormalities of live-born infants occur on chromosome 13 and chromosome 18. Refer to Table 2.2 on the prevalence of these chromosomal disorders in our home state of Illinois.

Table 2.2: Illinois Prevalence Rates (2007-2011) for Trisomy 13, 18, and 21 based on Maternal Age

Chromosomal Disorder	Age<35 Prevalence Rate	Age>35 Prevalence Rate	Total Prevalence
Trisomy 13	1.0 per 10,000	35 Prevalence Rate">4.3 per 10,000	1.6 per 10,000
Trisomy 18	0.9 per 10,000	35 Prevalence Rate">8.3 per 10,000	2.0 per 10,000
Trisomy 21	6.9 per 10,000	35 Prevalence Rate">43.7 per 10,000	12.7 per 10,000

When the abnormality is on 23rd pair the result is a **sex-linked chromosomal abnormality**. A person might have XXY, XYY, XXX, XO. Two of the more common sex-linked chromosomal disorders are Turner Syndrome and Klinefelter Syndrome. **Turner Syndrome** *occurs when part or all of one of the X chromosomes is lost and the resulting zygote has an XO composition*. This occurs in 1 of every 2,500 live female births (Carroll, 2007) and affects the individual's cognitive functioning and sexual maturation. The external genitalia appear normal, but breasts and ovaries do not develop fully and the woman does not menstruate. Turner's syndrome also results in short stature and other physical characteristics. **Klinefelter Syndrome (XXY)** *results when an extra X chromosome is present in the cells of a male* and occurs in 1 out of 700 live male births. The Y chromosome stimulates the growth of male genitalia, but the additional X chromosome inhibits this development. An individual with Klinefelter Syndrome has some breast development, infertility (this is the most common cause of infertility in males), and has low levels of testosterone. See Table 2.3 for Chromosomal Disorders descriptions.

Table 2.3 Chromosomal Disorders

Autosomal Chromosome Disorders: The individual inherits too many or two few chromosomes	Cases per Birth
• **Down Syndrome/Trisomy 21** is caused by an extra chromosome 21 and includes a combination of birth defects. Affected individuals have some degree of intellectual disability, characteristic facial features, often heart defects, and other health problems. The severity varies greatly among affected individuals.	1 in 691; 1 in 300 births at age 35
• **Trisomy 13** is caused by an extra chromosome 13. Affected individuals have multiple birth defects and generally die in the first weeks or months of life.	1 in 7,906
• **Trisomy 18** is caused by an extra chromosome 18 and the affected individual also has multiple birth defects and early death.	1 in 3,762

Autosomal Chromosome Disorders: The individual inherits too many or two few chromosomes	Cases per Birth
Sex-Linked Chromosomal Disorders: The disorder occurs on chromosome pair #23 or the sex chromosomes.	**Cases per Birth**
• **Turner Syndrome** is caused when all or part of one of the X chromosomes is lost before or soon after conception due to a random event. The resulting zygote has an XO composition. Turner Syndrome affects cognitive functioning and sexual maturation in girls. Infertility and a short stature may be noted.	1 in 2500 females
• **Klinefelter Syndrome** is caused when an extra X chromosome is present in the cells of a male due to a random event. The Y chromosome stimulates the growth of male genitalia, but the additional X chromosome inhibits this development. The male can have some breast development, infertility, and low levels of testosterone.	1 in 700 males

Genetic Counseling: Genetic counseling refers to a service that assists individuals identify, test for, and explain potential genetic conditions that could adversely affect themselves or their offspring (CDC, 2015b). The common reasons for genetic counseling include:

- Family history of a genetic condition
- Membership in a certain ethnic group with a higher risk of a genetic condition
- Information regarding the results of genetic testing, including blood tests, amniocentesis, or ultra sounds
- Learning about the chances of having a baby with a genetic condition if the mother is older, has had several miscarriages, has offspring with birth defects, experiences infertility, or has a medical condition

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2.5: Behavioral Genetics

Behavioral Genetics *is the scientific study of the interplay between the genetic and environmental contributions to behavior.* Often referred to as the nature/nurture debate, Gottlieb (1998, 2000, 2002) suggests an analytic framework for this debate that recognizes the interplay between the environment, behavior, and genetic expression. This bidirectional interplay suggests that the environment can affect the expression of genes just as genetic predispositions can impact a person's potentials. Additionally, environmental circumstances can trigger symptoms of a genetic disorder. For example, a person who has sickle cell anemia, a recessive gene linked disorder, can experience a sickle cell crisis under conditions of oxygen deprivation. Someone predisposed genetically for type-two diabetes can trigger the disease through poor diet and little exercise.

Research has shown how the environment and genotype interact in several ways. **Genotype- Environment Correlations** *refer to the processes by which genetic factors contribute to variations in the environment* (Plomin, DeFries, Knopik, & Niederhiser, 2013). There are three types of genotype-environment correlations:

Passive genotype-environment correlation *occurs when children passively inherit the genes and the environments their family provides.* Certain behavioral characteristics, such as being athletically inclined, may run in families. The children have inherited both the genes that would enable success at these activities, and given the environmental encouragement to engage in these actions. Figure 2.3 highlights this correlation by demonstrating how a family passes on water skiing skills through both genetics and environmental opportunities.

Figure 2.3

Evocative genotype-environment correlation *refers to how the social environment reacts to individuals based on their inherited characteristics.* For example, whether one has a more outgoing or shy temperament will affect how he or she is treated by others.

Active genotype-environment correlation *occurs when individuals seek out environments that support their genetic tendencies*. This is also referred to as *niche picking*. For example, children who are musically inclined seek out music instruction and opportunities that facilitate their natural musical ability.

Conversely, **Genotype-Environment Interactions** *involve genetic susceptibility to the environment.* Adoption studies provide evidence for genotype-environment interactions. For example, the Early Growth and Development Study (Leve, Neiderhiser, Scaramella, & Reiss, 2010) followed 360 adopted children and their adopted and biological parents in a longitudinal study. Results have shown that children whose biological parents exhibited psychopathology, exhibited significantly fewer behavior problems when their adoptive parents used more structured parenting than unstructured. Additionally, elevated psychopathology in adoptive parents increased the risk for the children's development of behavior problems, but only when the biological parents' psychopathology was high. Consequently, the results show how environmental effects on behavior differ based on the genotype, especially stressful environments on genetically at-risk children.

Lastly, **Epigenetics** studies modifications in DNA that affect gene expression and are passed on when the cells divide. Environmental factors, such as nutrition, stress, and teratogens are thought to change gene expression by switching genes on and off. These gene changes can then be inherited by daughter cells. This would explain why monozygotic or identical twins may increasingly differ in gene expression with age. For example, Fraga et al. (2005) found that when examining differences in DNA, a group of monozygotic twins were indistinguishable during the early years. However, when the twins were older there were

significant discrepancies in their gene expression, most likely due to different experiences. These differences included susceptibilities to disease and a range of personal characteristics.

Box 2.2 The Human Genome Project

In 1990 the Human Genome Project (HGP), an international scientific endeavor, began the task of sequencing the 3 billion base pairs that make up the human genome. In April of 2003, more than two years ahead of schedule, scientists have given us the genetic blueprint for building a human. Since this time, using the information from the HGP, researchers have discovered the genes involved in over 1800 diseases. In 2005 the HGP amassed a large data base called HapMap that catalogs the genetic variations in 11 global populations. Data on genetic variation can improve our understanding of differential risk for disease and reactions to medical treatments, such as drugs. Pharmacogenomic researchers have already developed tests to determine whether a patient will respond favorably to certain drugs used in the treatment of breast cancer or HIV by using information from HapMap (NIH, 2015).

Future directions for the HGP include identifying the genetic markers for all 50 major forms of cancer (The Cancer Genome Atlas), continued use of the HapMap for creating more effective drugs for the treatment of disease, and examining the legal, social and ethical implications of genetic knowledge (NIH, 2015).

From the outset, the HGP made ethical issues one of their main concerns. Part of the HGP's budget supports research and holds workshops that address these concerns. Who owns this information, and how the availability of genetic information may influence healthcare and its impact on individuals, their families, and the greater community are just some of the many questions being addressed (NIH, 2015).

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CHAPTER OVERVIEW

3: Prenatal Development and Birth

In this chapter, we will consider what happens during prenatal development, including the impact of teratogens. We will also discuss the impact that both the mother and father have on the developing fetus.

Learning Objectives: Prenatal Development

- Describe the changes that occur in the three periods of prenatal development
- Describe what occurs during prenatal brain development
- Define teratogens and describe the factors that influence their effects
- List and describe the effects of several common teratogens
- Explain maternal and paternal factors that affect the developing fetus
- Explain the types of prenatal assessment
- Describe both the minor and major complications of pregnancy

Now we turn our attention to prenatal development which is divided into three periods: The germinal period, the embryonic period, and the fetal period. The following is an overview of some of the changes that take place during each period.

Topic hierarchy

3.1: Prenatal Development
3.2: Teratogens
3.3: Maternal Factors
3.4: Prenatal Assessment
3.5: Complications of Pregnancy
3.6: Birth
3.7: Assessing the Neonate

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3.1: Prenatal Development

Learning Objectives: Prenatal Development

- Describe the changes that occur in the three periods of prenatal development
- Describe what occurs during prenatal brain development
- Define teratogens and describe the factors that influence their effects
- List and describe the effects of several common teratogens
- Explain maternal and paternal factors that affect the developing fetus
- Explain the types of prenatal assessment
- Describe both the minor and major complications of pregnanc

Now we turn our attention to prenatal development which is divided into three periods: The germinal period, the embryonic period, and the fetal period. The following is an overview of some of the changes that take place during each period.

The Germinal Period

The germinal period (about 14 days in length) lasts from conception to implantation of the fertilized egg in the lining of the uterus (Figure 2.5). At ejaculation millions of sperm are released into the vagina, but only a few reach the egg and typically only one fertilizes the egg. Once a single sperm has entered the wall of the egg, the wall becomes hard and prevents other sperm from entering. After the sperm has entered the egg, the tail of the sperm breaks off and the head of the sperm, containing the genetic information from the father, unites with the nucleus of the egg. It is typically fertilized in the top section of the fallopian tube and continues its journey to the uterus. As a result, a new cell is formed. *This cell, containing the combined genetic information from both parents*, is referred to as a **zygote.**

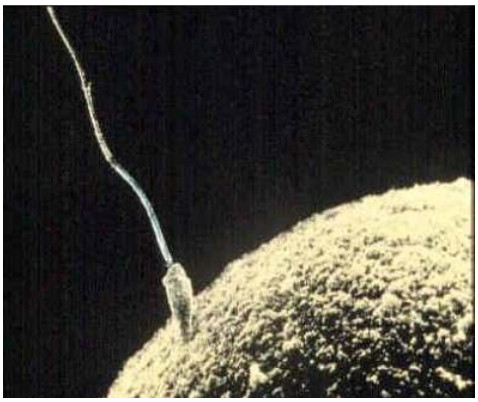

Figure 2.4: Sperm and Ovum at Conception

During this time, the organism begins cell division through mitosis. After five days of mitosis there are 100 cells, which is now called a **blastocyst**. *The blastocyst consists of both an inner and outer group of cells. The inner group of cells, or* **embryonic disk** *will become the embryo*, while *the outer group of cells*, or **trophoblast**, *becomes the support system which nourishes the developing organism*. This stage ends when the blastocyst fully implants into the uterine wall (U.S. National Library of Medicine, 2015).

Mitosis is a fragile process and fewer than one half of all zygotes survive beyond the first two weeks (Hall, 2004). Some of the reasons for this include the egg and sperm do not join properly, thus their genetic material does not combine, there is too little or damaged genetic material, the zygote does not replicate, or the blastocyst does not implant into the uterine wall. The failure rate is higher for in vitro conceptions. Figure 2.5 illustrates the journey of the ova from its release to its fertilization, cell duplication, and implantation into the uterine lining.

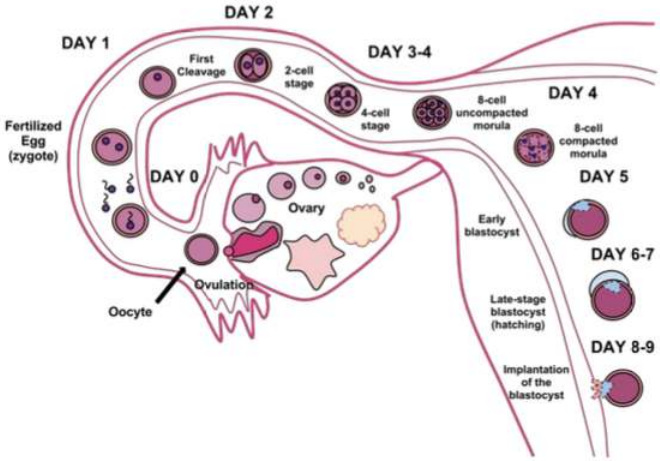

Figure 2.5: "Human Fertilization" by Ttrue12. Source.

The Embryonic Period

Starting the third week the blastocyst has implanted in the uterine wall. *Upon implantation this multi-cellular organism* is called an **embryo**. Now blood vessels grow forming the **placenta**. *The placenta is a structure connected to the uterus that provides nourishment and oxygen from the mother to the developing embryo via the umbilical cord*. During this period, cells continue to differentiate. Growth during prenatal development occurs in two major directions: *from head to tail* called **cephalocaudal development** and *from the midline outward* referred to as **proximodistal development**. This means that those structures nearest the head develop before those nearest the feet and those structures nearest the torso develop before those away from the center of the body (such as hands and fingers). The head develops in the fourth week and the precursor to the heart begins to pulse. In the early stages of the embryonic period, gills and a tail are apparent. However, by the end of this stage they disappear and the organism takes on a more human appearance. About 20 percent of organisms fail during the embryonic period, usually due to gross chromosomal abnormalities. As in the case of the germinal period, often the mother does not yet know that she is pregnant. It is during this stage that the major structures of the body are taking form making the embryonic period the time when the organism is most vulnerable to the greatest amount of damage if exposed to harmful substances. Potential mothers are not often aware of the risks they introduce to the developing embryo during this time. The embryo is approximately 1 inch in length and weighs about 4 grams at the end of eight weeks. The embryo can move and respond to touch at this time.

Figure 2.6: The Embryo. Photo by Lunar Caustic.

The Fetal Period

From the ninth week until birth, the organism is referred to as a **fetus**. During this stage, the major structures are continuing to develop. By the third month, the fetus has all its body parts including external genitalia. In the following weeks, the fetus will develop hair, nails, teeth and the excretory and digestive systems will continue to develop. The fetus is about 3 inches long and weighs about 28 grams.

Figure 2.7: Fetus. Source.

During the 4th - 6th months, the eyes become more sensitive to light and hearing develops. The respiratory system continues to develop, and reflexes such as sucking, swallowing and hiccupping, develop during the 5th month. Cycles of sleep and wakefulness are present at this time as well. *The first chance of survival outside the womb, known as the* **age of viability** *is reached at about 24 weeks* (Morgan, Goldenberg, & Schulkin, 2008). Many practitioners hesitate to resuscitate before 24 weeks. The majority of the neurons in the brain have developed by 24 weeks, although they are still rudimentary, and the glial or nurse cells that support neurons continue to grow. At 24 weeks the fetus can feel pain (Royal College of Obstetricians and Gynecologists, 1997).

Between the 7th - 9th months, the fetus is primarily preparing for birth. It is exercising its muscles and its lungs begin to expand and contract. The fetus gains about 5 pounds and 7 inches during this last trimester of pregnancy, and during the 8th month a layer of fat develops under the skin. This layer of fat serves as insulation and helps the baby regulate body temperature after birth.

At around 36 weeks the fetus is almost ready for birth. It weighs about 6 pounds and is about 18.5 inches long. By week 37 all of the fetus's organ systems are developed enough that it could survive outside the mother's uterus without many of the risks associated with premature birth. The fetus continues to gain weight and grow in length until approximately 40 weeks. By then the fetus has very little room to move around and birth becomes imminent. The progression through the stages is shown in Figure 2.8.

Figure 2.8 Prenatal Development Age Milestones.

Prenatal Brain Development

Prenatal brain development begins in the third gestational week with the differentiation of stem cells, which are capable of producing all the different cells that make up the brain (Stiles & Jernigan, 2010). *The location of these stem cells in the embryo is referred to as the* neural plate. By the end of the third week, two ridges appear along the neural plate first forming the neural groove and then the neural tube. The open region in the center of the neural tube forms the brain's ventricles and spinal canal. By the end of the embryonic period, or week eight, the neural tube has further differentiated into the forebrain, midbrain, and hindbrain.

Brain development during the fetal period involves neuron production, migration, and differentiation. From the early fetal period until midgestation, most of the 85 billion neurons have been generated and many have already migrated to their brain positions. **Neurogenesis,** or *the formation of neurons*, is largely completed after five months of gestation. One exception is in the hippocampus, which continues to develop neurons throughout life. Neurons that form the neocortex, or the layer of cells that lie on the surface of the brain, migrate to their location in an orderly way. Neural migration is mostly completed by 29 weeks. Once in position neurons begin to produce dendrites and axons that begin to form the neural networks responsible for information processing. *Regions of the brain that contain the cell bodies are referred to as the* **Gray Matter** because they look gray in appearance. *The axons that form the neural pathways make up the* **White Matter** because they are covered in myelin, a fatty substance that is white in appearance. Myelin aids in both the insulation and efficiency of neural transmission. Although cell differentiation is complete at birth, the growth of dendrites, axons, and synapses continue for years.

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3.2: Teratogens

Good prenatal care is essential. The developing child is most at risk for some of the most severe problems during the first three months of development. Unfortunately, this is a time at which many mothers are unaware that they are pregnant. Today, we know many of the factors that can jeopardize the health of the developing child. *The study of factors that contribute to birth defects is called* **teratology. Teratogens** *are environmental factors that can contribute to birth defects*, and include some maternal diseases, pollutants, drugs and alcohol.

Factors influencing prenatal risks: There are several considerations in determining the type and amount of damage that might result from exposure to a particular teratogen (Berger, 2005). These include:

- **The timing of the exposure**: Structures in the body are vulnerable to the most severe damage when they are forming. If a substance is introduced during a particular structure's critical period (time of development), the damage to that structure may be greater. For example, the ears and arms reach their critical periods at about 6 weeks after conception. If a mother exposes the embryo to certain substances during this period, the arms and ears may be malformed.
- **The amount of exposure**: Some substances are not harmful unless the amounts reach a certain level. The critical level depends in part on the size and metabolism of the mother.
- **The number of teratogens**: Fetuses exposed to multiple teratogens typically have more problems than those exposed to only one.
- **Genetics:** Genetic make-up also plays a role on the impact a particular teratogen might have on the child. This is suggested by fraternal twins exposed to the same prenatal environment, but they do not experience the same teratogenic effects. The genetic make- up of the mother can also have an effect; some mothers may be more resistant to teratogenic effects than others.
- **Being male or female**: Males are more likely to experience damage due to teratogens than are females. It is believed that the Y chromosome, which contains fewer genes than the X, may have an impact.

Figure 2.9 illustrates the timing of teratogen exposure and the types of structural defects that can occur during the prenatal period.

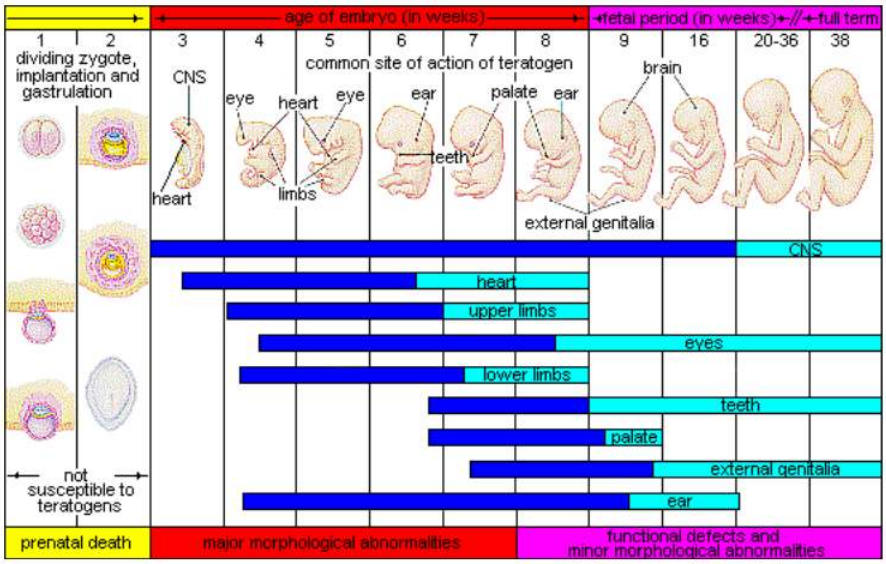
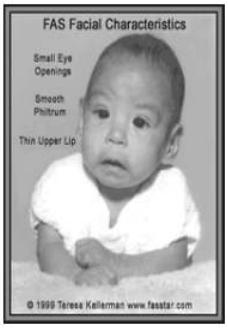


Figure 2.9 Critical Periods of Prenatal Development.

Alcohol: One of the most commonly used teratogens is alcohol, and because half of all pregnancies in the United States are unplanned, it is recommended that women of child-bearing age take great caution against drinking alcohol when not using birth control or when pregnant (CDC, 2005). Alcohol use during pregnancy is the leading preventable cause of intellectual disabilities in children in the United States (Maier & West, 2001). Alcohol consumption, particularly during the second month of prenatal development but at any point during pregnancy, may lead to neurocognitive and behavioral difficulties that can last a lifetime. Binge drinking (5 or more drinks on a single occasion) or 7 or more drinks during a single week place a child at risk.

In extreme cases, alcohol consumption during pregnancy can lead to fetal death, but also can result **in Fetal Alcohol Spectrum Disorders (FASD),** *which is an umbrella term for the range of effects that can occur due to alcohol consumption during pregnancy* (March of Dimes, 2016a). The most severe form of FASD is Fetal Alcohol Syndrome (FAS). Children with FAS share certain

physical features such as flattened noses, small eye holes, and small heads (see Figure 2.10). Cognitively, these children have poor judgment, poor impulse control, higher rates of ADHD, learning issues, and lower IQ scores. These developmental problems and delays persist into adulthood (Streissguth, Barr, Kogan, & Bookstein, 1996) and can include criminal behavior, psychiatric problems, and unemployment (CDC, 2016a). Based on animal studies, it has been hypothesized that a mother's alcohol consumption during pregnancy may predispose her child to like alcohol (Youngentob, Molina, Spear, & Youngentob, 2007).



Fetal Alcohol Spectrum Disorder Facial Features

Facial Feature	Potential Effect of Fetal Alcohol
Head size	Below-average head circumference
Eyes	Smaller than average eye opening, skin folds at corners of eyes
Nose	Low nasal bridge, short nose
Midface	Smaller than average midface size
Lip and philtrum	Thin upper lip, indistinct philtrum

Source

Figure 2.10: Fetal Alcohol Spectrum Disorders. Source.

Tobacco: Another widely used teratogen is tobacco. According to Tong et al. (2013) in conjunction with the Centers for Disease Control and Prevention, data from 27 sites in 2010 representing 52% of live births, showed that among women with recent live births:

- About 23% reported smoking in the 3 months prior to pregnancy.
- Almost 11% reported smoking during pregnancy.
- More than half (54.3%) reported that they quit smoking by the last 3 months of pregnancy.
- Almost 16% reported smoking after delivery.

When comparing the ages of women who smoked:

- Women <20, 13.6% smoked during pregnancy
- Women 20–24,17.6% smoked during pregnancy
- Women 25–34, 8.8% smoked during pregnancy
- Women ≥35, 5.7% smoked during pregnancy

The findings among racial and ethnic groups indicated that smoking during pregnancy was highest among American Indians/Alaska Natives (26.0%) and lowest among Asians/Pacific Islanders (2.1%).

When a pregnant woman smokes the fetus is exposed to dangerous chemicals including nicotine, carbon monoxide and tar, which lessen the amount of oxygen available to the fetus. Oxygen is important for overall growth and development. Tobacco use during pregnancy has been associated with low birth weight, **ecotopic pregnancy** (*fertilized egg implants itself outside of the uterus*), **placenta previa** (*placenta lies low in the uterus and covers all or part of the cervix*), **placenta abruption** (*placenta separates prematurely from the uterine wall*), preterm delivery, stillbirth, fetal growth restriction, sudden infant death syndrome (SIDS), birth defects, learning disabilities, and early puberty in girls (Center for Disease Control, 2015d). A woman being exposed to second-hand smoke during pregnancy has also been linked to low-birth weight infants.

Prescription/Over-the-counter Drugs: About 70% of pregnant women take at least one prescription drug (March of Dimes, 2016e). A woman should not be taking any prescription drug during pregnancy unless it was prescribed by a health care provider who knows she is pregnant. Some prescription drugs can cause birth defects, problems in overall health, and development of the fetus. Over-the-counter drugs are also a concern during the prenatal period because they may cause certain health problems. For example, the pain reliever ibuprofen can cause serious blood flow problems to the fetus during the last three months.

Figure 2.11.

Illicit Drugs: Common illicit drugs include cocaine, ecstasy and other club drugs, heroin, marijuana, and prescription drugs that are abused. It is difficult to completely determine the effects of a particular illicit drug on a developing child because most mothers who use, use more than one substance and have other unhealthy behaviors. These include smoking, drinking alcohol, not eating healthy meals, and being more likely to get a sexually transmitted disease. However, several problems seem clear. The use of cocaine is connected with low birth weight, stillbirths and spontaneous abortion. Heavy marijuana use is associated with problems in brain development (March of Dimes, 2016c). *If a baby's mother used an addictive drug during pregnancy that baby can get addicted to the drug before birth and go through drug withdrawal after birth*, also known as **Neonatal Abstinence Syndrome** (March of Dimes, 2015d). Other complications of illicit drug use include premature birth, smaller than normal head size, birth defects, heart defects, and infections. Additionally, babies born to mothers who use drugs may have problems later in life, including learning and behavior difficulties, slower than normal growth, and die from Sudden Infant Death Syndrome. Children of substance abusing parents are also considered at high risk for a range of biological, developmental, academic, and behavioral problems, including developing substance abuse problems of their own (Conners, et al., 2003).

Box 2.3: Should Women Who Use Drugs During Pregnancy Be Arrested and Jailed?

Women who use drugs or alcohol during pregnancy can cause serious lifelong harm to their child. Some people have advocated mandatory screenings for women who are pregnant and have a history of drug abuse, and if the women continue using, to arrest, prosecute, and incarcerate them (Figdor & Kaeser, 1998). This policy was tried in Charleston, South Carolina 20 years ago. The policy was called the Interagency Policy on Management of Substance Abuse During Pregnancy and had disastrous results.

The Interagency Policy applied to patients attending the obstetrics clinic at MUSC, which primarily serves patients who are indigent or on Medicaid. It did not apply to private obstetrical patients. The policy required patient education about the harmful effects of substance abuse during pregnancy. A statement also warned patients that protection of unborn and newborn children from the harms of illegal drug abuse could involve the Charleston police, the Solicitor of the Ninth Judicial Court, and the Protective Services Division of the Department of Social Services (DSS). (Jos, Marshall, & Perlmutter, 1995, pp. 120–121)

This policy seemed to deter women from seeking prenatal care, deterred them from seeking other social services, and was applied solely to low-income women, resulting in lawsuits. The program was canceled after 5 years, during which 42 women were arrested. A federal agency later determined that the program involved human experimentation without the approval and oversight of an institutional review board (IRB).

In July 2014, Tennessee enacted a law that allows women who illegally use a narcotic drug while pregnant to be prosecuted for assault if her infant is harmed or addicted to the drug (National Public Radio, 2015). According to the National Public Radio report, a baby is born dependent on a drug every 30 minutes in Tennessee, which is a rate three times higher than the national average. However, since the law took effect the number of babies born having drug withdrawal symptoms has not diminished. Critics contend that the criminal justice system should not be involved in what is considered a healthcare problem. What do you think? Is the issue of mothers using illicit drugs more of a legal or medical concern?

Pollutants: There are more than 83,000 chemicals used in the United States with little information on the effects of them during pregnancy (March of Dimes, 2016b). An environmental pollutant of significant concern is lead poisoning, which is connected with low birth weight and slowed neurological development. The chemicals in certain pesticides are also potentially damaging and may lead to birth defects, learning problems, low birth weight, miscarriage, and premature birth (March of Dimes, 2014). Prenatal exposure to bisphenol A (BPA), a chemical commonly used in plastics and food and beverage containers, may disrupt the action of

certain genes contributing to certain birth defects (March of Dimes, 2016b). Radiation is another environmental hazard. If a mother is exposed to radiation, it can get into the bloodstream and pass through the umbilical cord to the baby. Radiation can also build up in body areas close to the uterus, such as the bladder. Exposure to radiation can slow the baby's growth, cause birth defects, affect brain development, cause cancer, and result in a miscarriage. Mercury, a heavy metal, can cause brain damage and affect the baby's hearing and vision. This is why women are cautioned about the amount and type of fish they consume during pregnancy.

Figure 2.12.

Toxoplasmosis: The tiny parasite, *Toxoplasma gondii*, causes an infection called **Toxoplasmosis**. According to the March of Dimes (2012d), *Toxoplasma gondii* infects more than 60 million people in the United States. A healthy immune system can keep the parasite at bay producing no symptoms, so most people do not know they are infected. As routine prenatal screening frequently does not test for the presence of this parasite, pregnant women may want to talk to their health-care provider about being tested. Toxoplasmosis can cause premature birth, stillbirth, and can result in birth defects to the eyes and brain. While most babies born with this infection show no symptoms, ten percent may experience eye infections, enlarged liver and spleen, jaundice, and pneumonia. To avoid being infected, women should avoid eating undercooked or raw meat and unwashed fruits and vegetables, touching cooking utensils that touched raw meat or unwashed fruits and vegetables, and touching cat feces, soil or sand. If women think they may have been infected during pregnancy, they should have their baby tested.

Sexually Transmitted Diseases: Gonorrhea, syphilis, and chlamydia are sexually transmitted infections that can be passed to the fetus by an infected mother. Mothers should be tested as early as possible to minimize the risk of spreading these infections to their unborn child. Additionally, the earlier the treatment begins, the better the health outcomes for mother and baby (CDC, 2016d). Sexually transmitted diseases (STDs) can cause premature birth, premature rupture of the amniotic sac, an ectopic pregnancy, birth defects, miscarriage, and still births (March of Dimes, 2013). Most babies become infected with STDS while passing through the birth canal during delivery, but some STDs can cross the placenta and infect the developing fetus.

Human Immunodeficiency Virus (HIV): One of the most potentially devastating teratogens is HIV. HIV and Acquired Immune Deficiency Syndrome (AIDS) are leading causes of illness and death in the United States (Health Resources and Services Administration, 2015). One of the main ways children under age 13 become infected with HIV is via mother-to-child transmission of the virus prenatally, during labor, or by breastfeeding (CDC, 2016c). There are some measures that can be taken to lower the chance the child will contract the disease. HIV positive mothers who take antiviral medications during their pregnancy greatly reduce the chance of passing the virus to the fetus. The risk of transmission is less than 2 percent; in contrast, it is 25 percent if the mother does not take antiretroviral drugs (CDC, 2016b). However, the long-term risks of prenatal exposure to the medication are not known. It is recommended that women with HIV deliver the child by c-section, and that after birth they avoid breast feeding.

German measles (or rubella): Rubella, also called German measles, is an infection that causes mild flu-like symptoms and a rash on the skin. However, only have of children infected have these symptoms, while others have no symptoms (March of Dimes, 2012a). Rubella has been associated with a number of birth defects. If the mother contracts the disease during the first three months of pregnancy, damage can occur in the eyes, ears, heart or brain of the unborn child. Deafness is almost certain if the mother has German measles before the 11th week of prenatal development and can also cause brain damage. Women in the United States are much less likely to be afflicted with rubella, because most women received childhood vaccinations that protect her from the disease.

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3.3: Maternal Factors

Mothers over 35: Most women over 35 who become pregnant are in good health and have healthy pregnancies. However, according to the March of Dimes (2016d), women over age 35 are more likely to have an increased risk of:

- Fertility problems
- High blood pressure
- Diabetes
- Miscarriages
- Placenta Previa
- Cesarean section
- Premature birth
- Stillbirth
- A baby with a genetic disorder or other birth defects

Because a woman is born with all her eggs, environmental teratogens can affect the quality of the eggs as women get older. Also, a woman's reproductive system ages which can adversely affect the pregnancy. Some women over 35 choose special prenatal screening tests, such as a maternal blood screening, to determine if there are any health risks for the baby.

Figure 2.13. Source.

Although there are medical concerns associated with having a child later in life, there are also many positive consequences to being a more mature parent. Older parents are more confident, less stressed, and typically married providing family stability. Their children perform better on math and reading tests, and they are less prone to injuries or emotional troubles (Albert, 2013). Women who choose to wait are often well educated and lead healthy lives. According to Gregory (2007), older women are more stable, demonstrate a stronger family focus, possess greater self-confidence, and have more money.

Having a child later in one's career equals overall higher wages. In fact, for every year a woman delays motherhood, she makes 9% more in lifetime earnings. Lastly, women who delay having children actually live longer. Sun et al. (2015) found that women who had their last child after the age of 33 doubled their chances of living to age 95 or older than women who had their last child before their 30th birthday. A woman's natural ability to have a child at a later age indicates that her reproductive system is aging slowly, and consequently so is the rest of her body.

Teenage Pregnancy: A teenage mother is at a greater risk for having pregnancy complications including anemia, and high blood pressure. These risks are even greater for those under age 15. Infants born to teenage mothers have a higher risk for being premature and having low birthweight or other serious health problems. Premature and low birthweight babies may have organs that are not fully developed which can result in breathing problems, bleeding in the brain, vision loss, and serious intestinal problems. Very low birthweight babies (less than 3 1/3 pounds) are more than 100 times as likely to die, and moderately low birthweight babies (between 3 1/3 and 5 1⁄2 pounds) are more than 5 times as likely to die in their first year, than normal weight babies (March of Dimes, 2012c). Again, the risk is highest for babies of mothers under age 15. Reasons for these health issues include that teenagers are the least likely of all age groups to get early and regular prenatal care. Additionally, they may engage in negative behaviors including eating unhealthy food, smoking, drinking alcohol, and taking drugs. Additional concerns for teenagers are repeat births. About 25% of teen mothers under age 18 have a second baby within 2 years after the first baby's birth.

Gestational Diabetes: Seven percent of pregnant women develop **gestational diabetes** (March of Dimes, 2015b). *Diabetes is a condition where the body has too much glucose in the bloodstream*. Most pregnant women have their glucose level tested at 24 to 28 weeks of pregnancy. Gestational diabetes usually goes away after the mother gives birth, but it might indicate a risk for developing diabetes later in life. If untreated, gestational diabetes can cause premature birth, stillbirth, the baby having breathing

problems at birth, jaundice, or low blood sugar. Babies born to mothers with gestational diabetes can also be considerably heavier (more than 9 pounds) making the labor and birth process more difficult. For expectant mothers, untreated gestational diabetes can cause preeclampsia (high blood pressure and signs that the liver and kidneys may not be working properly) discussed later in the chapter. Risk factors for gestational diabetes include age (being over age 25), being overweight or gaining too much weight during pregnancy, family history of diabetes, having had gestational diabetes with a prior pregnancy, and race and ethnicity (African-American, Native American, Hispanic, Asian, or Pacific Islander have a higher risk). Eating healthy and maintaining a healthy weight during pregnancy can reduce the chance of gestational diabetes. Women who already have diabetes and become pregnant need to attend all their prenatal care visits, and follow the same advice as those for women with gestational diabetes as the risk of preeclampsia, premature birth, birth defects, and stillbirth are the same.

High Blood Pressure (Hypertension): Hypertension *is a condition in which the pressure against the wall of the arteries becomes too high*. There are two types of high blood pressure during pregnancy, gestational and chronic. Gestational hypertension only occurs during pregnancy and goes away after birth. Chronic high blood pressure refers to women who already had hypertension before the pregnancy or to those who developed it during pregnancy and it did not go away after birth. According to the March of Dimes (2015c) about 8 in every 100 pregnant women have high blood pressure. High blood pressure during pregnancy can cause premature birth and low birth weight (under five and a half pounds), placental abruption, and mothers can develop preeclampsia.

Rh Disease: Rh is a protein found in the blood. Most people are Rh positive, meaning they have this protein. Some people are Rh negative, meaning this protein is absent. Mothers who are Rh negative are at risk of having a baby with *a form of anemia* called **Rh disease** (March of Dimes, 2009). A father who is Rh-positive and mother who is Rh-negative can conceive a baby who is Rh-positive. Some of the fetus's blood cells may get into the mother's bloodstream and her immune system is unable to recognize the Rh factor. The immune system starts to produce antibodies to fight off what it thinks is a foreign invader. Once her body produces immunity, the antibodies can cross the placenta and start to destroy the red blood cells of the developing fetus. As this process takes time, often the first Rh positive baby is not harmed, but as the mother's body will continue to produce antibodies to the Rh factor across her lifetime, subsequent pregnancies can pose greater risk for an Rh positive baby. In the newborn, Rh disease can lead to jaundice, anemia, heart failure, brain damage and death.

Weight Gain during Pregnancy: According to March of Dimes (2016f) during pregnancy most women need only an additional 300 calories per day to aid in the growth of the fetus. Gaining too little or too much weight during pregnancy can be harmful. Women who gain too little may have a baby who is low-birth weight, while those who gain too much are likely to have a premature or large baby. There is also a greater risk for the mother developing preeclampsia and diabetes, which can cause further problems during the pregnancy. Table 2.4 shows the healthy weight gain during pregnancy. Putting on the weight slowly is best. Mothers who are concerned about their weight gain should talk to their health care provider.

Table 2.4 Weight Gain during Pregnancy. Source.

If you were a healthy weight before pregnancy	If you were underweight before pregnancy	If you were overweight before pregnancy	If you were obese before pregnancy
• Gain 25 - 35 lbs • 1-4.5 lbs in the first trimester and 1 lb per week in the second and third trimesters	• Gain 28-40 lbs • 1-4.5 lbs in the first trimester and a little more than 1 lb per week thereafter	• Gain 12-25 lbs • 1-4.5 lbs in the first trimester and a little more than 1/2 lb per week in the second and third trimesters	• 11-20 lbs • 1-4.5 lbs in the first trimester and less than 1/2 lb per week in the second and third trimesters

Mothers of twins need to gain more in each category.

Stress: Feeling stressed is common during pregnancy, but high levels of stress can cause complications including having a premature baby or a low-birthweight baby. Babies born early or too small are at an increased risk for health problems. Stress-related hormones may cause these complications by affecting a woman's immune systems resulting in an infection and premature birth. Additionally, some women deal with stress by smoking, drinking alcohol, or taking drugs, which can lead to problems in the pregnancy. High levels of stress in pregnancy have also been correlated with problems in the baby's brain development and immune system functioning, as well as childhood problems such as trouble paying attention and being afraid (March of Dimes, 2012b).

Depression: Depression is a significant medical condition in which feelings of sadness, worthlessness, guilt, and fatigue interfere with one's daily functioning. Depression can occur before, during, or after pregnancy, and 1 in 7 women is treated for depression

sometime between the year before pregnancy and year after pregnancy (March of Dimes, 2015a). Women who have experienced depression previously are more likely to have depression during pregnancy. Consequences of depression include the baby being born premature, having a low birthweight, being more irritable, less active, less attentive, and having fewer facial expressions. About 13% of pregnant women take an antidepressant during pregnancy. It is important that women taking antidepressants during pregnancy discuss the medication with a health care provider as some medications can cause harm to the developing organism. In fact, birth defects happen about 2 to 3 times more often in women who take certain Selective Serotonin Reuptake Inhibitors (SSRIs). Depression is not the same as the Baby Blues. The baby Blues are feelings of sadness that occur 3 to 5 days after having a baby, and typically disappear usually within 10 days of the birth. New mothers may have trouble sleeping, be moody, and feel let-down from the birthing experience. According to the Diagnostic and Statistical Manual of Mental Disorders-5th edition (DSM-V), (American Psychiatric Association, 2013), peripartum onset of depression, also known as Postpartum Depression, is a type of depression that occurs during pregnancy or in the 4 weeks following pregnancy. Approximately 1 out of 8 women experience postpartum depression. Changing hormone levels are thought to be a factor in its occurrence, however, risk factors include having depression previously, a family history of depression, being younger than 20, experiencing stress, and substance use.

Peripartum-onset mood disorders, both depression and mania, can present with or without psychotic features. Hallucinations and delusions are associated with postpartum psychotic episodes, and have included command hallucinations to kill the infant or delusions that the infant is possessed. Psychotic features occur in approximately 1 in 500 to 1 in 1,000 deliveries, and the risk is higher for women with prior postpartum mood episodes (American Psychiatric Association, 2013).

Paternal Impact: The age of fathers at the time of conception is also an important factor in health risks for children. According to Nippoldt (2015) offspring of men over 40 face an increased risk of miscarriages, autism, birth defects, achondroplasia (bone growth disorder) and schizophrenia. These increased health risks are thought to be due to accumulated chromosomal aberrations and mutations during the maturation of sperm cells in older men (Bray, Gunnell, & Smith, 2006). However, like older women, the overall risks are small.

Figure 2.14: Hazardous Occupations. Source.

In addition, men are more likely than women to work in occupations where hazardous chemicals, many of which have teratogenic effects or may cause genetic mutations, are used (Cordier, 2008). These may include petrochemicals, lead, and pesticides that can cause abnormal sperm and lead to miscarriages or diseases. Men are also more likely to be a source of second hand smoke for their developing offspring. As noted earlier, smoking by either the mother or around the mother can hinder prenatal development.

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3.4: Prenatal Assessment

A number of assessments are suggested to women as part of their routine prenatal care to find conditions that may increase the risk of complications for the mother and fetus (Eisenberg, Murkoff, & Hathaway, 1996). These can include blood and urine analyses and screening and diagnostic tests for birth defects.

Ultrasound is one of the main screening tests done in combination with blood tests. The ultrasound *is a test in which sound waves are used to examine the fetus*. There are two general types. *Transvaginal ultrasounds* are used early pregnancy, while *transabdominal ultrasounds* are more common and used after 10 weeks of pregnancy (typically, 16 to 20 weeks). Ultrasounds are used to check the fetus for defects or problems. It can also find out the age of the fetus, location of the placenta, fetal position, movement, breathing and heart rate, amount of amniotic fluid in the uterus, and number of fetuses. Most women have at least one ultra sound during pregnancy, but if problems are noted, additional ultrasounds may be recommended.

Figure 2.15: Preparing for an Ultrasound.

When diagnosis of a birth defect is necessary, ultrasounds help guide the more invasive diagnostic tests of amniocentesis and chorionic villus sampling. **Amniocentesis** *is a procedure in which a needle is used to withdraw a small amount of amniotic fluid and cells from the sac surrounding the fetus and later tested.* **Chorionic Villus Sampling** *is a procedure in which a small sample of cells is taken from the placenta and tested.* Both amniocentesis and chorionic villus sampling have a risk of miscarriage, and consequently they are not done routinely.

Box 2.4: Infertility and Reproductive Technology

Infertility: Infertility affects about 10 to 15 percent of couples in the United States (Mayo Clinic, 2015). Male factors create infertility in about a third of the cases. For men, the most common cause is a lack of sperm production or low sperm production. Female factors cause infertility in another third of cases. For women, one of the most common causes of infertility is the failure to ovulate. Another cause of infertility in women is **Pelvic Inflammatory Disease** (**PID**), *which is an infection of a woman's reproductive organs* (Carroll, 2007). It is a complication often caused by some STDs, such as chlamydia and gonorrhea. Other infections that are not sexually transmitted can also cause PID. Based on a nationally representative sample from 2006-2010, 5.0% of U.S. women have reported being treated for PID in their lifetime, and 1 out of 8 women with a history of PID experience difficulties getting pregnant (CDC, 2014). Both male and female factors contribute to the remainder of cases of infertility.

Fertility treatment: The majority of infertility cases are treated using fertility drugs to increase ovulation or with surgical procedures to repair the reproductive organs or remove scar tissue from the reproductive tract. ***In vitro* fertilization (IVF)** is used when a woman has blocked or deformed fallopian tubes or sometimes when a man has a very low sperm count. *This procedure involves removing eggs from the female and fertilizing the eggs outside the woman's body*. The fertilized egg is then reinserted in the woman's uterus. The average costs of IVF are between $12,000-$17,000 (U. S. National Library of Medicine, 2014). The success rate varies depending on the age of the mother and type of egg implanted, such as whether the egg was recently removed from the woman, used after being frozen, or donated from another woman. According to a 2006 CDC report on assisted reproductive technologies that led to a healthy baby, the percentages were as follows:

- 40.9% in women aged 25
- 39.5% in women aged 30
- 33.4% in women aged 35
- 15.4% in women aged 40

Higher success rates, but less common procedures include **gamete intra-fallopian tube transfer** (GIFT) *which involves implanting both sperm and ova into the fallopian tube and fertilization is allowed to occur naturally* (Carroll, 2007). **Zygote**

intra-fallopian tube transfer (ZIFT) is *another procedure in which sperm and ova are fertilized outside of the woman's body and the fertilized egg or zygote is then implanted in the fallopian tube*. This allows the zygote to travel down the fallopian tube and embed in the lining of the uterus naturally. This procedure also has a higher success rate than IVF.

Insurance coverage for infertility is required in fifteen states, but the amount and type of coverage available varies greatly (American Society of Reproductive Medicine, 2015). The majority of couples seeking treatment for infertility pay much of the cost. Consequently, infertility treatment is much more accessible to couples with higher incomes. However, grants and funding sources are available for lower income couples seeking infertility treatment as well.

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3.5: Complications of Pregnancy

Minor complications: There are a number of common side effects of pregnancy. Not everyone experiences all of these, nor to the same degree. And although they are considered "minor" this is not to say that these problems are not potentially very uncomfortable. These side effects include nausea (particularly during the first 3-4 months of pregnancy as a result of higher levels of estrogen in the system), heartburn, gas, hemorrhoids, backache, leg cramps, insomnia, constipation, shortness of breath or varicose veins (as a result of carrying a heavy load on the abdomen).

Major Complications: The following are some serious complications of pregnancy which can pose health risks to mother and child and that often require hospitalization.

Ectopic Pregnancy *occurs when the zygote becomes attached to the fallopian tube before reaching the uterus.* About 1 in 50 pregnancies in the United States are tubal pregnancies and this number has been increasing because of the higher rates of pelvic inflammatory disease and Chlamydia (Carroll, 2007). Abdominal pain, vaginal bleeding, nausea and fainting are symptoms of ectopic pregnancy.

Preeclampsia, also known as Toxemia, *is characterized by a sharp rise in blood pressure, a leakage of protein into the urine as a result of kidney problems, and swelling of the hands, feet, and face during the third trimester of pregnancy*. Preeclampsia is the most common complication of pregnancy. It is estimated to affect 5% to 10% of all pregnancies globally and accounts for 40% to 60% of maternal deaths in developing countries (National Institute of Child Health and Human Development, 2013). Rates are lower in the United States and preeclampsia affects about 3% to 5% of pregnant women. Preeclampsia occurs most frequently in first pregnancies, and it is more common in women who are obese, have diabetes, or are carrying twins. *When preeclampsia causes seizures, the condition is known as* **eclampsia**, which is the second leading cause of maternal death in the United States. Preeclampsia is also a leading cause of fetal complications, which include low birth weight, premature birth, and stillbirth. Treatment is typically bed rest and sometimes medication. If this treatment is ineffective, labor may be induced.

Maternal Mortality: Approximately 1000 women die in childbirth around the world each day (World Health Organization, 2010). Rates are highest in Subsaharan Africa and South Asia, although there has been a substantial decrease in these rates. The campaign to make childbirth safe for everyone has led to the development of clinics accessible to those living in more isolated areas and training more midwives to assist in childbirth.

Spontaneous abortion is experienced in an estimated 20-40 percent of undiagnosed pregnancies and in another 10 percent of diagnosed pregnancies. Usually the body aborts due to chromosomal abnormalities, and this typically happens before the 12th week of pregnancy. Cramping and bleeding result and normal periods return after several months. Some women are more likely to have repeated miscarriages due to chromosomal, amniotic, or hormonal problems, but miscarriage can also be a result of defective sperm (Carrell et. al., 2003).

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3.6: Birth

Learning Objectives: Birth

- Describe how expectant parents prepare for childbirth
- Describe the stages of vaginal delivery
- Explain why a Caesarean or induced birth is necessary
- Describe the two common procedures to assess the condition of the newborn
- Describe problems newborns experience before, during, and after birth

Preparation for Childbirth

Prepared childbirth refers to being not only in good physical condition to help provide a healthy environment for the baby to develop, but also helping individuals to prepare to accept their new roles as parents. Additionally, parents can receive information and training that will assist them for delivery and life with the baby. The more future parents can learn about childbirth and the newborn, the better prepared they will be for the adjustment they must make to a new life.

One of the most common methods for preparing for childbirth is **The Lamaze Method.** This method originated in Russia and was brought to the United States in the 1950s by Fernand Lamaze. *The emphasis of this method is on teaching the woman to be in control in the process of delivery.* It includes learning muscle relaxation, breathing though contractions, having a focal point (usually a picture to look at) during contractions and having a support person who goes through the training process with the mother and serves as a coach during delivery (Eisenberg, Murkoff, & Hathaway, 1996).

Choosing Where to Have the Baby and Who Will Deliver: The vast majority of births occur in a hospital setting. However, one percent of women choose to deliver at home (Martin, Hamilton, Osterman, Curtin, & Mathews, 2015). Women who are at low risk for birth complications can successfully deliver at home. More than half (67%) of home deliveries are by certified nurse midwifes. Midwives are trained and licensed to assist in delivery and are far less expensive than the cost of a hospital delivery. However, because of the potential for a complication during the birth process, most medical professionals recommend that delivery take place in a hospital. Despite the concerns, in the United States women who have had previous children, who are over 25, and who are white are more likely to have out-of-hospital births (MacDorman, Menacker, & Declercq, 2010)**.** In addition to home births, one-third of out-of- hospital births occur in freestanding clinics, birthing centers, in physician's offices, or other locations.

Stages of Birth for Vaginal Delivery

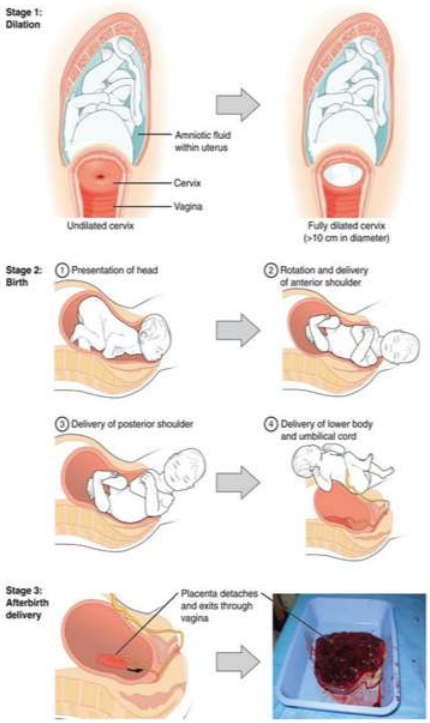

Figure 2.16: Stages of Birth for a Vaginal Delivery. Source.

The First Stage of labor begins with uterine contractions that may initially last about 30 seconds and be spaced 15 to 20 minutes apart. These increase in duration and frequency to more than a minute in length and about 3 to 4 minutes apart. Typically, doctors advise that they be called when contractions are coming about every 5 minutes. Some women experience *false labor or* **Braxton-Hicks Contractions**, especially with the first child. These may come and go. They tend to diminish when the mother begins walking around. Real labor pains tend to increase with walking. Labor may also be signaled by a bloody discharge being expelled from the cervix. In one out of 8 pregnancies, the amniotic sac or water in which the fetus is suspended may break before labor begins. In such cases, the physician may induce labor with the use of medication if it does not begin on its own in order to reduce the risk of infection. Normally this sac does not rupture until the later stages of labor.

The first stage of labor is typically the longest. During this stage the cervix or opening to the uterus dilates to 10 centimeters or just under 4 inches (See Figure 2.16). This may take around 12-16 hours for first children or about 6-9 hours for women who have previously given birth. Labor may also begin with a discharge of blood or amniotic fluid.

The Second Stage involves the passage of the baby through the birth canal. This stage takes about 10-40 minutes. Contractions usually come about every 2-3 minutes. The mother pushes and relaxes as directed by the medical staff. Normally the head is delivered first. The baby is then rotated so that one shoulder can come through and then the other shoulder. The rest of the baby quickly passes through. At this stage, an **episiotomy** *or incision made in the tissue between the vaginal opening and anus*, may be performed to avoid tearing the tissue of the back of the vaginal opening (Mayo Clinic, 2016). The baby's mouth and nose are suctioned out. The umbilical cord is clamped and cut.

The Third Stage is relatively painless. During this stage, the placenta or afterbirth is delivered. This is typically within 20 minutes after delivery. If an episiotomy was performed it is stitched up during this stage.

More than 50% of women giving birth at hospitals use an epidural anesthesia during delivery (American Pregnancy Association, 2015). An **epidural block** *is a regional analgesic that can be used during labor and alleviates most pain in the lower body without slowing labor.* The epidural block can be used throughout labor and has little to no effect on the baby. Medication is injected into a small space outside the spinal cord in the lower back. It takes 10 to 20 minutes for the medication to take effect. An epidural block with stronger medications, such as anesthetics, can be used shortly before a C-section or if a vaginal birth requires the use of forceps or vacuum extraction. A **Cesarean Section (C-section)** *is surgery to deliver the baby by being removed through the mother's abdomen.* In the United States, about one in three women have their babies delivered this way (Martin et al., 2015). Most C-sections are done when problems occur during delivery unexpectedly. These can include:

- Health problems in the mother
- Signs of distress in the baby
- Not enough room for the baby to go through the vagina
- The position of the baby, such as a breech presentation where the head is not in the downward position.

C-sections are also more common among women carrying more than one baby. Although the surgery is relatively safe for mother and baby, it is considered major surgery and carries health risks. Additionally, it also takes longer to recover from a C-section than from vaginal birth. After healing, the incision may leave a weak spot in the wall of the uterus. This could cause problems with an attempted vaginal birth later. However, more than half of women who have a C-section can give vaginal birth later.

An **Induced Birth**: Sometimes a baby's arrival may need to be **Induced** *or delivered before labor begins*. Inducing labor may be recommended for a variety of reasons when there is concern for the health of the mother or baby. For example:

- The mother is approaching two weeks beyond her due date and labor has not started naturally
- The mother's water has broken, but contractions have not begun
- There is an infection in the mother's uterus
- The baby has stopped growing at the expected pace
- There is not enough amniotic fluid surrounding the baby
- The placenta peels away, either partially or completely, from the inner wall of the uterus before delivery
- The mother has a medical condition that might put her or her baby at risk, such as high blood pressure or diabetes (Mayo Clinic, 2014).

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3.7: Assessing the Neonate

The Apgar assessment is conducted one minute and five minutes after birth. This is a very quick way to assess the newborn's overall condition. Five measures are assessed: Heart rate, respiration, muscle tone (assessed by touching the baby's palm), reflex response (the Babinski reflex is tested), and color. A score of 0 to 2 is given on each feature examined. An Apgar of 5 or less is cause for concern. The second Apgar should indicate improvement with a higher score.

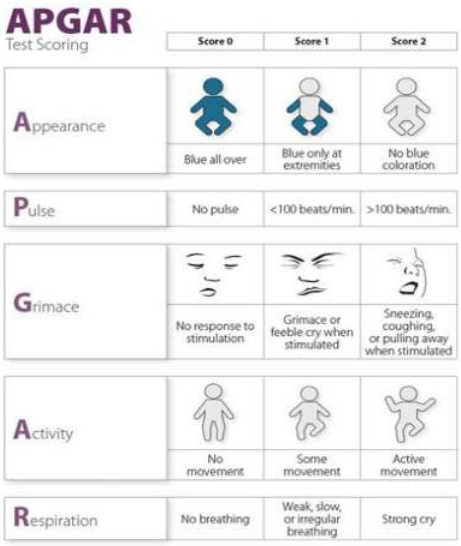

Figure 2.17 APGAR Test Scores. Source.

Another way to assess the condition of the newborn is the Neonatal Behavioral Assessment Scale (NBAS). The baby's motor development, muscle tone, and stress response are assessed. This tool has been used around the world to further assess the newborn, especially those with low Apgar scores, and to make comparisons of infants in different cultures (Brazelton & Nugent, 1995).

Figure 2.18: Newborn in the neonatal unit. Source.

Problems of the Newborn

Anoxia: **Anoxia** *is a temporary lack of oxygen to the brain*. Difficulty during delivery may lead to anoxia which can result in brain damage or in severe cases, death. Babies who suffer both low birth weight and anoxia are more likely to suffer learning disabilities later in life as well.

Low Birth weight: We have been discussing a number of teratogens associated with low birth weight such as alcohol, tobacco, etc. A child is considered **low birth weight** *if he or she weighs less than 5 pounds 8 ounces (2500 grams)*. About 8.2 percent of babies born in the United States are of low birth weight (Center for Disease Control, 2015a). A low birth weight baby has difficulty maintaining adequate body temperature because it lacks the fat that would otherwise provide insulation. Such a baby is also at more risk for infection, and 67 percent of these babies are also preterm which can make them more at risk for respiratory infection. Very low birth weight babies (2 pounds or less) have an increased risk of developing cerebral palsy. Many causes of low birth weight are preventable with proper prenatal care.

Preterm: A newborn might also have a low birth weight if it is *born at less than 37 weeks gestation*, which qualifies it as a **preterm** baby (CDC, 2015c). Early birth can be triggered by anything that disrupts the mother's system. For instance, vaginal infections can lead to premature birth because such infection causes the mother to release anti-inflammatory chemicals which, in turn, can trigger contractions. Smoking and the use of other teratogens can lead to preterm birth. A significant consequence of preterm birth includes **respiratory distress syndrome**, *which is characterized by weak and irregular breathing* (United States National Library of Medicine, 2015).

Small-for-Date Infants: *Infants that have birth weights that are below expectation based on their gestational age are referred to as* **small-for-date.** These infants may be full term or preterm, but still weigh less than 90 % of all babies of the same gestational age. This is a very serious situation for newborns as their growth was adversely affected. Regev et al. (2003) found that small-for-date infants died at rates more than four times higher than other infants.

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CHAPTER OVERVIEW

4: Physical Development

Topic hierarchy

4.1: Physical Development in Infancy and Toddlerhood
4.2: Infant Sleep
4.3: Brain Maturation
4.4: Physical Development in Early Childhood
4.5: Sexual Development
4.6: Physical Development in Middle and Late Childhood
4.7: Growth in Adolescence
4.8: Adolescent Brain
4.9: Adolescent Sexual Activity

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4.1: Physical Development in Infancy and Toddlerhood

Overall Physical Growth: The average newborn in the United States weighs about 7.5 pounds (between 5 and 10 pounds) and is about 20 inches in length. For the first few days of life, infants typically lose about 5 percent of their body weight as they eliminate waste and get used to feeding. This often goes unnoticed by most parents, but can be cause for concern for those who have a smaller infant. This weight loss is temporary, however, and is followed by a rapid period of growth. By the time an infant is 4 months old, it usually doubles in weight and by one year has tripled the birth weight. By age 2, the weight has quadrupled, so we can expect that a 2 year-old should weigh between 20 and 40 pounds. The average length at one year is about 29.5 inches and at two years it is around 34.4 inches (Bloem, 2007).

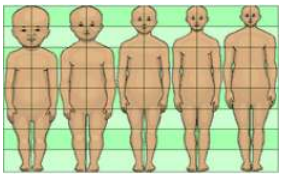

Figure 3.1: Changes in Proportions. Source.

Body Proportions: Another dramatic physical change that takes place in the first several years of life is the change in body proportions. The head initially makes up about 50 percent of our entire length when we are developing in the womb. At birth, the head makes up about 25 percent of our length, and by age 25 it comprises about 20 percent our length.

The Brain in the First Two Years

Some of the most dramatic physical change that occurs during this period is in the brain. We are born with most of the brain cells that we will ever have; that is, about 85 billion neurons whose function is to store and transmit information (Huttenlocher & Dabholkar, 1997). While most of the brain's neurons are present at birth, they are not fully mature. During the next several years **Dendrites**, *or branching extensions that collect information from other neurons*, will undergo a period of exuberance. Because of this proliferation of dendrites, by age two a single neuron might have thousands of dendrites. **Synaptogenesis**, *or the formation of connections between neurons*, continues from the prenatal period forming thousands of new connections during infancy and toddlerhood. *This period of rapid neural growth is referred to as* **Synaptic Blooming**.

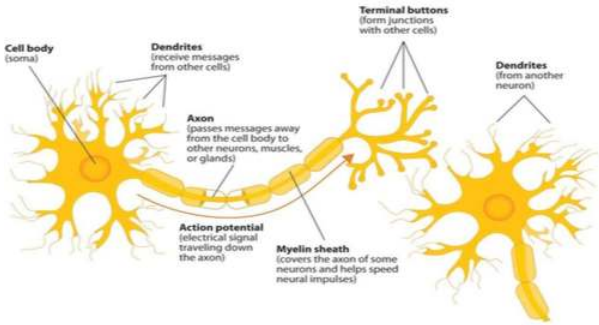

Figure 3.2: Components of the Neuron. Source.

The blooming period of neural growth is then followed by a period of **Synaptic Pruning**, *where neural connections are reduced thereby making those that are used much stronger*. It is thought that pruning causes the brain to function more efficiently, allowing for mastery of more complex skills (Kolb & Whishaw, 2011). Experience will shape which of these connections are maintained and which of these are lost. Ultimately, about 40 percent of these connections will be lost (Webb, Monk, and Nelson, 2001). Blooming occurs during the first few years of life, and pruning continues through childhood and into adolescence in various areas of the brain.

Another major change occurring in the central nervous system is the development of **Myelin**, *a coating of fatty tissues around the axon of the neuron* (Carlson, 2014). Myelin helps insulate the nerve cell and speed the rate of transmission of impulses from one cell to another. This enhances the building of neural pathways and improves coordination and control of movement and thought processes. The development of myelin continues into adolescence, but is most dramatic during the first several years of life.

At birth the brain is about 25 percent its adult weight and by age two it is at 75 percent its adult weight. Most of the neural activity is occurring in the **Cortex** *or the thin outer covering of the brain involved in voluntary activity and thinking.* The cortex is divided

into two hemispheres, and each hemisphere is divided into four lobes, each separated by folds known as fissures. If we look at the cortex starting at the front of the brain and moving over the top (see Figure 3.3), we see first the **frontal lobe** (behind the forehead), *which is responsible primarily for thinking, planning, memory, and judgment*. Following the frontal lobe is the **parietal lobe**, *which extends from the middle to the back of the skull and which is responsible primarily for processing information about touch*. Next is the **occipital lobe**, *at the very back of the skull, which processes visual information*. Finally, in front of the occipital lobe, between the ears, is the **temporal lobe**, which is *responsible for hearing and language*.

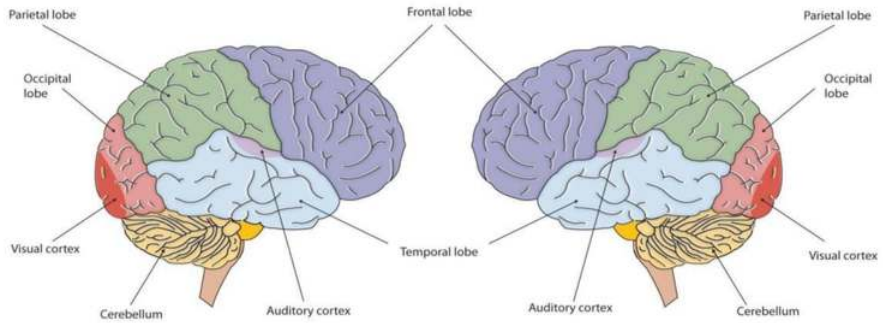

Figure 3.3: The two hemispheres. The brain is divided into two hemispheres (left and right), each of which has four lobes (temporal, frontal, occipital, and parietal). Furthermore, there are specific cortical areas that control different processes. Source.

Although the brain grows rapidly during infancy, specific brain regions do not mature at the same rate. Primary motor areas develop earlier than primary sensory areas, and the prefrontal cortex, that is located behind the forehead, is the least developed. As the prefrontal cortex matures, the child is increasingly able to regulate or control emotions, to plan activities, strategize, and have better judgment. This is not fully accomplished in infancy and toddlerhood, but continues throughout childhood, adolescence and into adulthood.

Lateralization *is the process in which different functions become localized primarily on one side of the brain*. For example, in most adults the left hemisphere is more active than the right during language production, while the reverse pattern is observed during tasks involving visuospatial abilities (Springer & Deutsch, 1993). This process develops over time, however, structural asymmetries between the hemispheres have been reported even in fetuses (Chi, Dooling, & Gilles, 1997; Kasprian et al., 2011) and infants (Dubois et al., 2009). Lastly, **Neuroplasticity** *refers to the brain's ability to change, both physically and chemically, to enhance its adaptability to environmental change and compensate for injury*. Both environmental experiences, such as stimulation, and events within a person's body, such as hormones and genes, affect the brain's plasticity. So too does age. Adult brains demonstrate neuroplasticity, but they are influenced more slowly and less extensively than those of children (Kolb & Whishaw, 2011).

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4.2: Infant Sleep

A newborn typically sleeps approximately 16.5 hours per 24-hour period. This is usually polyphasic sleep in that the infant is accumulating the 16.5 hours over several sleep periods throughout the day (Salkind, 2005). The infant is averaging 15 hours per 24-hour period by one month, and 14 hours by 6 months. By the time children turn two, they are averaging closer to 10 hours per 24 hours. Additionally, the average newborn will spend close to 50% of the sleep time in the Rapid Eye Movement (REM) phase, which decreases to 25% to 30% in childhood.

Figure 3.4.

Sudden Unexpected Infant Deaths (SUID): Each year in the United States, there are about 3,500 Sudden Unexpected Infant Deaths (SUID). These deaths occur among infants less than one year-old and have no immediately obvious cause (CDC, 2015). The three commonly reported types of SUID are:

- ***Sudden Infant Death Syndrome* (SIDS): SIDS** *is identified when the death of a healthy infant occurs suddenly and unexpectedly, and medical and forensic investigation findings (including an autopsy) are inconclusive.* SIDS is the leading cause of death in infants 1 to 12 months old, and approximately 1,500 infants died of SIDS in 2013 (CDC, 2015). Because SIDS is diagnosed when no other cause of death can be determined, possible causes of SIDS are regularly researched. One leading hypothesis suggests that infants who die from SIDS have abnormalities in the area of the brainstem responsible for regulating breathing (Weekes-Shackelford & Shackelford, 2005).
- **Unknown Cause**: The sudden death of an infant less than one year of age that cannot be explained because a thorough investigation was not conducted and cause of death could not be determined.
- **Accidental Suffocation and Strangulation in Bed**: Reasons for accidental suffocation include: Suffocation by soft bedding, another person rolling on top of or against the infant while sleeping, an infant being wedged between two objects such as a mattress and wall, and strangulation such as when an infant's head and neck become caught between crib railings. The percentages of infants who died based on each of the three types are listed in Figure 3.5.

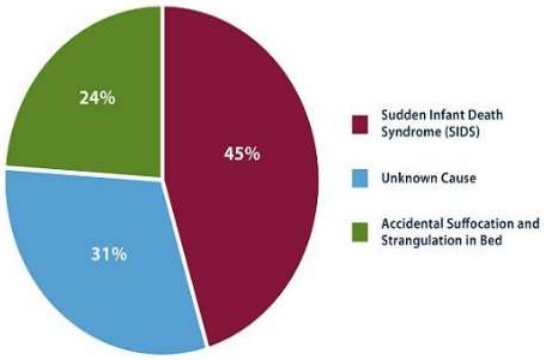

Figure 3.5 Breakdown of Sudden Unexpected Infant Death by Cause, 2013. Source: CDC/NCHS, National Vital Statistics System, Compressed Mortality File.

As can be seen in the below graph (Figure 3.6), the combined SUID death rate declined considerably following the release of the American Academy of Pediatrics safe sleep recommendations in 1992, which advocated that infants be placed for sleep on their backs (nonprone position). These recommendations were followed by a major Back to Sleep Campaign in 1994. However, accidental suffocation and strangulation in bed mortality rates remained unchanged until the late 1990s. In 1998 death rates from accidental suffocation and strangulation in bed actually started to increase, and they reached the highest rate at 20.8 deaths per 100,000 live births in 2013.

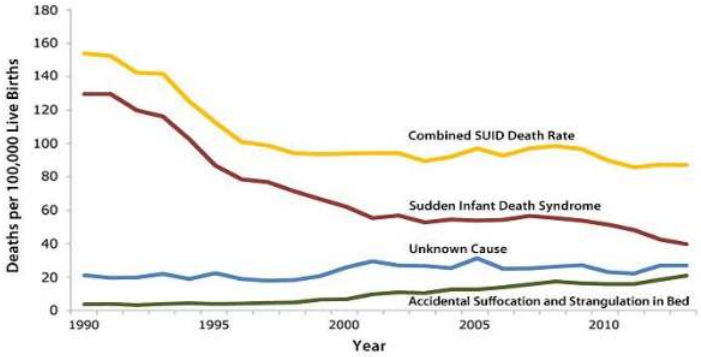

Figure 3.6 Sudden Unexpected Infant Death by Cause, 1990-2013. Source: CDC/NCHS, National Vital Statistics System, Compressed Mortality File.

Should infants be sharing the bed with parents?

Colvin, Collie-Akers, Schunn and Moon (2014) analyzed a total of 8207 deaths from 24 states during 2004–2012 that were contained in the National Center for the Review and Prevention of Child Deaths Case Reporting System, a database of death reports from state child death review teams. The results indicated that younger victims (0-3 months) were more likely to die by bed-sharing and sleeping in an adult bed/on a person. A higher percentage of older victims (4 months to 364 days) rolled into objects in the sleep environment and changed position from side/back to prone. Carpenter et al. (2013) compared infants who died of SIDS with a matched control and found that infants younger than three months old who slept in bed with a parent were five times more likely to die of SIDS compared to babies who slept separately from the parents, but were still in the same room. They concluded that bed sharing, even when the parents do not smoke or take alcohol or drugs, increases the risk of SIDS. However, when combined with parental smoking and maternal alcohol consumption and/or drug use, risks associated with bed sharing greatly increased.

Figure 3.7. Source.

The two studies discussed above were based on American statistics. What about the rest of the world? Co-sleeping occurs in many cultures, primarily because of a more collectivist perspective that encourages a close parent-child bond and interdependent relationship (Morelli, Rogoff, Oppenheim, & Goldsmith, 1992). In countries where co-sleeping is common, however, parents and infants typically sleep on floor mats and other hard surfaces which minimize the suffocation that can occur with bedding and mattresses (Nelson, Schiefenhoevel, & Haimerl, 2000).

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4.3: Brain Maturation

Brain weight: The brain is about 75 percent its adult weight by three years of age. By age 6, it is at 95 percent its adult weight (Lenroot & Giedd, 2006). Myelination and the development of dendrites continue to occur in the cortex and as it does, we see a corresponding change in what the child is capable of doing. Greater development in the prefrontal cortex, the area of the brain behind the forehead that helps us to think, strategize, and control attention and emotion, makes it increasingly possible to inhibit emotional outbursts and understand how to play games. Understanding the game, thinking ahead, and coordinating movement improve with practice and myelination.

Growth in the Hemispheres and Corpus Callosum: Between ages 3 and 6, the left hemisphere of the brain grows dramatically. This side of the brain or hemisphere is typically involved in language skills. The right hemisphere continues to grow throughout early childhood and is involved in tasks that require spatial skills, such as recognizing shapes and patterns. The **Corpus Callosum,** *a dense band of fibers that connects the two hemispheres of the brain*, contains approximately 200 million nerve fibers that connect the hemispheres (Kolb & Whishaw, 2011). The corpus callosum is illustrated in Figure 4.2.

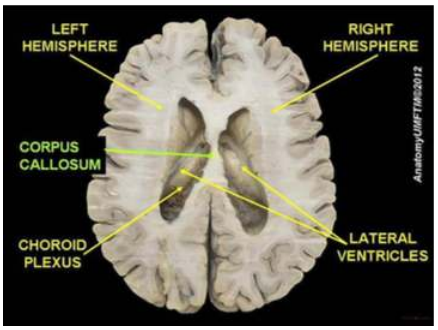

Figure 4.2: Corpus Callosum. Source.

The corpus callosum is located a couple of inches below the longitudinal fissure, which runs the length of the brain and separates the two cerebral hemispheres (Garrett, 2015). Because the two hemispheres carry out different functions, they communicate with each other and integrate their activities through the corpus callosum. Additionally, because incoming information is directed toward one hemisphere, such as visual information from the left eye being directed to the right hemisphere, the corpus callosum shares this information with the other hemisphere.

The corpus callosum undergoes a growth spurt between ages 3 and 6, and this results in improved coordination between right and left hemisphere tasks. For example, in comparison to other individuals, children younger than 6 demonstrate difficulty coordinating an Etch A Sketch toy because their corpus callosum is not developed enough to integrate the movements of both hands (Kalat, 2016).

Neuroplasticity: The control of some specific bodily functions, such as movement, vision, and hearing, is performed in specified areas of the cortex, and if these areas are damaged, the individual will likely lose the ability to perform the corresponding function. For instance, if an infant suffers damage to facial recognition areas in the temporal lobe, it is likely that he or she will never be able to recognize faces (Farah, Rabinowitz, Quinn, & Liu, 2000). On the other hand, the brain is not divided up in an entirely rigid way. The brain's neurons have a remarkable capacity to reorganize and extend themselves to carry out particular functions in response to the needs of the organism, and to repair damage. As a result, the brain constantly creates new neural communication routes and rewires existing ones. **Neuroplasticity** refers to *the brain's ability to change its structure and function in response to experience or damage*. Neuroplasticity enables us to learn and remember new things and adjust to new experiences. Our brains are the most "plastic" when we are young children, as it is during this time that we learn the most about our environment. On the other hand, neuroplasticity continues to be observed even in adults (Kolb & Fantie, 1989).

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4.4: Physical Development in Early Childhood

Overall Physical Growth: Children between the ages of two and six years tend to grow about 3 inches in height and gain about 4 to 5 pounds in weight each year. Just as in infancy, growth occurs in spurts rather than continually. According to the Centers for Disease Control and Prevention (2000) the average 2 year-old weighs between 23 and 28 pounds and stands between 33 and 35 inches tall. The average 6 year-old weighs between 40 and 50 pounds and is about 44 to 47 inches in height. The 3 year-old is still very similar to a toddler with a large head, large stomach, short arms and legs. By the time the child reaches age 6, however, the torso has lengthened and body proportions have become more like those of adults.

Figure 4.1. Source.

This growth rate is slower than that of infancy and is accompanied by a reduced appetite between the ages of 2 and 6. This change can sometimes be surprising to parents and lead to the development of poor eating habits. However, children between the ages of 2 and 3 need 1,000 to 1,400 calories, while children between the ages of 4 and 8 need 1,200 to 2,000 calories (Mayo Clinic, 2016a).

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4.5: Sexual Development

Historically, children have been thought of as innocent or incapable of sexual arousal (Aries, 1962). Yet, the physical dimension of sexual arousal is present from birth. However, to associate the elements of seduction, power, love, or lust that is part of the adult meanings of sexuality would be inappropriate. Sexuality begins in childhood as a response to physical states and sensation and cannot be interpreted as similar to that of adults in any way (Carroll, 2007).

Infancy: Boys and girls are capable of erections and vaginal lubrication even before birth (Martinson, 1981). Arousal can signal overall physical contentment and stimulation that accompanies feeding or warmth. Infants begin to explore their bodies and touch their genitals as soon as they have the sufficient motor skills. This stimulation is for comfort or to relieve tension rather than to reach orgasm (Carroll, 2007).

Early Childhood: Self-stimulation is common in early childhood for both boys and girls. Curiosity about the body and about others' bodies is a natural part of early childhood as well. As children grow, they are more likely to show their genitals to siblings or peers, and to take off their clothes and touch each other (Okami, Olmstead, & Abramson, 1997). Masturbation is common for both boys and girls. Boys are often shown by other boys how to masturbate, but girls tend to find out accidentally. Additionally, boys masturbate more often and touch themselves more openly than do girls (Schwartz, 1999).

Hopefully, parents respond to this without undue alarm and without making the child feel guilty about their bodies. Instead, messages about what is going on and the appropriate time and place for such activities help the child learn what is appropriate.

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4.6: Physical Development in Middle and Late Childhood

Overall Physical Growth: Rates of growth generally slow during these years. Typically, a child will gain about 5-7 pounds a year and grow about 2-3 inches per year (CDC, 2000). They also tend to slim down and gain muscle strength and lung capacity making it possible to engage in strenuous physical activity for long periods of time. The beginning of the growth spurt, which occurs prior to puberty, begins two years earlier for females than males. The mean age for the beginning of the growth spurt for girls is nine, while for boys it is eleven. Children of this age tend to sharpen their abilities to perform both gross motor skills, such as riding a bike, and fine motor skills, such as cutting their fingernails. In gross motor skills (involving large muscles) boys typically outperform girls, while with fine motor skills (small muscles) girls outperform the boys. These improvements in motor skills are related to brain growth and experience during this developmental period.

Brain Growth: Two major brain growth spurts occur during middle/late childhood (Spreen, Riser, & Edgell, 1995). Between ages 6 and 8, significant improvements in fine motor skills and eye-hand coordination are noted. Then between 10 and 12 years of age, the frontal lobes become more developed and improvements in logic, planning, and memory are evident (van der Molen & Molenaar, 1994). Myelination is one factor responsible for these growths. From age 6 to 12, the nerve cells in the association areas of the brain, that is those areas where sensory, motor, and intellectual functioning connect, become almost completely myelinated (Johnson, 2005). This myelination contributes to increases in information processing speed and the child's reaction time. The hippocampus, responsible for transferring information from the short-term to long-term memory, also show increases in myelination resulting in improvements in memory functioning (Rolls, 2000). Children in middle to late childhood are also better able to plan, coordinate activity using both left and right hemispheres of the brain, and to control emotional outbursts. Paying attention is also improved as the prefrontal cortex matures (Markant & Thomas, 2013).

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4.7: Growth in Adolescence

Puberty *is a period of rapid growth and sexual maturation*. These changes begin sometime between eight and fourteen. Girls begin puberty at around ten years of age and boys begin approximately two years later. Pubertal changes take around three to four years to complete. Adolescents experience an overall physical growth spurt. *The growth proceeds from the extremities toward the torso. This is referred to as* **distalproximal development**. First the hands grow, then the arms, and finally the torso. The overall physical growth spurt results in 10-11 inches of added height and 50 to 75 pounds of increased weight. The head begins to grow sometime after the feet have gone through their period of growth. Growth of the head is preceded by growth of the ears, nose, and lips. The difference in these patterns of growth result in adolescents appearing awkward and out-of-proportion. As the torso grows, so does the internal organs. The heart and lungs experience dramatic growth during this period.

During childhood, boys and girls are quite similar in height and weight. However, gender differences become apparent during adolescence. From approximately age ten to fourteen, the average girl is taller, but not heavier, than the average boy. After that, the average boy becomes both taller and heavier, although individual differences are certainly noted. As adolescents physically mature, weight differences are more noteworthy than height differences. At eighteen years of age, those that are heaviest weigh almost twice as much as the lightest, but the tallest teens are only about 10% taller than the shortest (Seifert, 2012).

Both height and weight can certainly be sensitive issues for some teenagers. Most modern societies, and the teenagers in them, tend to favor relatively short women and tall men, as well as a somewhat thin body build, especially for girls and women. Yet, neither socially preferred height nor thinness is the destiny for many individuals. Being overweight, in particular, has become a common, serious problem in modern society due to the prevalence of diets high in fat and lifestyles low in activity (Tartamella, Herscher, & Woolston, 2004). The educational system has, unfortunately, contributed to the problem as well by gradually restricting the number of physical education courses and classes in the past two decades.

Average height and weight are also related somewhat to racial and ethnic background. In general, children of Asian background tend to be slightly shorter than children of European and North American background. The latter in turn tend to be shorter than children from African societies (Eveleth & Tanner, 1990). Body shape differs slightly as well, though the differences are not always visible until after puberty. Asian background youth tend to have arms and legs that are a bit short relative to their torsos, and African background youth tend to have relatively long arms and legs. The differences are only averages as there are large individual differences as well.

Sexual Development

Typically, the growth spurt is followed by the development of sexual maturity. Sexual changes are divided into two categories: Primary sexual characteristics and secondary sexual characteristics. **Primary sexual characteristics** *are changes in the reproductive organs*. For males, this includes growth of the testes, penis, scrotum, and **spermarche** *or first ejaculation of semen*. This occurs between 11 and 15 years of age. For females, primary characteristics include growth of the uterus and **menarche** *or the first menstrual period*. The female gametes, which are stored in the ovaries, are present at birth, but are immature. Each ovary contains about 400,000 gametes, but only 500 will become mature eggs (Crooks & Baur, 2007). Beginning at puberty, one ovum ripens and is released about every 28 days during the menstrual cycle. Stress and higher percentage of body fat can bring menstruation at younger ages.

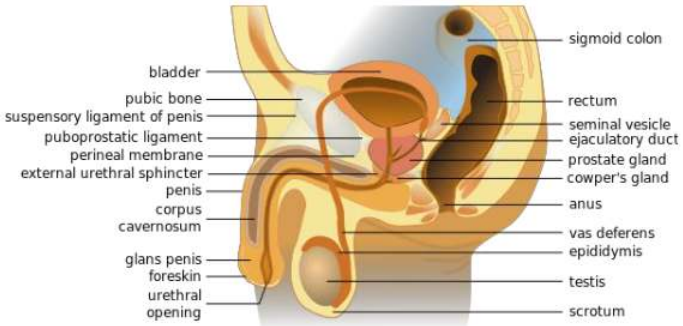

Figure 6.1: Male reproductive system. Source.

Male Anatomy: Males have both internal and external genitalia that are responsible for procreation and sexual intercourse. Males produce their sperm on a cycle, and unlike the female's ovulation cycle, the male sperm production cycle is constantly producing

millions of sperm daily. The main male sex organs are the penis and the testicles, the latter of which produce semen and sperm. The semen and sperm, as a result of sexual intercourse, can fertilize an ovum in the female's body; the fertilized ovum (zygote) develops into a fetus which is later born as a child.

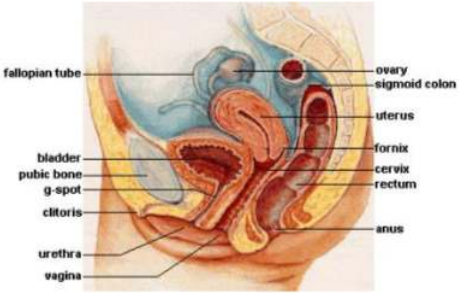

Figure 6.2: Female reproductive system. Source.

Female Anatomy: Female external genitalia is collectively known as the vulva, which includes the mons veneris, labia majora, labia minora, clitoris, vaginal opening, and urethral opening. Female internal reproductive organs consist of the vagina, uterus, fallopian tubes, and ovaries. The uterus hosts the developing fetus, produces vaginal and uterine secretions, and passes the male's sperm through to the fallopian tubes while the ovaries release the eggs. A female is born with all her eggs already produced. The vagina is attached to the uterus through the cervix, while the uterus is attached to the ovaries via the fallopian tubes. Females have a monthly reproductive cycle; at certain intervals the ovaries release an egg, which passes through the fallopian tube into the uterus. If, in this transit, it meets with sperm, the sperm might penetrate and merge with the egg, fertilizing it. If not fertilized, the egg is flushed out of the system through menstruation.

Figure 6.3: First time shaving. Source.

Secondary sexual characteristics *are visible physical changes not directly linked to reproduction, but signal sexual maturity*. For males this includes broader shoulders and a lower voice as the larynx grows. Hair becomes coarser and darker, and hair growth occurs in the pubic area, under the arms and on the face. For females breast development occurs around age 10, although full development takes several years. Hips broaden and pubic and underarm hair develops and also becomes darker and coarser.

Acne: An unpleasant consequence of the hormonal changes in puberty is **acne**, defined *as pimples on the skin due to overactive sebaceous (oil-producing) glands* (Dolgin, 2011). These glands develop at a greater speed than the skin ducts that discharges the oil. Consequently, the ducts can become blocked with dead skin and acne will develop. According to the University of California at Los Angeles Medical Center (2000), approximately 85% of adolescents develop acne, and boys develop acne more than girls because of greater levels of testosterone in their systems (Dolgin, 2011). Experiencing acne can lead the adolescent to withdraw socially, especially if they are self-conscious about their skin or teased (Goodman, 2006).

Effects of Pubertal Age: The age of puberty is getting younger for children throughout the world. According to Euling et al. (2008) data are sufficient to suggest a trend toward an earlier breast development onset and menarche in girls. A century ago the average age of a girl’s first period in the United States and Europe was 16, while today it is around 13. Because there is no clear marker of puberty for boys, it is harder to determine if boys are maturing earlier too. In addition to better nutrition, less positive reasons associated with early puberty for girls include increased stress, obesity, and endocrine disrupting chemicals.

Cultural differences are noted with Asian-American girls, on average, developing last, while African American girls enter puberty the earliest. Hispanic girls start puberty the second earliest, while European-American girls rank third in their age of starting puberty. Although African- American girls are typically the first to develop, they are less likely to experience negative consequences of early puberty when compared to European-American girls (Weir, 2016).

Research has demonstrated mental health problems linked to children who begin puberty earlier than their peers. For girls early puberty is associated with depression, substance use, eating disorders, disruptive behavior disorders, and early sexual behavior (Graber, 2013). Early maturing girls demonstrate more anxiety and less confidence in their relationships with family and friends, and they compare themselves more negatively to their peers (Weir, 2016).

Problems with early puberty seem to be due to the mismatch between the child's appearance and the way she acts and thinks. Adults especially may assume the child is more capable than she actually is, and parents might grant more freedom than the child's age would indicate. For girls, the emphasis on physical attractiveness and sexuality is emphasized at puberty and they may lack effective coping strategies to deal with the attention they may receive.

Figure 6.4. Source.

Additionally, mental health problems are more likely to occur when the child is among the first in his or her peer group to develop. Because the preadolescent time is one of not wanting to appear different, early developing children stand out among their peer group and gravitate toward those who are older. For girls, this results in them interacting with older peers who engage in risky behaviors such as substance use and early sexual behavior (Weir, 2016).

Boys also see changes in their emotional functioning at puberty. According to Mendle, Harden, Brooks-Gunn, and Graber (2010), while most boys experienced a decrease in depressive symptoms during puberty, boys who began puberty earlier and exhibited a rapid tempo, or a fast rate of change, actually increased in depressive symptoms. The effects of pubertal tempo were stronger than those of pubertal timing, suggesting that rapid pubertal change in boys may be a more important risk factor than the timing of development. In a further study to better analyze the reasons for this change, Mendle, Harden, Brooks-Gunn and Graber (2012) found that both early maturing boys and rapidly maturing boys displayed decrements in the quality of their peer relationships as they moved into early adolescence, whereas boys with more typical timing and tempo development actually experienced improvements in peer relationships. The researchers concluded that the transition in peer relationships may be especially challenging for boys whose pattern of pubertal maturation differs significantly from those of others their age. Consequences for boys attaining early puberty was increased odds of cigarette, alcohol, or other drug use (Dudovitz, et al., 2015).

Figure 6.5. Source.

Gender Role Intensification: At about the same time that puberty accentuates gender, role differences also accentuate for at least some teenagers. Some girls who excelled at math or science in elementary school, may curb their enthusiasm and displays of success at these subjects for fear of limiting their popularity or attractiveness as girls (Taylor, Gilligan, & Sullivan, 1995; Sadker, 2004). Some boys who were not especially interested in sports previously may begin dedicating themselves to athletics to affirm their masculinity in the eyes of others. Some boys and girls who once worked together successfully on class projects may no longer feel comfortable doing so, or alternatively may now seek to be working partners, but for social rather than academic reasons. Such changes do not affect all youngsters equally, nor affect any one youngster equally on all occasions. An individual student may act like a young adult on one day, but more like a child the next.

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4.8: Adolescent Brain

The brain undergoes dramatic changes during adolescence. Although it does not get larger, it matures by becoming more interconnected and specialized (Giedd, 2015). The myelination and development of connections between neurons continues. This results in an increase in the white matter of the brain, and allows the adolescent to make significant improvements in their thinking and processing skills. Different brain areas become myelinated at different times. For example, the brain's language areas undergo myelination during the first 13 years. Completed insulation of the axons consolidates these language skills, but makes it more difficult to learn a second language. With greater myelination, however, comes diminished plasticity as a myelin coating inhibits the growth of new connections (Dobbs, 2012).

Even as the connections between neurons are strengthened, synaptic pruning occurs more than during childhood as the brain adapts to changes in the environment. This synaptic pruning causes the gray matter of the brain, or the cortex, to become thinner but more efficient (Dobbs, 2012). The corpus callosum, which connects the two hemispheres, continues to thicken allowing for stronger connections between brain areas. Additionally, the hippocampus becomes more strongly connected to the frontal lobes, allowing for greater integration of memory and experiences into our decision making.

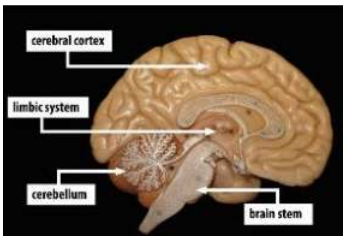

Figure 6.6: The limbic system.

The **limbic system**, *which regulates emotion and reward*, is linked to the hormonal changes that occur at puberty. The limbic system is also related to novelty seeking and a shift toward interacting with peers. In contrast, the **prefrontal cortex** *which is involved in the control of impulses, organization, planning, and making good decisions*, does not fully develop until the mid-20s. According to Giedd (2015) the significant aspect of the later developing prefrontal cortex and early development of the limbic system is the "mismatch" in timing between the two. The approximately ten years that separates the development of these two brain areas can result in risky behavior, poor decision making, and weak emotional control for the adolescent. When puberty begins earlier, this mismatch extends even further.

Teens often take more risks than adults and according to research it is because they weigh risks and rewards differently than adults do (Dobbs, 2012). For adolescents the brain's sensitivity to the neurotransmitter dopamine peaks, and **dopamine** *is involved in reward circuits* so the possible rewards outweighs the risks. Adolescents respond especially strongly to social rewards during activities, and they prefer the company of others their same age. In addition to dopamine, the adolescent brain is affected by **oxytocin** *which facilitates bonding and makes social connections more rewarding*. With both dopamine and oxytocin engaged, it is no wonder that adolescents seek peers and excitement in their lives that could end up actually harming them.

Because of all the changes that occur in the adolescent brain, the chances for abnormal development can occur, including mental illness. In fact, 50% of the mental illness occurs by the age 14 and 75% occurs by age 24 (Giedd, 2015). Additionally, during this period of development the adolescent brain is especially vulnerable to damage from drug exposure. For example, repeated exposure to marijuana can affect cellular activity in the endocannabinoid system. Consequently, adolescents are more sensitive to the effects of repeated marijuana exposure (Weir, 2015).

However, researchers have also focused on the highly adaptive qualities of the adolescent brain which allow the adolescent to move away from the family towards the outside world (Dobbs, 2012; Giedd, 2015). Novelty seeking and risk taking can generate positive outcomes including meeting new people and seeking out new situations. Separating from the family and moving into new relationships and different experiences are actually quite adaptive for society.

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4.9: Adolescent Sexual Activity

By about age ten or eleven, most children experience increased sexual attraction to others that affects social life, both in school and out (McClintock & Herdt, 1996). By the end of high school, more than half of boys and girls report having experienced sexual intercourse at least once, though it is hard to be certain of the proportion because of the sensitivity and privacy of the information. (Center for Disease Control, 2004; Rosenbaum, 2006).

Adolescent Pregnancy: Although adolescent pregnancy rates have declined since 1991, teenage birth rates in the United States are higher than most developed countries.

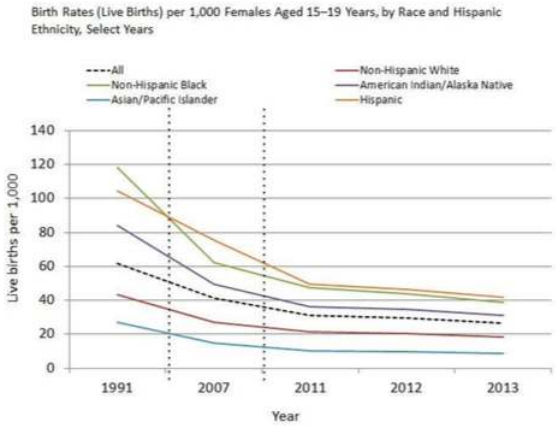

Figure 6.8. Source.

In 2014 females aged 15–19 years experienced a birth rate of 24.2 per 1,000 women. This is a drop of 9% from 2013. Birth rates fell 11% for those aged 15–17 years and 7% for 18–19 year-olds. It appears that adolescents seem to be less sexually active than in previous years, and those who are sexually active seem to be using birth control (CDC, 2016). Figure 6.8 shows the birth rates (live births) per 1,000 females aged 15–19 years for all races and Hispanic ethnicity in the United States, 1991, 2007, 2011, 2012, & 2013.

Risk Factors for Adolescent Pregnancy: Miller, Benson, and Galbraith (2001) found that parent/child closeness, parental supervision, and parents' values against teen intercourse (or unprotected intercourse) decreased the risk of adolescent pregnancy. In contrast, residing in disorganized/dangerous neighborhoods, living in a lower SES family, living with a single parent, having older sexually active siblings or pregnant/parenting teenage sisters, early puberty, and being a victim of sexual abuse place adolescents at an increased risk of adolescent pregnancy.

Consequences of Adolescent Pregnancy: After the child is born life can be difficult for a teenage mother. Only 40% of teenagers who have children before age 18 graduate from high school. Without a high school degree her job prospects are limited and economic independence is difficult. Teen mothers are more likely to live in poverty, and more than 75% of all unmarried teen mother receive public assistance within 5 years of the birth of their first child. Approximately, 64% of children born to an unmarried teenage high-school dropout live in poverty. Further, a child born to a teenage mother is 50% more likely to repeat a grade in school and is more likely to perform poorly on standardized tests and drop out before finishing high school (March of Dimes, 2012).

Research analyzing the age that men father their first child and how far they complete their education have been summarized by the Pew Research Center (2015) and reflect the research for females. Among dads ages 22 to 44, 70% of those with less than a high school diploma say they fathered their first child before the age of 25. In comparison, less than half (45%) of fathers with some college experience became dads by that age. Additionally, becoming a young father occurs much less for those with a bachelor's degree or higher as just 14% had their first child prior to age 25. Like men, women with more education are likely to be older when they become mothers.

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CHAPTER OVERVIEW

5: Cognitive Development

5.1: Piaget and the Sensorimotor Stage
5.2: Infant Memory
5.3: Cognitive Development in Early Childhood
5.4: Vygotsky’s Sociocultural Theory of Cognitive Development
5.5: Information Processing
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5.1: Piaget and the Sensorimotor Stage

Learning Objectives: Cognitive Development in Infancy and Toddlerhood

- Compare the Piagetian concepts of schema, assimilation, and accommodation
- List and describe the six substages of sensorimotor intelligence
- Describe the characteristics of infant memory
- Describe components and developmental progression of language
- Identify and compare the theories of language

Schema, Assimilation and Accommodation

Piaget believed that we are continuously trying to maintain cognitive equilibrium, or a balance, in what we see and what we know (Piaget, 1954). Children have much more of a challenge in maintaining this balance because they are constantly being confronted with new situations, new words, new objects, etc. All this new information needs to be organized, and *a framework for organizing information is referred to as a* **Schema.** Children develop schemata through the processes of assimilation and accommodation.

When faced with something new, a child may demonstrate **Assimilation,** *which is fitting the new information into an existing schema*, such as calling all animals with four legs "doggies" because he or she knows the word doggie. Instead of assimilating the information, the child may demonstrate **Accommodation**, *which is expanding the framework of knowledge to accommodate the new situation* and thus learning a new word to more accurately name the animal. For example, recognizing that a horse is different than a zebra means the child has accommodated, and now the child has both a zebra schema and a horse schema. Even as adults we continue to try and "make sense" of new situations by determining whether they fit into our old way of thinking (assimilation) or whether we need to modify our thoughts (accommodation).

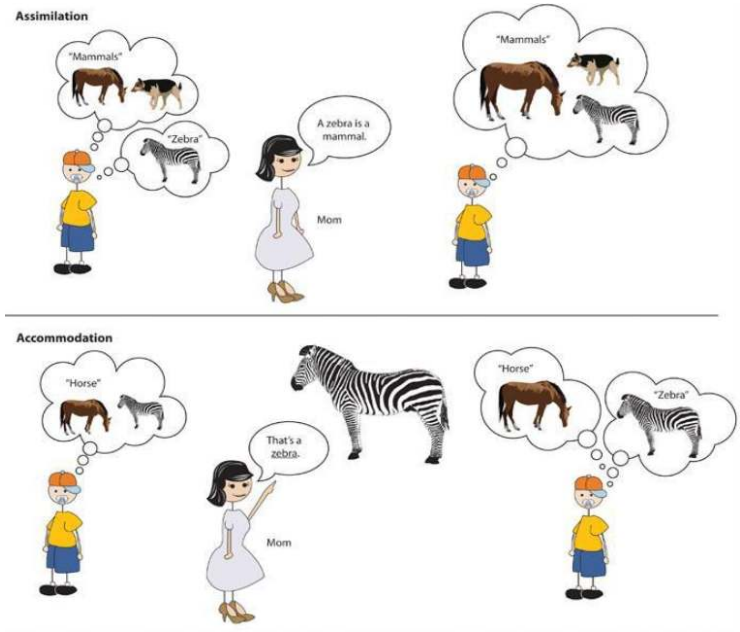

Figure 3.13: assimilation and accommodation. Source.

According to the Piagetian perspective, infants learn about the world primarily through their senses and motor abilities (Harris, 2005). These basic motor and sensory abilities provide the foundation for the cognitive skills that will emerge during the subsequent stages of cognitive development. *The first stage of cognitive development is referred to as the* **Sensorimotor Period** and it occurs through six substages. Table 3.2 identifies the ages typically associated with each substage.

Table 3.2 Infant Ages for the Six Substages of the Sensorimotor Period

Substage 1	Reflexes (0-1 month)
Substage 2	Primary Circular Reactions (1-4 months)

Substage 1	Reflexes (0-1 month)
Substage 3	Secondary Circular Reactions (4-8 months)
Substage 4	Coordination of Secondary Circular Reactions (8-12 months)
Substage 5	Tertiary Circular Reactions (12-18 months)
Substage 6	Beginning of Representational Thought (18-24 months)

Substage 1: Reflexes. Newborns learn about their world through the use of their reflexes, such as when sucking, reaching, and grasping. Eventually the use of these reflexes becomes more deliberate and purposeful.

Substage 2: Primary Circular Reactions. During these next 3 months, the infant begins to actively involve his or her own body in some form of repeated activity. An infant may accidentally engage in a behavior and find it interesting such as making a vocalization. This interest motivates trying to do it again and helps the infant learn a new behavior that originally occurred by chance. The behavior is identified as circular and primary because it centers on the infant's own body.

Substage 3: Secondary Circular Reactions. The infant begins to interact with objects in the environment. At first the infant interacts with objects (e.g., a crib mobile) accidentally, but then these contacts with the objects are deliberate and become a repeated activity. The infant becomes more and more actively engaged in the outside world and takes delight in being able to make things happen. Repeated motion brings particular interest as, for example, the infant is able to bang two lids together from the cupboard when seated on the kitchen floor.

Figure 3.14. Source.

Substage 4: Coordination of Secondary Circular Reactions. The infant combines these basic reflexes and uses planning and coordination to achieve a specific goal. Now the infant can engage in behaviors that others perform and anticipate upcoming events. Perhaps because of continued maturation of the prefrontal cortex, the infant become capable of having a thought and carrying out a planned, goal-directed activity. For example, an infant sees a toy car under the kitchen table and then crawls, reaches, and grabs the toy. The infant is coordinating both internal and external activities to achieve a planned goal.

Substage 5: Tertiary Circular Reactions. The toddler is considered a “little scientist” and begins exploring the world in a trial-and-error manner, using both motor skills and planning abilities. For example, the child might throw her ball down the stairs to see what happens. The toddler’s active engagement in experimentation helps them learn about their world.

Substage 6: Beginning of Representational Thought. The sensorimotor period ends with the appearance of symbolic or representational thought. The toddler now has a basic understanding that objects can be used as symbols. Additionally, the child is able to solve problems using mental strategies, to remember something heard days before and repeat it, and to engage in pretend play. This initial movement from a “hands-on” approach to knowing about the world to the more mental world of substage six marks the transition to preoperational thought.

Figure 3.15. Source.

Development of Object Permanence

A critical milestone during the sensorimotor period is the development of object permanence. **Object permanence** *is the understanding that even if something is out of sight, it still exists* (Bogartz, Shinskey, & Schilling, 2000). According to Piaget, young infants do not remember an object after it has been removed from sight. Piaget studied infants' reactions when a toy was first shown to an infant and then hidden under a blanket. Infants who had already developed object permanence would reach for the hidden toy, indicating that they knew it still existed, whereas infants who had not developed object permanence would appear confused. Piaget emphasizes this construct because it was an objective way for children to demonstrate that they can mentally represent their world. Children have typically acquired this milestone by 8 months. Once toddlers have mastered **object permanence,** they enjoy games like hide and seek, and they realize that when someone leaves the room they will come back. Toddlers also point to pictures in books and look in appropriate places when you ask them to find objects.

In Piaget's view, around the same time children develop object permanence, they also begin to exhibit **Stranger Anxiety**, *which is a fear of unfamiliar people* (Crain, 2005). Babies may demonstrate this by crying and turning away from a stranger, by clinging to a caregiver, or by attempting to reach their arms toward familiar faces such as parents. Stranger anxiety results when a child is unable to assimilate the stranger into an existing schema; therefore, she can't predict what her experience with that stranger will be like, which results in a fear response.

Critique of Piaget: Piaget thought that children's ability to understand objects, such as learning that a rattle makes a noise when shaken, was a cognitive skill that develops slowly as a child matures and interacts with the environment. Today, developmental psychologists think Piaget was incorrect. Researchers have found that even very young children understand objects and how they work long before they have experience with those objects (Baillargeon, 1987; Baillargeon, Li, Gertner, & Wu, 2011). For example, Piaget believed that infants did not fully master object permanence until substage 5 of the sensorimotor period (Thomas, 1979). However, infants seem to be able to recognize that objects have permanence at much younger ages. Diamond (1985) found that infants show earlier knowledge if the waiting period is shorter. At age 6 months, they retrieved the hidden object if their wait for retrieving the object is no longer than 2 seconds, and at 7 months if the wait is no longer than 4 seconds.

Even earlier, children as young as 3 months old demonstrated knowledge of the properties of objects that they had only viewed and did not have prior experience with them. In one study, 3-month-old infants were shown a truck rolling down a track and behind a screen. The box, which appeared solid but was actually hollow, was placed next to the track. The truck rolled past the box as would be expected. Then the box was placed on the track to block the path of the truck. When the truck was rolled down the track this time, it continued unimpeded. The infants spent significantly more time looking at this impossible event (Figure 3.16). Baillargeon (1987) concluded that they knew solid objects cannot pass through each other. Baillargeon's findings suggest that very young children have an understanding of objects and how they work, which Piaget (1954) would have said is beyond their cognitive abilities due to their limited experiences in the world.

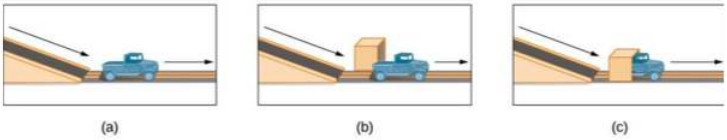

Figure 3.16 In Baillargeon's (1987) study,infants observed a truck (a) roll down an unobstructed track, (b) roll down an unobstructed track with an obstruction (box) beside it, and (c) roll down and pass through what appeared to be an obstruction.

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5.2: Infant Memory

Memory requires a certain degree of brain maturation, so it should not be surprising that infant memory is rather fleeting and fragile. As a result, older children and adults experience **infantile amnesia**, *the inability to recall memories from the first few years of life*. Several hypotheses have been proposed for this amnesia. From the biological perspective, it has been suggested that infantile amnesia is due to the immaturity of the infant brain, especially those areas that are crucial to the formation of autobiographical memory, such as the hippocampus. From the cognitive perspective, it has been suggested that the lack of linguistic skills of babies and toddlers limit their ability to mentally represent events; thereby, reducing their ability to encode memory. Moreover, even if infants do form such early memories, older children and adults may not be able to access them because they may be employing very different, more linguistically based, retrieval cues than infants used when forming the memory. Finally, social theorists argue that episodic memories of personal experiences may hinge on an understanding of "self", something that is clearly lacking in infants and young toddlers.

However, in a series of clever studies Carolyn Rovee-Collier and her colleagues have demonstrated that infants can remember events from their life, even if these memories are short- lived. Three-month-old infants were taught that they could make a mobile hung over their crib shake by kicking their legs. The infants were placed in their crib, on their backs. A ribbon was tied to one foot and the other end to a mobile. At first infants made random movements, but then came to realize that by kicking they could make the mobile shake. After two 9 minute sessions with the mobile, the mobile was removed. One week later the mobile was reintroduced to one group of infants and most of the babies immediately started kicking their legs, indicating that they remembered their prior experience with the mobile. A second group of infants was shown the mobile two weeks later and the babies made only random movements. The memory had faded (Rovee-Collier, 1987; Giles & Rovee-Collier, 2011). Rovee-Collier and Hayne (1987) found that 3-month-olds could remember the mobile after two weeks if they were shown the mobile and watched it move, even though they were not tied to it. This reminder helped most infants to remember the connection between their kicking and the movement of the mobile. Like many researchers of infant memory, Rovee-Collier (1990) found infant memory to be very context dependent. In other words, the sessions with the mobile and the later retrieval sessions had to be conducted under very similar circumstances or else the babies would not remember their prior experiences with the mobile. For instance, if the first mobile had had yellow blocks with blue letters, but at the later retrieval session the blocks were blue with yellow letters, the babies would not kick.

Infants older than 6 months of age can retain information for longer periods of time; they also need less reminding to retrieve information in memory. Studies of **Deferred Imitation**, that is, *the imitation of actions after a time delay*, can occur as early as six-months of age (Campanella & Rovee-Collier, 2005), but only if infants are allowed to practice the behavior they were shown. By 12 months of age, infants no longer need to practice the behavior in order to retain the memory for four weeks (Klein & Meltzoff, 1999).

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5.3: Cognitive Development in Early Childhood

Learning Objectives: Cognitive Development in Early Childhood

- Describe Piaget's preoperational stage and the characteristics of preoperational thought
- Summarize the challenges to Piaget's theory
- Describe Vygotsky's theory of cognitive development
- Describe Information processing research on attention and memory
- Describe the views of the neo-Piagetians
- Describe theory-theory and the development of theory of mind
- Describe the developmental changes in language
- Describe the various types of early childhood education
- Describe the characteristics of autis

Early childhood is a time of pretending, blending fact and fiction, and learning to think of the world using language. As young children move away from needing to touch, feel, and hear about the world, they begin learning basic principles about how the world works. Concepts such as tomorrow, time, size, distance and fact vs. fiction are not easy to grasp at this age, but these tasks are all part of cognitive development during early childhood.

Piaget's Preoperational Stage of Cognitive Development

Piaget's stage that coincides with early childhood is the **Preoperational Stage**. According to Piaget, this stage occurs from the age of 2 to 7 years. In the preoperational stage, *children use symbols to represent words, images, and ideas*, which is why children in this stage engage in pretend play. A child's arms might become airplane wings as she zooms around the room, or a child with a stick might become a brave knight with a sword. Children also begin to use language in the preoperational stage, but they cannot understand adult logic or mentally manipulate information. The term **Operational** *refers to logical manipulation of information*, so children at this stage are considered *pre*-operational. Children's logic is based on their own personal knowledge of the world so far, rather than on conventional knowledge.

The preoperational period is divided into two stages: The **Symbolic Function Substage** occurs between 2 and 4 years of age and *is characterized by the child being able to mentally represent an object that is not present and a dependence on perception in problem solving*. The **Intuitive Thought Substage,** lasting from 4 to 7 years, *is marked by greater dependence on intuitive thinking rather than just perception* (Thomas, 1979). At this stage, children ask many questions as they attempt to understand the world around them using immature reasoning. Let's examine some of Piaget's assertions about children's cognitive abilities at this age.

Figure 4.8. Source.

Pretend Play: Pretending is a favorite activity at this time. A toy has qualities beyond the way it was designed to function and can now be used to stand for a character or object unlike anything originally intended. A teddy bear, for example, can be a baby or the queen of a faraway land. Piaget believed that children's pretend play helped children solidify new schemata they were developing cognitively. This play, then, reflected changes in their conceptions or thoughts. However, children also learn as they pretend and experiment. Their play does not simply represent what they have learned (Berk, 2007).

Egocentrism: Egocentrism in early childhood *refers to the tendency of young children not to be able to take the perspective of others, and instead the child thinks that everyone sees, thinks, and feels just as they do*. An egocentric child is not able to infer the perspective of other people and instead attributes his own perspective to situations. For example, ten year-old Keiko's birthday is coming up, so her mom takes 3 year-old Kenny to the toy store to choose a present for his sister. He selects an Iron Man action figure for her, thinking that if he likes the toy, his sister will too.

Piaget's classic experiment on egocentrism involved showing children a three dimensional model of a mountain and asking them to describe what a doll that is looking at the mountain from a different angle might see (see Figure 4.9).

Figure 4.9: "What does Dolly see?" Source.

Children tend to choose a picture that represents their own, rather than the doll's view. By age 7 children are less self-centered. However, even younger children when speaking to others tend to use different sentence structures and vocabulary when addressing a younger child or an older adult. This indicates some awareness of the views of others.

Conservation Errors: Conservation *refers to the ability to recognize that moving or rearranging matter does not change the quantity.* Let's look at Kenny and Keiko again. Dad gave a slice of pizza to 10-year-old Keiko and another slice to 3-year-old Kenny. Kenny's pizza slice was cut into five pieces, so Kenny told his sister that he got more pizza than she did. Kenny did not understand that cutting the pizza into smaller pieces did not increase the overall amount. This was because Kenny exhibited **Centration,** or *focused on only one characteristic of an object to the exclusion of others.* Kenny focused on the five pieces of pizza to his sister's one piece even though the total amount was the same. Keiko was able to consider several characteristics of an object than just one. Because children have not developed this understanding of conservation, they cannot perform mental operations.

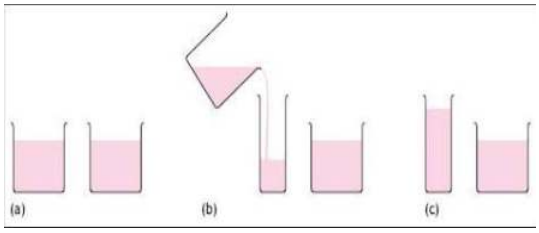

Figure 4.10 Conservation of Liquid. Does pouring liquid in a tall, narrow container make it have more?

The classic Piagetian experiment associated with conservation involves liquid (Crain, 2005). As seen in Figure 4.10, the child is shown two glasses (as shown in a) which are filled to the same level and asked if they have the same amount. Usually the child agrees they have the same amount. The experimenter then pours the liquid in one glass to a taller and thinner glass (as shown in b). The child is again asked if the two glasses have the same amount of liquid. The preoperational child will typically say the taller glass now has more liquid because it is taller (as shown in c). The child has concentrated on the height of the glass and fails to conserve.

Classification Errors: Preoperational children have difficulty understanding that an object can be classified in more than one way. For example, if shown three white buttons and four black buttons and asked whether there are more black buttons or buttons, the child is likely to respond that there are more black buttons. They do not consider the general class of buttons. Because children lack these general classes, their reasoning is typically **Transductive**, that is, *making faulty inferences from one specific example to another.* For example, Piaget's daughter Lucienne stated she had not had her nap, therefore it was not afternoon. She did not understand that afternoons are a time period and her nap was just one of many event that occurred in the afternoon (Crain, 2005). As the child's vocabulary improves and more schemata are developed, the ability to classify objects improves.

Animism: Animism *refers to attributing life-like qualities to objects*. The cup is alive, the chair that falls down and hits the child's ankle is mean, and the toys need to stay home because they are tired. Cartoons frequently show objects that appear alive and take on lifelike qualities. Young children do seem to think that objects that move may be alive, but after age three, they seldom refer to objects as being alive (Berk, 2007).

Critique of Piaget: Similar to the critique of the sensorimotor period, several psychologists have attempted to show that Piaget also underestimated the intellectual capabilities of the reoperational child. For example, children's specific experiences can influence when they are able to conserve. Children of pottery makers in Mexican villages know that reshaping clay does not change the amount of clay at much younger ages than children who do not have similar experiences (Price-Williams, Gordon, & Ramirez, 1969). Crain (2005) indicated that preoperational children can think rationally on mathematical and scientific tasks, and they are not as egocentric as Piaget implied. Research on Theory of Mind (discussed later in the chapter) has demonstrated that children overcome egocentrism by 4 or 5 years of age, which is sooner than Piaget indicated.

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5.4: Vygotsky's Sociocultural Theory of Cognitive Development

Lev Vygotsky (1896-1934) was a Russian psychologist who argued that culture has a major impact on a child's cognitive development. Piaget and Gesell believed development stemmed directly from the child, and although Vygotsky acknowledged intrinsic development, he argued that it is the language, writings, and concepts arising from the culture that elicit the highest level of cognitive thinking (Crain, 2005). He believed that the social interactions with adults and more learned peers can facilitate a child's potential for learning. Without this interpersonal instruction, he believed children's minds would not advance very far as their knowledge would be based only on their own discoveries. Let's review some of Vygotsky's key concepts.

Figure 4.11: Lev Vygotsky. Source.

Zone of Proximal Development and Scaffolding: Vygotsky's best known concept is the **Zone of Proximal Development (ZPD).** Vygotsky stated that children should be taught in the ZPD, *which occurs when they can almost perform a task, but not quite on their own without assistance.* With the right kind of teaching, however, they can accomplish it successfully. A good teacher identifies a child's ZPD and helps the child stretch beyond it. Then the adult (teacher) gradually withdraws support until the child can then perform the task unaided. Researchers have applied the metaphor of scaffolds (the temporary platforms on which construction workers stand) to this way of teaching. **Scaffolding** *is the temporary support that parents or teachers give a child to do a task.*

Private Speech: Do you ever talk to yourself? Why? Chances are, this occurs when you are struggling with a problem, trying to remember something, or feel very emotional about a situation. Children talk to themselves too. Piaget interpreted this as **Egocentric Speech** *or a practice engaged in because of a child's inability to see things from another's point of view.* Vygotsky, however, believed that children talk to themselves in order to solve problems or clarify thoughts. As children learn to think in words, they do so aloud before eventually closing their lips and engaging in **Private Speech** *or inner speech.*

Thinking out loud eventually becomes thought accompanied by internal speech, and talking to oneself becomes a practice only engaged in when we are trying to learn something or remember something. This inner speech is not as elaborate as the speech we use when communicating with others (Vygotsky, 1962).

Figure 4.12: Children talk to themselves to better problem solve. Source.

Contrast with Piaget: Piaget was highly critical of teacher-directed instruction believing that teachers who take control of the child's learning place the child into a passive role (Crain, 2005). Further, teachers may present abstract ideas without the child's true understanding, and instead they just repeat back what they heard. Piaget believed children must be given opportunities to discover concepts on their own. As previously stated, Vygotsky did not believe children could reach a higher cognitive level without instruction from more learned individuals. Who is correct? Both theories certainly contribute to our understanding of how children learn.

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5.5: Information Processing

Information processing researchers have focused on several issues in cognitive development for this age group, including improvements in attention skills, changes in the capacity and the emergence of executive functions in working memory. Additionally, in early childhood memory strategies, memory accuracy, and autobiographical memory emerge. Early childhood is seen by many researchers as a crucial time period in memory development (Posner & Rothbart, 2007).

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5.6: Attention

Changes in attention have been described by many as the key to changes in human memory (Nelson & Fivush, 2004; Posner & Rothbart, 2007). However, attention is not a unified function; it is comprised of sub-processes. *The ability to switch our focus between tasks or external stimuli* is called **divided attention** or **multitasking.** This is separate from *our ability to focus on a single task or stimulus, while ignoring distracting information*, called **selective attention**. Different from these is **sustained attention**, or *the ability to stay on task for long periods of time*. Moreover, we also have attention processes that influence our behavior and enable us to inhibit a habitual or dominant response, and others that enable us to distract ourselves when upset or frustrated.

Figure 4.13 These children will experience difficulty focusing on anything except playing. Source.

Divided Attention: Young children (age 3-4) have considerable difficulties in dividing their attention between two tasks, and often perform at levels equivalent to our closest relative, the chimpanzee, but by age five they have surpassed the chimp (Hermann, Misch, Hernandez-Lloreda & Tomasello, 2015; Hermann & Tomasello, 2015). Despite these improvements, 5-year-olds continue to perform below the level of school-age children, adolescents, and adults.

Selective Attention: Children's ability with selective attention tasks improve as they age. However, this ability is also greatly influenced by the child's temperament (Rothbart & Rueda, 2005), the complexity of the stimulus or task (Porporino, Shore, Iarocci & Burack, 2004), and along with whether the stimuli are visual or auditory (Guy, Rogers & Cornish, 2013). Guy et al. (2013) found that children's ability to selectively attend to visual information outpaced that of auditory stimuli. This may explain why young children are not able to hear the voice of the teacher over the cacophony of sounds in the typical preschool classroom (Jones, Moore & Amitay, 2015). Jones and his colleagues found that 4 to 7 year-olds could not filter out background noise, especially when its frequencies were close in sound to the target sound. In comparison, 8 to 11 year-old older children often performed similar to adults.

Sustained Attention: Most measures of sustained attention typically ask children to spend several minutes focusing on one task, while waiting for an infrequent event, while there are multiple distractors for several minutes. Berwid, Curko-Kera, Marks & Halperin (2005) asked children between the ages of 3 and 7 to push a button whenever a "target" image was displayed, but they had to refrain from pushing the button when a non-target image was shown. The younger the child, the more difficulty he or she had maintaining their attention.

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5.7: Memory

Based on studies of adults, people with amnesia, and neurological research on memory, researchers have proposed several “types” of memory (see Figure 4.14). **Sensory memory** (also called the *sensory register*) is *the first stage of the memory system, and it stores sensory input in its raw form for a very brief duration; essentially long enough for the brain to register and start processing the information*. Studies of auditory sensory memory have found that the sensory memory trace for the characteristics of a tone last about one second in 2 year-olds, two seconds in 3-year-olds, more than two seconds in 4-year-olds and three to five seconds in 6-year-olds (Glass, Sachse, & vob Suchodoletz, 2008). Other researchers have found that young children hold sounds for a shorter duration than do older children and adults, and that this deficit is not due to attentional differences between these age groups, but reflect differences in the performance of the sensory memory system (Gomes et al., 1999).

The second stage of the memory system is called *short-term* or **working memory**. Working memory is *the component of memory in which current conscious mental activity occurs*. Working memory often requires conscious effort and adequate use of attention to function effectively. As you read earlier, children in this age group struggle with many aspects of attention and this greatly diminishes their ability to consciously juggle several pieces of information in memory. The capacity of working memory, that is the amount of information someone can hold in consciousness, is smaller in young children than in older children and adults. The typical adult and teenager can hold a 7 digit number active in their short-term memory. The typical 5 year-old can hold only a 4 digit number active. This means that the more complex a mental task is, the less efficient a younger child will be in paying attention to, and actively processing, information in order to complete the task.

Changes in attention and the working memory system also involve changes in executive function. **Executive function (EF)** *refers to self-regulatory processes*, such as the ability to inhibit a behavior or cognitive flexibility, *that enable adaptive responses to new situations or to reach a specific goal*. Executive function skills gradually emerge during early childhood and continue to develop throughout childhood and adolescence. Like many cognitive changes, brain maturation, especially the prefrontal cortex, along with experience influence the development of executive function skills. A child, whose parents are more warm and responsive, use scaffolding when the child is trying to solve a problem, and who provide cognitively stimulating environments for the child show higher executive function skills (Fay-Stammbach, Hawes & Meredith, 2014). For instance, scaffolding was positively correlated with greater cognitive flexibility at age two and inhibitory control at age four (Bibok, Carpendale & Müller, 2009).

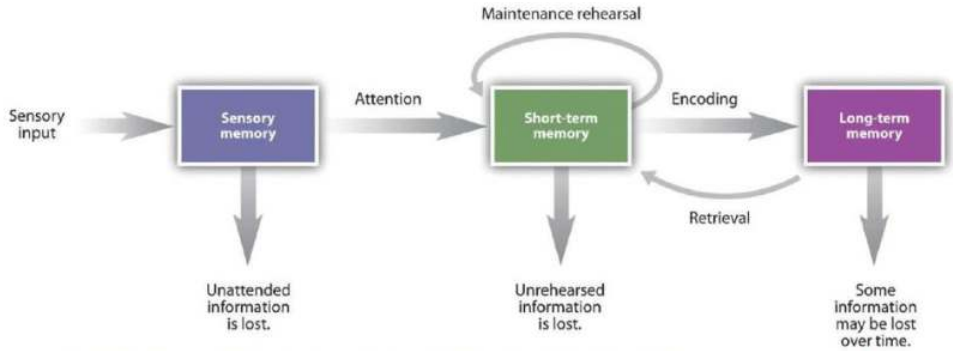

Figure 4.14. Memory can be characterized in terms of stages--the length of time that information remains available to us. Source: adapted from Atkinson, R. C., & Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes. In K. Spence (Ed.) The psychology of learning and motivation *(Vol. 2). Oxford, England: Academic Press.*

Older children and adults use mental strategies to aid their memory performance. For instance, simple rote rehearsal may be used to commit information to memory. Young children often do not rehearse unless reminded to do so, and when they do rehearse, they often fail to use clustering rehearsal. In **clustering rehearsal,** *the person rehearses previous material while adding in additional information*. If a list of words is read out loud to you, you are likely to rehearse each word as you hear it along with any previous words you were given. Young children will repeat each word they hear, but often fail to repeat the prior words in the list. In Schneider, Kron-Sperl and Hunnerkopf’s (2009) longitudinal study of 102 kindergarten children, the majority of children used no strategy to remember information, a finding that was consistent with previous research. As a result, their memory performance was poor when compared to their abilities as they aged and started to use more effective memory strategies.

Figure 4.15 How long will these children remember their trip to Disneyland? Source.

The third component in memory is **long-term memory**, *which is also known as permanent memory.* A basic division of long-term memory is between declarative and non-declarative memory. **Declarative memories**, sometimes referred to as **explicit memories**, *are memories for facts or events that we can consciously recollect*. **Non-declarative memories**, sometimes referred to as **implicit memories**, *are typically automated skills that do not require conscious recollection*. Remembering that you have an exam next week would be an example of a declarative memory. In contrast, knowing how to walk so you can get to the classroom or how to hold a pencil to write would be examples of non-declarative memories. Declarative memory is further divided into semantic and episodic memory. **Semantic memories** *are memories for facts and knowledge that are not tied to a timeline*, while **episodic memories** *are tied to specific events in time*.

A component of episodic memory is **autobiographical memory,** *or our personal narrative*. As you may recall in Chapter 3 the concept of infantile amnesia was introduced. Adults rarely remember events from the first few years of life. In other words, we lack autobiographical memories from our experiences as an infant, toddler and very young preschooler. Several factors contribute to the emergence of autobiographical memory including brain maturation, improvements in language, opportunities to talk about experiences with parents and others, the development of theory of mind, and a representation of "self" (Nelson & Fivush, 2004). Two-year-olds do remember fragments of personal experiences, but these are rarely coherent accounts of past events (Nelson & Ross, 1980). Between 2 and 2 1⁄2 years of age children can provide more information about past experiences. However, these recollections require considerable prodding by adults (Nelson & Fivush, 2004). Over the next few years children will form more detailed autobiographical memories and engage in more reflection of the past.

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5.8: Neo-Piagetians

As previously discussed, Piaget's theory has been criticized on many fronts, and updates to reflect more current research have been provided by the **Neo-Piagetians**, *or those theorists who provide "new" interpretations of Piaget's theory*. Morra, Gobbo, Marini and Sheese (2008) reviewed Neo-Piagetian theories, which were first presented in the 1970s, and identified how these "new" theories combined Piagetian concepts with those found in Information Processing. Similar to Piaget's theory, Neo-Piagetian theories believe in constructivism, assume cognitive development can be separated into different stages with qualitatively different characteristics, and advocate that children's thinking becomes more complex in advanced stages. Unlike Piaget, Neo-Piagetians believe that aspects of information processing change the complexity of each stage, not logic as determined by Piaget.

Neo-Piagetians propose that working memory capacity is affected by biological maturation, and therefore restricts young children's ability to acquire complex thinking and reasoning skills. Increases in working memory performance and cognitive skills development coincide with the timing of several neurodevelopmental processes. These include myelination, axonal and synaptic pruning, changes in cerebral metabolism, and changes in brain activity (Morra et al., 2008). Myelination especially occurs in waves between birth and adolescence, and the degree of myelination in particular areas explains the increasing efficiency of certain skills. Therefore, brain maturation, which occurs in spurts, affects how and when cognitive skills develop. Additionally, all Neo-Piagetian theories support that experience and learning interact with biological maturation in shaping cognitive development.

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5.9: Children's Understanding of the World

Both Piaget and Vygotsky believed that children actively try to understand the world around them. More recently developmentalists have added to this understanding by examining how children organize information and develop their own theories about the world.

Figure 4.16. Source.

Theory-Theory is *the tendency of children to generate theories to explain everything they encounter*. This concept implies that humans are naturally inclined to find reasons and generate explanations for why things occur. Children frequently ask question about what they see or hear around them. When the answers provided do not satisfy their curiosity or are too complicated for them to understand, they generate their own theories. In much the same way that scientists construct and revise their theories, children do the same with their intuitions about the world as they encounter new experiences (Gopnik & Wellman, 2012). One of the theories they start to generate in early childhood centers on the mental states; both their own and those of others.

Theory of mind refers to *the ability to think about other people's thoughts*. This mental mind reading helps humans to understand and predict the reactions of others, thus playing a crucial role in social development. One common method for determining if a child has reached this mental milestone is the false belief task, described below.

The research began with a clever experiment by Wimmer and Perner (1983), who tested whether children can pass a false-belief test (see Figure 4.17).

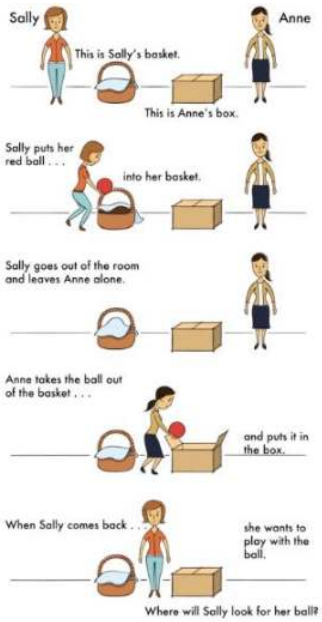

Figure 4.17. Source.

The child is shown a picture story of Sally, who puts her ball in a basket and leaves the room. While Sally is out of the room, Anne comes along and takes the ball from the basket and puts it inside a box. The child is then asked *where* Sally thinks the ball is located when she comes back to the room. Is she going to look first *in the box* or *in the basket*? The right answer is that she will look in the basket, because that's where she put it and thinks it is; but we have to infer this *false belief* against our own better knowledge that the ball is in the box. This is very difficult for children before the age of four because of the cognitive effort it

takes. Three-year-olds have difficulty distinguishing between what they once thought was true and what they now know to be true. They feel confident that what they know now is what they have always known (Birch & Bloom, 2003). Even adults need to think through this task (Epley, Morewedge, & Keysar, 2004). To be successful at solving this type of task the child must separate what he or she "knows" to be true from what someone else might "think" is true. In Piagetian terms, they must give up a tendency toward egocentrism. The child must also understand that what guides people's actions and responses are what they "believe" rather than what is reality. In other words, people can mistakenly believe things that are false and will act based on this false knowledge. Consequently, prior to age four children are rarely successful at solving such a task (Wellman, Cross & Watson, 2001).

Researchers examining the development of theory of mind have been concerned by the overemphasis on the mastery of false belief as the primary measure of whether a child has attained theory of mind. Wellman and his colleagues (Wellman, Fang, Liu, Zhu & Liu, 2006) suggest that theory of mind is comprised of a number of components, each with its own developmental timeline (see Table 4.2).

Table 4.2: Components of Theory of Mind

Component	Description
Diverse-desires	Understanding that two people may have different desires regarding the same object
Diverse-beliefs	Understanding that two people may hold different beliefs about an object
Knowledge access (knowledge/ignorance)	Understanding that people may or may not have access to information.
False belief	Understanding that someone might hold a belief based on false information.
Hidden emotion	Understanding that people may not always express their true emotions.

Two-year-olds understand the diversity of desires, yet as noted earlier it is not until age four or five that children grasp false belief, and often not until middle childhood do they understand that people may hide how they really feel. In part, because children in early childhood have difficulty hiding how they really feel.

Those in early childhood in the US, Australia, and Germany develop theory of mind in the sequence outlined above. Yet, Chinese and Iranian preschoolers acquire knowledge access before diverse beliefs (Shahaeian, Peterson, Slaughter & Wellman, 2011). Shahaeian and colleagues suggested that cultural differences in child-rearing may account for this reversal. Parents in collectivistic cultures, such as China and Iran, emphasize conformity to the family and cultural values, greater respect for elders, and the acquisition of knowledge and academic skills more than they do autonomy and social skills (Frank, Plunkett & Otten, 2010). This could reduce the degree of familial conflict of opinions expressed in the family. In contrast, individualistic cultures encourage children to think for themselves and assert their own opinion, and this could increase the risk of conflict in beliefs being expressed by family members. As a result, children in individualistic cultures would acquire insight into the question of diversity of belief earlier, while children in collectivistic cultures would acquire knowledge access earlier in the sequence. The role of conflict in aiding the development of theory of mind may account for the earlier age of onset of an understanding of false belief in children with siblings, especially older siblings (McAlister & Petersen, 2007; Perner, Ruffman & Leekman, 1994).

This awareness of the existence of theory of mind is part of social intelligence, such as recognizing that others can think differently about situations. It helps us to be self-conscious or aware that others can think of us in different ways and it helps us to be able to be understanding or be empathic toward others. Moreover, this mind reading ability helps us to anticipate and predict people's actions. The awareness of the mental states of others is important for communication and social skills.

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5.10: Cognitive Development in Middle and Late Childhood

Learning Objectives: Cognitive Development in Middle and Late Childhood

- Describe Piaget's concrete operational stage and the characteristics of concrete thought
- Describe information processing research on memory, attention, knowledge base, metacognition, and critical thinking
- Describe language development and explain the three types of communication disorders
- Describe the theories of intelligence, including general "g", triarchic theory, and Gardner's multiple intelligences
- Explain how intelligence is measured, the tests used to assess intelligence, the extremes in intelligence, and the concern of bias
- Describe how language and culture influence the typical classroom
- Identify common disabilities in childhood and the legislation that protects them educationally

Recall from the last chapter that children in early childhood are in Piaget's preoperational stage, and during this stage, children are learning to think symbolically about the world. Cognitive skills continue to expand in middle and late childhood as thought processes become more logical and organized when dealing with concrete information. Children at this age understand concepts such as past, present, and future, giving them the ability to plan and work toward goals. Additionally, they can process complex ideas such as addition and subtraction and cause-and- effect relationships.

Concrete Operational Thought

From ages 7 to 11, children are in what Piaget referred to as the **Concrete Operational Stage** of cognitive development (Crain, 2005). *This involves mastering the use of logic in concrete ways.* The word concrete refers to that which is tangible; that which can be seen, touched, or experienced directly. The concrete operational child is able to make use of logical principles in solving problems involving the physical world. For example, the child can understand principles of cause and effect, size, and distance.

The child can use logic to solve problems tied to their own direct experience, but has trouble solving hypothetical problems or considering more abstract problems. The child uses **Inductive Reasoning,** *which is a logical process in which multiple premises believed to be true are combined to obtain a specific conclusion*. For example, a child has one friend who is rude, another friend who is also rude, and the same is true for a third friend. The child may conclude that friends are rude. We will see that this way of thinking tends to change during adolescence being replaced with deductive reasoning. We will now explore some of the major abilities that the concrete child exhibits.

Classification: As children's experiences and vocabularies grow, *they build schemata and are able to organize objects in many different ways*. They also understand classification hierarchies and can arrange objects into a variety of classes and subclasses.

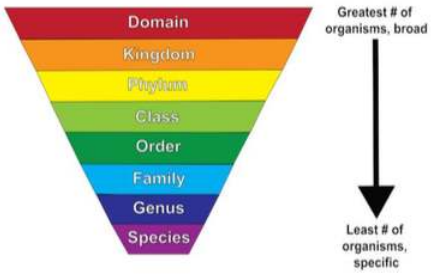

Figure 5.6: Children in the concrete operational stage understand how to classify organisms. Source.

Identity: One feature of concrete operational thought is the understanding *that objects have qualities that do not change even if the object is altered in some way*. For instance, mass of an object does not change by rearranging it. A piece of chalk is still chalk even when the piece is broken in two.

Reversibility: *The child learns that some things that have been changed can be returned to their original state.* Water can be frozen and then thawed to become liquid again. But eggs cannot be unscrambled. Arithmetic operations are reversible as well: 2 + 3 = 5 and 5 – 3 = 2. Many of these cognitive skills are incorporated into the school's curriculum through mathematical problems and in worksheets about which situations are reversible or irreversible.

Conservation: Remember the example in our last chapter of preoperational children thinking that a tall beaker filled with 8 ounces of water was "more" than a short, wide bowl filled with 8 ounces of water? Concrete operational children can understand the concept of conservation *which means that changing one quality (in this example, height or water level) can be compensated for by changes in another quality (width).* Consequently, there is the same amount of water in each container, although one is taller and narrower and the other is shorter and wider.

Decentration: Concrete operational children *no longer focus on only one dimension of any object (such as the height of the glass) and instead consider the changes in other dimensions too (such as the width of the glass).* This allows for conservation to occur.

Seriation: *Arranging items along a quantitative dimension, such as length or weight, in a methodical way* is now demonstrated by the concrete operational child. For example, they can methodically arrange a series of different-sized sticks in order by length, while younger children approach a similar task in a haphazard way.

These new cognitive skills increase the child's understanding of the physical world, however according to Piaget, they still cannot think in abstract ways. Additionally, they do not think in systematic scientific ways. For example, when asked which variables influence the period that a pendulum takes to complete its arc, and given weights they can attach to strings in order to do experiments, most children younger than 12 perform biased experiments from which no conclusions can be drawn (Inhelder & Piaget, 1958).

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5.11: Information Processing

Children differ in their memory abilities, and these differences predict both their readiness for school and academic performance in school (PreBler, Krajewski, & Hasselhorn, 2013). During middle and late childhood children make strides in several areas of cognitive function including the capacity of working memory, their ability to pay attention, and their use of memory strategies. Both changes in the brain and experience foster these abilities.

Working Memory: The capacity of working memory expands during middle and late childhood, and research has suggested that both an increase in processing speed and the ability to inhibit irrelevant information from entering memory are contributing to the greater efficiency of working memory during this age (de Ribaupierre, 2002). Changes in myelination and synaptic pruning in the cortex are likely behind the increase in processing speed and ability to filter out irrelevant stimuli (Kail, McBride-Chang, Ferrer, Cho, & Shu, 2013).

Children with learning disabilities in math and reading often have difficulties with working memory (Alloway, 2009). They may struggle with following the directions of an assignment. When a task calls for multiple steps, children with poor working memory may miss steps because they may lose track of where they are in the task. Adults working with such children may need to communicate: Using more familiar vocabulary, using shorter sentences, repeating task instructions more frequently, and breaking more complex tasks into smaller more manageable steps. Some studies have also shown that more intensive training of working memory strategies, such as chunking, aid in improving the capacity of working memory in children with poor working memory (Alloway, Bibile, & Lau, 2013).

Attention: As noted above the ability to inhibit irrelevant information improves during this age group, with there being a sharp improvement in selective attention from age six into adolescence (Vakil, Blachstein, Sheinman, & Greenstein, 2009). Children also improve in their ability to shift their attention between tasks or different features of a task (Carlson, Zelazo, & Faja, 2013). A younger child who is asked to sort objects into piles based on type of object, car versus animal, or color of object, red versus blue, may have difficulty if you switch from asking them to sort based on type to now having them sort based on color. This requires them to suppress the prior sorting rule. An older child has less difficulty making the switch, meaning there is greater flexibility in their attentional skills. These changes in attention and working memory contribute to children having more strategic approaches to challenging tasks.

Memory Strategies: Bjorklund (2005) describes a developmental progression in the acquisition and use of memory strategies. Such strategies are often lacking in younger children, but increase in frequency as children progress through elementary school. Examples of memory strategies include rehearsing information you wish to recall, visualizing and organizing information, creating rhymes, such “i” before “e” except after “c”, or inventing acronyms, such as “roygbiv” to remember the colors of the rainbow. Schneider, Kron-Sperl, and Hünnerkopf (2009) reported a steady increase in the use of memory strategies from ages six to ten in their longitudinal study (see Table 5.2).

Age	Percentage
6	55
7	44
8	25
9	17
10	13

Moreover, by age ten many children were using two or more memory strategies to help them recall information. Schneider and colleagues found that there were considerable individual differences at each age in the use of strategies, and that children who utilized more strategies had better memory performance than their same aged peers.

Children may experience three deficiencies in their use of memory strategies. A **mediation deficiency** *occurs when a child does not grasp the strategy being taught, and thus, does not benefit from its use*. If you do not understand why using an acronym might be helpful, or how to create an acronym, the strategy is not likely to help you. In a **production deficiency** *the child does not spontaneously use a memory strategy, and has to be prompted to do so.* In this case, the child knows the strategy and is more than capable of using it, but they fail to “produce” the strategy on their own. For example, a child might know how to make a list, but

may fail to do this to help them remember what to bring on a family vacation. A **utilization deficiency** *refers to a child using an appropriate strategy, but it fails to aid their performance*. Utilization deficiency is common in the early stages of learning a new memory strategy (Schneider & Pressley, 1997; Miller, 2000). Until the use of the strategy becomes automatic it may slow down the learning process, as space is taken up in memory by the strategy itself. Initially, children may get frustrated because their memory performance may seem worse when they try to use the new strategy. Once children become more adept at using the strategy, their memory performance will improve. Sodian and Schneider (1999) found that new memory strategies acquired prior to age eight often show utilization deficiencies with there being a gradual improvement in the child's use of the strategy. In contrast, strategies acquired after this age often followed an "all-or-nothing" principle in which improvement was not gradual, but abrupt.

Knowledge Base: During middle and late childhood, children are able to learn and remember due to an improvement in the ways they attend to and store information. As children enter school and learn more about the world, they develop more categories for concepts and learn more efficient strategies for storing and retrieving information. One significant reason is that they continue to have more experiences on which to tie new information. In other words, their **knowledge base**, *knowledge in particular areas that makes learning new information easier*, expands (Berger, 2014).

Metacognition: Children in middle and late childhood also have a better understanding of how well they are performing a task, and the level of difficulty of a task. As they become more realistic about their abilities, they can adapt studying strategies to meet those needs. Young children spend as much time on an unimportant aspect of a problem as they do on the main point, while older children start to learn to prioritize and gauge what is significant and what is not. As a result, they develop metacognition. **Metacognition** *refers to the knowledge we have about our own thinking and our ability to use this awareness to regulate our own cognitive processes* (Bruning, Schraw, Norby, & Ronning, 2004).

Critical Thinking: According to Bruning et al. (2004) there is a debate in U.S. education as to whether schools should teach students what to think or how to think. **Critical thinking**, *or a detailed examination of beliefs, courses of action, and evidence*, involves teaching children how to think. The purpose of critical thinking is to evaluate information in ways that help us make informed decisions. Critical thinking involves better understanding a problem through gathering, evaluating, and selecting information, and also by considering many possible solutions. Ennis (1987) identified several skills useful in critical thinking. These include: Analyzing arguments, clarifying information, judging the credibility of a source, making value judgements, and deciding on an action. Metacognition is essential to critical thinking because it allows us to reflect on the information as we make decisions.

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5.12: Cognitive Development in Adolescence

Learning Objectives: Cognitive Development in Adolescence

- Describe Piaget's formal operational stage and the characteristics of formal operational thought
- Describe adolescent egocentrism
- Describe Information Processing research on attention and memory
- Describe the developmental changes in language
- Describe the various types of adolescent education
- Identify changes in high school drop-out rates based on gender and ethnicity

Piaget's Formal Operational Stage of Cognitive Development

During the formal operational stage, adolescents are able to understand **abstract principles** *which have no physical reference.* They can now contemplate such abstract constructs as beauty, love, freedom, and morality. The adolescent is no longer limited by what can be directly seen or heard. Additionally, while younger children solve problems through trial and error, adolescents demonstrate **hypothetical-deductive reasoning**, *which is developing hypotheses based on what might logically occur*. They are able to think about all the possibilities in a situation beforehand, and then test them systematically (Crain, 2005). Now they are able to engage in true scientific thinking.

Formal operational thinking also involves accepting hypothetical situations. Adolescents understand the concept of **transitivity**, *which means that a relationship between two elements is carried over to other elements logically related to the first two*, such as if A<B and B<C, then A<C (Thomas, 1979). For example, when asked: If Maria is shorter than Alicia and Alicia is shorter than Caitlyn, who is the shortest? Adolescents are able to answer the question correctly as they understand the transitivity involved.

Does everyone reach formal operations? According to Piaget, most people attain some degree of formal operational thinking, but use formal operations primarily in the areas of their strongest interest (Crain, 2005). In fact, most adults do not regularly demonstrate formal operational thought, and in small villages and tribal communities, it is barely used at all. A possible explanation is that an individual's thinking has not been sufficiently challenged to demonstrate formal operational thought in all areas.

Adolescent Egocentrism: Once adolescents can understand abstract thoughts, they enter a world of hypothetical possibilities and demonstrate **egocentrism** *or a heightened self-focus*. The egocentricity comes from attributing unlimited power to their own thoughts (Crain, 2005). Piaget believed it was not until adolescents took on adult roles that they would be able to learn the limits to their own thoughts.

Figure 6.11. Source.

David Elkind (1967) expanded on the concept of Piaget's adolescent egocentricity. Elkind theorized that the physiological changes that occur during adolescence result in adolescents being primarily concerned with themselves. Additionally, since adolescents fail to differentiate between what others are thinking and their own thoughts, they believe that others are just as fascinated with their behavior and appearance. This belief results in the adolescent anticipating the reactions of others, and consequently constructing an imaginary audience. "The **imaginary audience** *is the adolescent's belief that those around them are as concerned and focused on their appearance as they themselves are"* (Schwartz, Maynard, & Uzelac, 2008, p. 441). Elkind thought that the imaginary audience contributed to the self-consciousness that occurs during early adolescence. The desire for privacy and reluctance to share personal information may be a further reaction to feeling under constant observation by others.

Another important consequence of adolescent egocentrism is the **personal fable** *or belief that one is unique, special, and invulnerable to harm.* Elkind (1967) explains that because adolescents feel so important to others (imaginary audience) they regard themselves and their feelings as being special and unique. Adolescents believe that only they have experienced strong and diverse emotions, and therefore others could never understand how they feel. This uniqueness in one's emotional experiences reinforces the adolescent's belief of invulnerability, especially to death. Adolescents will engage in risky behaviors, such as drinking and driving or unprotected sex, and feel they will not suffer any negative consequences. Elkind believed that adolescent egocentricity emerged in early adolescence and declined in middle adolescence, however, recent research has also identified egocentricity in late adolescence (Schwartz, et al., 2008).

Consequences of Formal Operational Thought: As adolescents are now able to think abstractly and hypothetically, they exhibit many new ways of reflecting on information (Dolgin, 2011). For example, they demonstrate greater **introspection** *or thinking about one's thoughts*

Information Processing

Cognitive control: As noted in earlier chapters, executive functions, such as attention, increases in working memory, and cognitive flexibility have been steadily improving since early childhood. Studies have found that executive function is very competent in adolescence. However, **self-regulation**, or *the ability to control impulses*, may still fail. A failure in self- regulation is especially true when there is high stress or high demand on mental functions (Luciano & Collins, 2012). While high stress or demand may tax even an adult's self-regulatory abilities, neurological changes in the adolescent brain may make teens particularly prone to more risky decision making under these conditions.

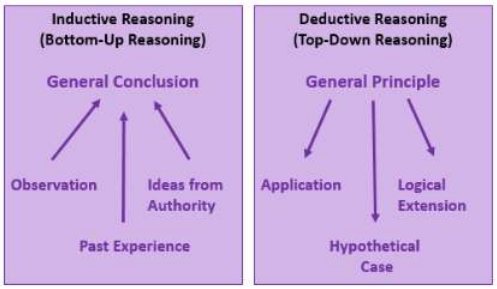

Figure 6.12.

Inductive and Deductive Reasoning: Inductive reasoning emerges in childhood, and is a type of reasoning that is sometimes characterized as "bottom-up-processing" in which *specific observations, or specific comments from those in authority, may be used to draw general conclusions*. However, in inductive reasoning the veracity of the information that created the general conclusion does not guarantee the accuracy of that conclusion. For instance, a child who has only observed thunder on summer days may conclude that it only thunders in the summer. In contrast, **deductive reasoning**, sometimes called "top-down-processing", emerges in adolescence. *This type of reasoning starts with some overarching principle, and based on this propose specific conclusions*. Deductive reasoning guarantees a truthful conclusion if the premises on which it is based are accurate.

Intuitive versus Analytic Thinking: Cognitive psychologists often refer to intuitive and analytic thought as the Dual-Process Model; the notion that humans have two distinct networks for processing information (Albert & Steinberg, 2011). **Intuitive thought** *is automatic, unconscious, and fast* (Kahneman, 2011), *and it is more experiential and emotional*. In contrast, **Analytic thought** *is deliberate, conscious, and rational*. While these systems interact, they are distinct (Kuhn, 2013). Intuitive thought is easier and more commonly used in everyday life. It is also more commonly used by children and teens than by adults (Klaczynski, 2001). The quickness of adolescent thought, along with the maturation of the limbic system, may make teens more prone to emotional intuitive thinking than adults.

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CHAPTER OVERVIEW

6: Motor Development

6.1: From Reflexes to Voluntary Movements
6.2: Sensory Capabilities
6.3: Motor Skill Development
6.4: Play

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6.1: From Reflexes to Voluntary Movements

Newborns are equipped with a number of **reflexes** (Table 3.1) *which are involuntary movements in response to stimulation*. Some of the more common reflexes, such as the sucking reflex and rooting reflex, are important to feeding. The grasping and stepping reflexes are eventually replaced by more voluntary behaviors. Within the first few months of life these reflexes disappear, while other reflexes, such as the eye-blink, swallowing, sneezing, gagging, and withdrawal reflex stay with us as they continue to serve important functions. Reflexes offer pediatricians insight into the maturation and health of the nervous system. Reflexes that persist longer than they should can impede normal development (Berne, 2006). In preterm infants and those with neurological impairments, some of these reflexes may be absent at birth. Once present, they may persist longer than in a neurologically healthy infant (El-Dib, Massaro, Glass & Aly, 2012).

Table 3.1 Some Common Infant Reflexes

Reflex	Description	Image
Sucking	Suck on anything that touches the lips. *Image source.*	
Rooting	Turning the head when the cheek is touched. *Image source.*	
Grasp	Fingers automatically grip anything that touches the palm of the hand. *Image source.*	
Babinski	The toes will fan out and curl when the sole of the foot is stroked from heel to toe.	
Moro	A sudden noise or loss of support to the head and neck will cause infants to spread out their arms and legs, then quickly contract the limbs inward. *Image source.*	
Tonic Neck	When lying on the back with the head to one side, infants will extend the arm and leg on that side while flexing the limbs on the opposite side (looks like a fencer pose). *Image source.*	
Stepping	Legs move in stepping-like motion when feet touch a smooth surface. *Image source.*	

Motor Development

Motor development occurs in an orderly sequence as infants move from reflexive reactions (e.g., sucking and rooting) to more advanced motor functioning. As mentioned during the prenatal section, development occurs according to the **Cephalocaudal** *(from head to tail)* and **Proximodistal** *(from the midline outward)* principles. For instance, babies first learn to hold their heads up, then to sit with assistance, then to sit unassisted, followed later by crawling, pulling up, cruising, and then walking. As motor skills develop, there are certain developmental milestones that young children should achieve. For each milestone there is an average age, as well as a range of ages in which the milestone should be reached. An example of a developmental milestone is a baby holding up

its head. Babies on average are able to hold up their head at 6 weeks old, and 90% of babies achieve this between 3 weeks and 4 months old. If a baby is not holding up his head by 4 months old, he is showing a delay. On average, most babies sit alone at 7 months old. Sitting involves both coordination and muscle strength, and 90% of babies achieve this milestone between 5 and 9 months old. If the child is displaying delays on several milestones, that is reason for concern, and the parent or caregiver should discuss this with the child's pediatrician. Some developmental delays can be identified and addressed through early intervention.

Motor Skills *refer to our ability to move our bodies and manipulate objects*. **Fine motor skills** *focus on the muscles in our fingers, toes, and eyes, and enable coordination of small actions* (e.g., grasping a toy, writing with a pencil, and using a spoon). Newborns cannot grasp objects voluntarily but do wave their arms toward objects of interest. At about 4 months of age, the infant is able to reach for an object, first with both arms and within a few weeks, with only one arm. At this age *grasping an object involves the use of the fingers and palm, but no thumbs. This is known as the* **Palmer Grasp**. *The use of the thumb comes at about 9 months of age when the infant is able to grasp an object using the forefinger and thumb. Now the infant uses a* **Pincer Grasp**, and this ability greatly enhances the ability to control and manipulate an object and infants take great delight in this newfound ability. They may spend hours picking up small objects from the floor and placing them in containers. By 9 months, an infant can also watch a moving object, reach for it as it approaches, and grab it.

Figure 3.7. Source.

Gross motor skills *focus on large muscle groups that control our head, torso, arms and legs and involve larger movements* (e.g., balancing, running, and jumping). These skills begin to develop first. Examples include moving to bring the chin up when lying on the stomach, moving the chest up, and rocking back and forth on hands and knees. But it also includes exploring an object with one's feet as many babies do as early as 8 weeks of age if seated in a carrier or other device that frees the hips. This may be easier than reaching for an object with the hands, which requires much more practice (Berk, 2007). Sometimes an infant will try to move toward an object while crawling and surprisingly move backward because of the greater amount of strength in the arms than in the legs.

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6.2: Sensory Capabilities

Throughout much of history, the newborn was considered a passive, disorganized being who possessed minimal abilities. William James, an early psychologist, had described the newborn's world as "a blooming, buzzing confusion," (Shaffer, 1985). However, current research techniques have demonstrated just how developed the newborn is with especially organized sensory and perceptual abilities.

Vision

The womb is a dark environment void of visual stimulation. Consequently, vision is the most poorly developed sense at birth and time is needed to build those neural pathways between the eye and the brain. Newborns typically cannot see further than 8 to 16 inches away from their faces, and their visual acuity is about 20/400, which means that an infant can see something at 20 feet that an adult with normal vision could see at 400 feet. Thus, the world probably looks blurry to young infants. Because of their poor visual acuity, they look longer at checkerboards with fewer large squares than with many small squares. Infants' thresholds for seeing a visual pattern are higher than adults'. Thus, toys for infants are sometimes manufactured with black and white patterns rather than pastel colors because the higher contrast between black and white makes the pattern more visible to the immature visual system. By about 6 months, infants' visual acuity improves and approximates adult 20/25 acuity.

When viewing a person's face, newborns do not look at the eyes the way adults do; rather, they tend to look at the chin a less detailed part of the face. However, by 2 or 3 months, they will seek more detail when exploring an object visually and begin showing preferences for unusual images over familiar ones, for patterns over solids, for faces over patterns, and for three-dimensional objects over flat images. Newborns have difficulty distinguishing between colors, but within a few months they are able to discriminate between colors as well as adults. Sensitivity to binocular depth cues, which require inputs from both eyes, is evident by about 3 months and continues to develop during the first 6 months. By 6 months, the infant can perceive depth perception in pictures as well (Sen, Yonas, & Knill, 2001). Infants who have experience crawling and exploring will pay greater attention to visual cues of depth and modify their actions accordingly (Berk, 2007).

Hearing

The infant's sense of hearing is very keen at birth, and the ability to hear is evidenced as soon as the 7th month of prenatal development. In fact, an infant can distinguish between very similar sounds as early as one month after birth and can distinguish between a familiar and non-familiar voice even earlier. Infants are especially sensitive to the frequencies of sounds in human speech and prefer the exaggeration of infant-directed speech, which will be discussed later. Additionally, infants are innately ready to respond to the sounds of any language, but some of this ability will be lost by 7 or 8 months as the infant becomes familiar with the sounds of a particular language and less sensitive to sounds that are part of an unfamiliar language.

Figure 3.9. Source.

Newborns also prefer their mother's voices over another female when speaking the same material (DeCasper & Fifer, 1980). Additionally, they will register in utero specific information heard from their mother's voice. DeCasper and Spence (1986) tested 16 infants (average age of 55.8 hours) whose mothers had previously read to them prenatally. The mothers read several passages to their fetuses, including the first 28 paragraphs of the *Cat in the Hat*, beginning when they were 7 months pregnant. The fetuses had been exposed to the stories an average of 67 times or 3.5 hours. When the experimental infants were tested, the target stories (previously heard) were more reinforcing than the novel story as measured by their rate of sucking. However, for control infants, the target stories were not more reinforcing than the novel story indicating that the experimental infants had heard them before.

Touch and Pain

Immediately after birth, a newborn is sensitive to touch and temperature, and is also highly sensitive to pain, responding with crying and cardiovascular responses (Balaban & Reisenauer, 2013). Newborns who are **Circumcised,** *which is the surgical removal of the foreskin of the penis*, without anesthesia experience pain as demonstrated by increased blood pressure, increased heart rate, decreased oxygen in the blood, and a surge of stress hormones (United States National Library of Medicine, 2016).

Research has demonstrated that infants who were circumcised without anesthesia experienced more pain and fear during routine childhood vaccines. Fortunately, many local pain killers are currently used during circumcision.

Figure 3.10. Source.

Taste and Smell

Studies of taste and smell demonstrate that babies respond with different facial expressions, suggesting that certain preferences are innate. Newborns can distinguish between sour, bitter, sweet, and salty flavors and show a preference for sweet flavors. Newborns also prefer the smell of their mothers. An infant only 6 days old is significantly more likely to turn toward its own mother's breast pad than to the breast pad of another baby's mother (Porter, Makin, Davis, & Christensen, 1992), and within hours of birth an infant also shows a preference for the face of its own mother (Bushnell, 2001; Bushnell, Sai, & Mullin, 1989).

Infants seem to be born with the ability to perceive the world in an intermodal way; that is, through stimulation from more than one sensory modality. For example, infants who sucked on a pacifier with either a smooth or textured surface preferred to look at a corresponding (smooth or textured) visual model of the pacifier. By 4 months, infants can match lip movements with speech sounds and can match other audiovisual events. Although sensory development emphasizes the afferent processes used to take in information from the environment, these sensory processes can be affected by the infant's developing motor abilities. Reaching, crawling, and other actions allow the infant to see, touch, and organize his or her experiences in new ways.

How are Infants Tested

Habituation Procedures, *that is measuring decreased responsiveness to a stimulus after repeated presentations*, have increasingly been used to evaluate infants to study the development of perceptual and memory skills. Phelps (2005) describes a habituation procedure used when measuring the rate of the sucking reflex. Researchers first measure the initial baseline rate of sucking to a pacifier equipped with transducers that measure muscle contractions. Next, an auditory stimulus is presented, such as a human voice uttering a speech sound such as "da." The rate of sucking will typically increase with the new sound, but then decrease to baseline levels as "da" is repeatedly presented, showing habituation. If the sound "ma" was then presented, the rate of sucking would again increase, demonstrating that the infant can discriminate between these two stimuli.

Additionally, the speed or efficiency with which infants show habituation has been shown to predict outcomes in behaviors such as language acquisition and verbal and nonverbal intelligence. Infants who show difficulty during habituation, or habituate at slower than normal rates, have been found to be at an increased risk for significant developmental delays. Infants with Down syndrome, teratogen-exposed infants, malnourished infants, and premature infants have all been studied. Researchers have found that at the age of 16 months, high-risk infants show rates of habituation comparable to newborn infants (Phelps, 2005).

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6.3: Motor Skill Development

Early childhood is the time period when most children acquire the basic skills for locomotion, such as running, jumping, and skipping, and object control skills, such as throwing, catching, and kicking (Clark, 1994). Children continue to improve their gross motor skills as they run and jump. Fine motor skills are also being refined in activities, such as pouring water into a container, drawing, coloring, and buttoning coats and using scissors. Table 4.1 highlights some of the changes in motor skills during early childhood between 2 and 5 years of age. The development of greater coordination of muscles groups and finer precision can be seen during this time period. Thus, average 2-year-olds may be able to run with slightly better coordination than they managed as a toddler, yet they would have difficulty peddling a tricycle, something the typical 3-year-old can do. We see similar changes in fine motor skills with 4-year-olds who no longer struggle to put on their clothes, something they may have had problems with two years earlier. Motor skills continue to develop into middle childhood, but for those in early childhood, play that deliberately involves these skills is emphasized.

Table 4.1: Changes in Gross and Fine Motor Skills in Early Childhood

	Gross Motor Skills	**Fine Motor Skills**
Age 2	• Can kick a ball without losing balance • Can pick up objects while standing, without losing balance (*This often occurs by 15 months. It is a cause for concern if not seen by 2 years.*) • Can run with better coordination (*May still have a wide stance.*)	• Able to turn a door knob • Can look through a book, turning one page at a time • Can build a tower of 6 to 7 cubes • Able to put on simple clothes without help. (*The child is often better at removing clothes than putting them on.*)
Age 3	• Can briefly balance and hop on one foot • May walk up stairs with alternating feet (without holding the rail) • Can pedal a tricycle	• Can build a block tower of more than nine cubes • Can easily place small objects in a small opening • Can copy a circle • Drawing a person with 3 parts • Feeds self easily
Age 4	• Shows improved balance • Hops on 1 foot without losing balance • Throws a ball overhand with coordination	• Can cut out a picture using scissors • Drawing a square • Managing a spoon and fork neatly while eating • Putting on clothes properly
Age 5	• Has better coordination (getting the arms, legs, and body to work together) • Skips, jumps, and hops with good balance • Stays balanced while standing on one foot with eyes closed	• Shows more skill with simple tools and writing utensils • Can copy a triangle • Can use a knife to spread soft foods

Source: NIH: US National Library of Medicine.

Children's Art: Children's art highlights many developmental changes. Rhoda Kellogg (1969) noted that children's drawings underwent several transformations. Starting with about 20 different types of scribbles at age 2, children move on to experimenting with the placement of scribbles on the page. By age 3 they are using the basic structure of scribbles to create shapes and are beginning to combine these shapes to create more complex images. By 4 or 5 children are creating images that are more recognizable representations of the world. These changes are a function of improvement in motor skills, perceptual development, and cognitive understanding of the world (Cote & Golbeck, 2007).

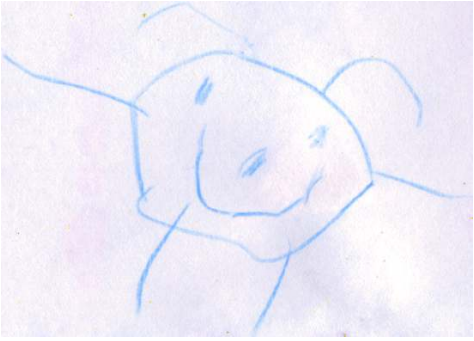

Figure 4.4. Source.

The drawing of tadpoles (see Figure: 4.4) is a pervasive feature of young children's drawings of self and others. Tadpoles emerge in children's drawing at about the age of 3 and have been observed in the drawings of young children around the world (Gernhardt, Rubeling & Keller, 2015). Despite the universality of tadpoles in children's drawings, there are cultural variations in the size, number of facial features, and emotional expressions displayed. Gernhardt et al. (2015) found that children from Western contexts (i.e., urban areas of Germany and Sweden) and urban educated non-Western contexts (i.e., urban areas of Turkey, Costa Rica and Estonia) drew larger images, with more facial detail and more positive emotional expressions, while those from non-Western rural contexts (i.e., rural areas of Cameroon and India) depicted themselves as smaller, with less facial details and a more neutral emotional expression. The authors suggest that cultural norms of non-Western traditionally rural cultures, which emphasize the social group rather than the individual, may be one of the factors for the difference in the size of the figure. The tadpole figures of children from Western cultures often took up most of the page. Coming from cultures that emphasize the individual, this should not be surprising.

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6.4: Play

Freud saw play as a means for children to release pent-up emotions and to deal with emotionally distressing situations in a more secure environment. Vygotsky and Piaget saw play as a way of children developing their intellectual abilities (Dyer & Moneta, 2006). All three theorists saw play as providing positive outcomes for children.

Figure 4.24 Which type of play are these two boys engaging in? Source.

Mildred Parten (1932) observed two to five year-old children and noted six types of play. Three types she labeled as non-social (unoccupied, solitary, and onlooker) and three types were categorized as social play (parallel, associative, and cooperative). Table 4.4 describes each type of play. Younger children engage in non-social play more than those older; by age five associative and cooperative play are the most common forms of play (Dyer & Moneta, 2006).

Category	Description
Unoccupied Play	Children's behavior seems more random and without a specific goal. This is the least common form of play.
Solitary Play	Children play by themselves, do not interact with others, nor are they engaging in similar activities as the children around them.
Onlooker Play	Children are observing other children playing. They may comment on the activities and even make suggestions but will not directly join the play.
Parallel Play	Children play alongside each other, using similar toys, but do not directly act with each other.
Associative Play	Children will interact with each other and share toys but are not working toward a common goal.
Cooperative Play	Children are interacting to achieve a common goal. Children may take on different tasks to reach that goal.

box 4.2: imaginary companions

An intriguing occurrence in early childhood is the emergence of imaginary companions. Researchers differ in how they define what qualifies as an imaginary companion. Some studies include only invisible characters that the child refers to in conversation, or plays with for an extended period of time. Other researchers also include objects that the child personifies, such as a stuffed toy or doll, or characters the child impersonates every day. Estimates of the number of children who have imaginary companions varies greatly (from as little as 6% to as high as 65%) depending on what is included in the definition (Gleason, Sebanc, & Hartup, 2000).

Figure 4.25. Source.

Little is known about why children create imaginary companions, and more than half of all companions have no obvious trigger in the child's life (Masih, 1978). Imaginary companions are sometimes based on real people, characters from stories, or simply names the child has heard (Gleason, et. al., 2000). Imaginary companions often change over time. In their study, Gleason et al. (2000) found that 40% of the imaginary companions of the children they studied changed, such as developing superpowers, switching age, gender, or even dying, and 68% of the characteristics of the companion were acquired over time. This could reflect greater complexity in the child's "creation" over time and/or a greater willingness to talk about their imaginary playmates.

In addition, research suggests that contrary to the assumption that children with imaginary companions are compensating for poor social skills, several studies have found that these children are very sociable (Mauro, 1991; Singer & Singer, 1990; Gleason, 2002). However, studies have reported that children with imaginary companions are more likely to be first-borns or only-children (Masih, 1978; Gleason et al., 2000, Gleason, 2002). Although not all research has found a link between birth order and the incidence of imaginary playmates (Manosevitz, Prentice, & Wilson, 1973). Moreover, some studies have found little or no difference in the presence of imaginary companions and parental divorce (Gleason et al., 2000), number of people in the home, or the amount of time children are spending with real playmates (Masih, 1978; Gleason & Hohmann, 2006).

Do children treat real friends differently? The answer appears to be not really. Young children view their relationship with their imaginary companion to be as supportive and nurturing as with their real friends. Gleason has suggested that this might suggest that children form a schema of what is a friend, and use this same schema in their interactions with both types of friends (Gleason, et al., 2000; Gleason, 2002; Gleason & Hohmann, 2006).

Children and the Media

Children view far more television today than in the 1960s; so much that they have been referred to as Generation M for Media. Almost all American families have at least one TV set, and half own three or more (Nielsen Company, 2009). For children age six and under, two-thirds watch television every day, usually for two hours (Rideout & Hamel, 2006). Even when involved in other activities, such as playing, there is often a television on nearby (Christakis, 2009; Kirkorian, Pempek, & Murphy, 2009). Research has consistently shown that too much television adversely affects children's behavior, health, and achievement (Gentile & Walsh, 2002; Robinson, Wilde, & Navracruz, 2001). Young children are less able to focus on active, hands-on play while the television is on, and background TV can negatively affect cognitive and language development as well as be linked to attention problems later in childhood (Schmidt, Pempek, & Kirkorian, 2008; Courage, Murphy, & Goulding, 2010).

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CHAPTER OVERVIEW

7: Intelligence

7.1: Theories of Intelligence
7.2: Measuring Intelligence - Standardization and the Intelligence Quotient

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7.1: Theories of Intelligence

Psychologists have long debated how to best conceptualize and measure intelligence (Sternberg, 2003). These questions include how many types of intelligence there are, the role of nature versus nurture in intelligence, how intelligence is represented in the brain, and the meaning of group differences in intelligence.

General (g) Versus Specific (s) Intelligences: From 1904- 1905 the French psychologist Alfred Binet (1857–1914) and his colleague Théodore Simon (1872–1961) began working on behalf of the French government to develop a measure that would identify children who would not be successful with the regular school curriculum. The goal was to help teachers better educate these students (Aiken, 1994). Binet and Simon developed what most psychologists today regard as the first intelligence test, which consisted of a wide variety of questions that included the ability to name objects, define words, draw pictures, complete sentences, compare items, and construct sentences.

Figure 5.8: Alfred Binet. Source.

Binet and Simon (Binet, Simon, & Town, 1915; Siegler, 1992) believed that the questions they asked the children all assessed the basic abilities to understand, reason, and make judgments. It turned out that the correlations among these different types of measures were in fact all positive; that is, students who got one item correct were more likely to also get other items correct, even though the questions themselves were very different.

On the basis of these results, the psychologist Charles Spearman (1863–1945) hypothesized that there must be a single underlying construct that all of these items measure. He called *the construct that the different abilities and skills measured on intelligence tests have in common* the **General Intelligence Factor (g).** Virtually all psychologists now believe that there is a generalized intelligence factor, “g”, that relates to abstract thinking and that includes the abilities to acquire knowledge, to reason abstractly, to adapt to novel situations, and to benefit from instruction and experience (Gottfredson, 1997; Sternberg, 2003). People with higher general intelligence learn faster.

Figure 5.9 Have you taken an intelligence test? © Thinkstock

Soon after Binet and Simon introduced their test, the American psychologist Lewis Terman at Stanford University (1877–1956) developed an American version of Binet’s test that became known as the *Stanford-Binet Intelligence Test*. The Stanford-Binet is a measure of general intelligence made up of a wide variety of tasks including vocabulary, memory for pictures, naming of familiar objects, repeating sentences, and following commands.

Although there is general agreement among psychologists that “g” exists, there is also evidence for **Specific Intelligence** “s”, *a measure of specific skills in narrow domains*. One empirical result in support of the idea of “s” comes from intelligence tests themselves.Althoughthedifferenttypesof questions do correlate with each other, some items correlate more highly with each other than do other items; they form clusters or clumps of intelligences.

Triarchic Theory: One advocate of the idea of multiple intelligences is the psychologist Robert Sternberg. Sternberg has proposed a **Triarchic (three-part) Theory of Intelligence** that proposes that *people may display more or less analytical intelligence, creative intelligence, and practical intelligence*. Sternberg (1985, 2003) argued that traditional intelligence tests assess **Analytical Intelligence**, *academic problem solving and performing calculations*, but that they do not typically assess **Creative Intelligence**, *the ability to adapt to new situations and create new ideas*, and/or **Practical Intelligence**, *the ability to demonstrate common sense and street- smarts.*

Figure 5.10: How many uses for a paper clip can you think of? © Thinkstock

As Sternberg proposed, research has found that creativity is not highly correlated with analytical intelligence (Furnham & Bachtiar, 2008) and exceptionally creative scientists, artists, mathematicians, and engineers do not score higher on intelligence than do their less creative peers (Simonton, 2000). Furthermore, the brain areas that are associated with **Convergent Thinking**, *thinking that is directed toward finding the correct answer to a given problem*, are different from those associated with **Divergent Thinking**, *the ability to generate many different ideas or solutions to a single problem* (Tarasova, Volf, & Razoumnikova, 2010). On the other hand, being creative often takes some of the basic abilities measured by "g", including the abilities to learn from experience, to remember information, and to think abstractly

(Bink & Marsh, 2000). Ericsson (1998), Weisberg (2006), Hennessey and Amabile (2010) and Simonton (1992) studied creative people and identified at least five components that are likely to be important for creativity as listed in Table 5.3

Table 5.3 Important Components for Creativity

Component	Description
Expertise	Creative people have studied and leraned about a topic
Imaginative Thinking	Creative people view problems in new and different ways
Risk Taking	Creative people take on new, but potentially risky, approaches
Intrinsic Interest	Creative people take on projects for interest, not money
Working in Creative Environments	The most creative people are supported, aided, and challenged by other people working on similar projects

The last aspect of the triarchic model, practical intelligence, refers primarily to intelligence that cannot be gained from books or formal learning. Practical intelligence represents a type of "street smarts" or "common sense" that is learned from life experiences. Although a number of tests have been devised to measure practical intelligence (Sternberg, Wagner, & Okagaki, 1993; Wagner & Sternberg, 1985), research has not found much evidence that practical intelligence is distinct from "g" or that it is predictive of success at any particular tasks (Gottfredson, 2003). Practical intelligence may include, at least in part, certain abilities that help people perform well at specific jobs, and these abilities may not always be highly correlated with general intelligence (Sternbergetal.,1993).

Theory of Multiple Intelligences: Another champion of the idea of specific types of intelligences rather than one overall intelligence is the psychologist Howard Gardner (1983, 1999). Gardner argued that it would be evolutionarily functional for different people to have different talents and skills, and proposed that there are eight intelligences that can be differentiated from each other. A potential ninth intelligence; that is, existential still needs empirical support. Gardner investigated intelligences by focusing on children who were talented in one or more areas and adults who suffered from strokes that compromised some capacities, but not others. Gardner also noted that some evidence for multiple intelligences comes from the abilities of **autistic savants**, *people who score low on intelligence tests overall but who nevertheless may have exceptional skills in a given domain*, such as math, music, art, or in being able to recite statistics in a given sport (Treffert & Wallace, 2004). In addition to brain damage and the existence of savants, Gardner identified these 8 intelligences based on other criteria including a set developmental history and psychometric findings. See Table 5.4 for a list of Gardner's eight specific intelligences.

Table 5.4 Howard Gardner's Eight Specific Intelligences

Intelligence	Description
Linguistic	The ability to speak and write well
Logical-mathematical	The ability to use logic and mathematical skills to solve problems
Spatial	The ability to think and reason about objects in three dimensions
Musical	The ability to perform and enjoy music
Kinesthetic (body)	The ability to move the body in sports, dance, or other physical activities
Interpersonal	The ability to understand and interact effectively with others
Intrapersonal	The ability to have insight into the self
Naturalistic	The ability to recognize, identify, and understand animals, plants, and other living things

Source: Adapted from Gardner, H. (1999). Intelligence reframed: Multiple intelligences for the 21st century. *New York, NY: Basic Books.*

Figure 5.11: Although intelligence is often conceptualized in a general way (as the "g" factor), there is a variety of specific skills that can be useful for particular tasks. © Thinkstock

The idea of multiple intelligences has been influential in the field of education, and teachers have used these ideas to try to teach differently to different students. For instance, to teach math problems to students who have particularly good kinesthetic intelligence, a teacher might encourage the students to move their bodies or hands according to the numbers. On the other hand, some have argued that these "intelligences" sometimes seem more like "abilities" or "talents" rather than real intelligence. There is no clear conclusion about how many intelligences there are. Are sense of humor, artistic skills, dramatic skills, and so forth also separate intelligences? Furthermore, and again demonstrating the underlying power of a single intelligence, the many different intelligences are in fact correlated and thus represent, in part, "g" (Brody, 2003).

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7.2: Measuring Intelligence - Standardization and the Intelligence Quotient

The goal of most intelligence tests is to measure "g", the general intelligence factor. Good intelligence tests are **reliable,** *meaning that they are consistent over time*, and also demonstrate **validity,** *meaning that they actually measure intelligence rather than something else*. Because intelligence is such an important individual difference dimension, psychologists have invested substantial effort in creating and improving measures of intelligence, and these tests are now considered the most accurate of all psychological tests. In fact, the ability to accurately assess intelligence is one of the most important contributions of psychology to everyday public life.

Intelligence changes with age. A 3-year-old who could accurately multiply 183 by 39 would certainly be intelligent, but a 25-year-old who could not do so would be seen as unintelligent. Thus understanding intelligence requires that we know the norms or standards in a given population of people at a given age. The **standardization** of a test involves *giving it to a large number of people at different ages and computing the average score on the test at each age level*.

It is important that intelligence tests be standardized on a regular basis, because the overall level of intelligence in a population may change over time. The **Flynn effect** refers to *the observation that scores on intelligence tests worldwide have increased substantially over the past decades* (Flynn, 1999). Although the increase varies somewhat from country to country, the average increase is about 3 IQ points every 10 years. There are many explanations for the Flynn effect, including better nutrition, increased access to information, and more familiarity with multiple-choice tests (Neisser, 1998). But whether people are actually getting smarter is debatable (Neisser,1997).

Once the standardization has been accomplished, we have a picture of the average abilities of people at different ages and can calculate a person's **mental age**, which is *the age at which a person is performing intellectually*. If we compare the mental age of a person to the person's chronological age, the result is the **Intelligence Quotient (IQ),** *a measure of intelligence that is adjusted for age*. A simple way to calculate IQ is by using the following formula:

$$\text{IQ} = \frac{\text{mental age}}{\text{chronological age}} \times 100. \tag{7.2.1}$$

Thus a 10-year-old child who does as well as the average 10-year-old child has an IQ of 100 (10 ÷ 10 × 100), whereas an 8-year-old child who does as well as the average 10-year-old child would have an IQ of 125 (10 ÷ 8 × 100). Most modern intelligence tests are based on the relative position of a person's score among people of the same age, rather than on the basis of this formula, but the idea of an intelligence "ratio" or "quotient" provides a good description of the score's meaning.

Wechsler Scales

A number of scales are based on the IQ. The **Wechsler Adult Intelligence Scale (WAIS)** is *the most widely used intelligence test for adults* (Watkins, Campbell, Nieberding, & Hallmark, 1995). The current version of the WAIS, the WAIS-IV, was standardized on 2,200 people ranging from 16 to 90 years of age. It consists of 15 different tasks, each designed to assess intelligence, including working memory, arithmetic ability, spatial ability, and general knowledge about the world. The WAIS-IV yields scores on four domains: verbal, perceptual, working memory, and processing speed. The reliability of the test is high (more than 0.95), and it shows substantial construct validity. The WAIS-IV is correlated highly with other IQ tests such as the Stanford-Binet, as well as with criteria of academic and life success, including college grades, measures of work performance, and occupational level. It also shows significant correlations with measures of everyday functioning among people with intellectual disabilities.

The Wechsler scale has also been adapted for preschool children in the form of the *Wechsler Primary and Preschool Scale of Intelligence-Fourth Edition (WPPSI-IV)* and for older children and adolescents in the form of the *Wechsler Intelligence Scale for Children-Fifth Edition (WISC-V)*. Figure 5.12 illustrates items from the WAIS.

Figure 5.12 Sample Items from the Wechsler Adult Intelligence Scale (WAIS). Source.

Bias: Intelligence tests and psychological definitions of intelligence have been heavily criticized since the 1970s for being biased in favor of Anglo-American, middle-class respondents and for being inadequate tools for measuring non-academic types of intelligence or talent. Intelligence changes with experience, and intelligence quotients or scores do not reflect that ability to change. What is considered smart varies culturally as well, and most intelligence tests do not take this variation into account. For example, in the West, being smart is associated with being quick. A person who answers a question the fastest is seen as the smartest, but in some cultures being smart is associated with considering an idea thoroughly before giving an answer. A well-thought out, contemplative answer is the best answer.

Extremes of Intelligence: Intellectual Disability and Giftedness

The results of studies assessing the measurement of intelligence show that IQ is distributed in the population in the form of a **Normal Distribution (or bell curve),** which *is the pattern of scores usually observed in a variable that clusters around its average*. In a normal distribution, the bulk of the scores fall toward the middle, with many fewer scores falling at the extremes. The normal distribution of intelligence shows that on IQ tests, as well as on most other measures, the majority of people cluster around the average (in this case, where IQ = 100), and fewer are either very smart or very dull (see Figure 5.13). Because the standard deviation of an IQ test is about 15, this means that about 2% of people score above an IQ of 130, often considered the threshold for giftedness, and about the same percentage score below an IQ of 70, often being considered the threshold for an intellectual disability.

Although Figure 5.13 presents a single distribution, the actual IQ distribution varies by sex such that the distribution for men is more spread out than is the distribution for women. These sex differences mean that about 20% more men than women fall in the extreme (very smart or very dull) ends of the distribution (Johnson, Carothers, & Deary, 2009). Boys are about five times more likely to be diagnosed with the reading disability dyslexia than are girls (Halpern, 1992), and are also more likely to be classified as having an intellectual disability. However, boys are also about 20% more highly represented in the upper end of the IQ distribution.

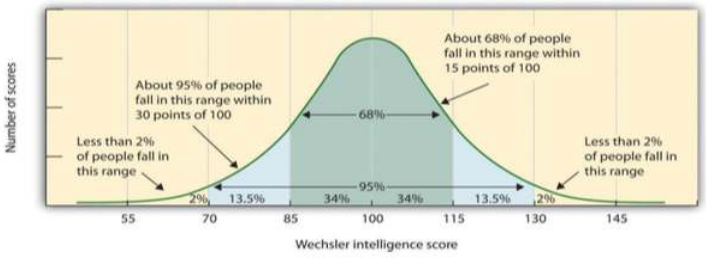

Figure 5.13: Distribution of IQ scores in the general population. The normal distribution of IQ scores in the general population shows that most people have about average intelligence, while very few have extremely high or extremely low intelligence.

One end of the distribution of intelligence scores is defined by people with very low IQ. **Intellectual disability** (or **intellectual developmental disorder**) is assessed based on cognitive capacity (IQ) and adaptive functioning. The severity of the disability is based on adaptive functioning, or how well the person handles everyday life tasks. About 1% of the United States population, most of them males, fulfill the criteria for intellectual developmental disorder, but some children who are given this diagnosis lose the classification as they get older and better learn to function in society. A particular vulnerability of people with low IQ is that they may be taken advantage of by others, and this is an important aspect of the definition of intellectual developmental disorder (Greenspan, Loughlin, & Black, 2001).

One cause of intellectual developmental disorder is **Down syndrome**, *a chromosomal disorder caused by the presence of all or part of an extra 21st chromosome*. The incidence of Down syndrome is estimated at approximately 1 per 700 births, and the prevalence increases as the mother's age increases (CDC, 2014a). People with Down syndrome typically exhibit a distinctive pattern of physical features, including a flat nose, upwardly slanted eyes, a protruding tongue, and a short neck (see Figure 5.14).

Figure 5.14. Individuals with Down syndrome. © *Thinkstock*

Fortunately, societal attitudes toward individuals with intellectual disabilities have changed over the past decades.Wenolongeruseterms such as “retarded,” “moron,” “idiot,” or “imbecile” to describe people with intellectual deficits, although these were the official psychological terms used to describe degrees of what was referred to as mental retardation in the past. Laws such as the Americans with Disabilities Act (ADA) have made it illegal to discriminate on the basis of mental and physical disability, and there has been a trend to bring people with mental disabilities out of institutions and into our workplaces and schools.

Giftedness *refers to children who have an IQ of 130 or higher* (Lally & Valentine-French, 2015). Having extremely high IQ is clearly less of a problem than having extremely low IQ, but there may also be challenges to being particularly smart. It is often assumed that schoolchildren who are labeled as “gifted” may have adjustment problems that make it more difficult for them to create social relationships. To study gifted children, Lewis Terman and his colleagues (Terman & Oden, 1959) selected about 1,500 high school students who scored in the top 1% on the Stanford-Binet and similar IQ tests (i.e., who had IQs of about 135 or higher), and tracked them for more than seven decades (the children became known as the “termites” and are still being studied today). This study found that these students were not unhealthy or poorly adjusted, but rather were above average in physical health and were taller and heavier than individuals in the general population. The students also had above average social relationships and were less likely to divorce than the average person (Seagoe, 1975).

Figure 5.15: The popular stereotype of highly intelligent people as physically uncoordinated and unpopular is not true. © Thinkstock

Terman’s study also found that many of these students went on to achieve high levels of education and entered prestigious professions, including medicine, law, and science. Of the sample, 7% earned doctoral degrees, 4% earned medical degrees, and 6% earned law degrees. These numbers are all considerably higher than what would have been expected from a more general population. Another study of young adolescents who had even higher IQs found that these students ended up attending graduate school at a rate more than 50 times higher than that in the general population (Lubinski & Benbow, 2006).

As you might expect based on our discussion of intelligence, kids who are gifted have higher scores on general intelligence “g”, but there are also different types of giftedness. Some children are particularly good at math or science, some at automobile repair or carpentry, some at music or art, some at sports or leadership, and so on. There is a lively debate among scholars about

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CHAPTER OVERVIEW

8: Language

8.1: Language
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8.1: Language

Our vast intelligence also allows us to have **Language**, *a system of communication that uses symbols in a regular way to create meaning*. Language gives us the ability to communicate our intelligence to others by talking, reading, and writing. Although other species have at least some ability to communicate, none of them have language. There are many components of language that will now be reviewed.

Components of Language

Figure 3.17

Phoneme: A **phoneme** is *the smallest unit of sound that makes a meaningful difference in a language*. The word "bit" has three phonemes. In spoken languages, phonemes are produced by the positions and movements of the vocal tract, including our lips, teeth, tongue, vocal cords, and throat, whereas in sign languages phonemes are defined by the shapes and movement of the hands.

There are hundreds of unique phonemes that can be made by human speakers, but most languages only use a small subset of the possibilities. English contains about 45 phonemes, whereas other languages have as few as 15 and others more than 60. The Hawaiian language contains less phonemes as it includes only 5 vowels (a, e, i, o, and u) and 7 consonants (h, k, l, m, n, p, and w).

Infants are born able to detect all phonemes, but they lose their ability to do so as they get older; by 10 months of age a child's ability to recognize phonemes becomes very similar to that of the adult speakers of the native language. Phonemes that were initially differentiated come to be treated as equivalent (Werker & Tees, 2002).

Morpheme: Whereas phonemes are the smallest units of sound in language, a **morpheme** is *a string of one or more phonemes that makes up the smallest units of meaning in a language*. Some morphemes are prefixes and suffixes used to modify other words. For example, the syllable "re-" as in "rewrite" or "repay" means "to do again," and the suffix "-est" as in "happiest" or "coolest" means "to the maximum."

Semantics: Semantics refers to *the set of rules we use to obtain meaning from morphemes*. For example, adding "ed" to the end of a verb makes it past tense.

Syntax: Syntax is *the set of rules of a language by which we construct sentences*. Each language has a different syntax. The syntax of the English language requires that each sentence have a noun and a verb, each of which may be modified by adjectives and adverbs. Some syntaxes make use of the order in which words appear. For example, in English "The man bites the dog" is different from "The dog bites the man."

Pragmatics: The social side of language is expressed through **pragmatics**, or *how we communicate effectively and appropriately with others*. Examples of pragmatics include turn- taking, staying on topic, volume and tone of voice, and appropriate eye contact.

Lastly, words do not possess fixed meanings but change their interpretation as a function of the context in which they are spoken. We use **contextual information**, *the information surrounding language*, to help us interpret it. Examples of contextual information include our knowledge and nonverbal expressions such as facial expressions, postures, and gestures. Misunderstandings can easily arise if people are not attentive to contextual information or if some of it is missing, such as it may be in newspaper headlines or in text messages.

Language Developmental Progression

An important aspect of cognitive development is language acquisition. The order in which children learn language structures is consistent across children and cultures (Hatch, 1983). Starting before birth, babies begin to develop language and communication skills. At birth, babies recognize their mother's voice and can discriminate between the language(s) spoken by their mothers and foreign languages, and they show preferences for faces that are moving in synchrony with audible language (Blossom & Morgan, 2006; Pickens et al., 1994; Spelke & Cortelyou, 1981).

Figure 3.18. Source.

Do newborns communicate? Of course they do. They do not, however, communicate with the use of oral language. Instead, they communicate their thoughts and needs with body posture (being relaxed or still), gestures, cries, and facial expressions. A person who spends adequate time with an infant can learn which cries indicate pain and which ones indicate hunger, discomfort, or frustration.

Intentional Vocalizations: In terms of producing spoken language, babies begin to coo almost immediately. **Cooing** *is a one-syllable combination of a consonant and a vowel sound* (e.g., coo or ba). Interestingly, babies replicate sounds from their own languages. A baby whose parents speak French will coo in a different tone than a baby whose parents speak Spanish or Urdu. These gurgling, musical vocalizations can serve as a source of entertainment to an infant who has been laid down for a nap or seated in a carrier on a car ride. Cooing serves as practice for vocalization, as well as the infant hears the sound of his or her own voice and tries to repeat sounds that are entertaining. Infants also begin to learn the pace and pause of conversation as they alternate their vocalization with that of someone else and then take their turn again when the other person's vocalization has stopped.

At about four to six months of age, infants begin making even more elaborate vocalizations that include the sounds required for any language. Guttural sounds, clicks, consonants, and vowel sounds stand ready to equip the child with the ability to repeat whatever sounds are characteristic of the language heard. Eventually, these sounds will no longer be used as the infant grows more accustomed to a particular language**.**

At about 7 months, infants begin **Babbling**, engaging in *intentional vocalizations that lack specific meaning and comprise a consonant-vowel repeated sequence, such as ma-ma-ma, da-da-da*. Children babble as practice in creating specific sounds, and by the time they are 1 year old, the babbling uses primarily the sounds of the language that they are learning (de Boysson- Bardies, Sagart, & Durand, 1984). These vocalizations have a conversational tone that sounds meaningful even though it isn't. Babbling also helps children understand the social, communicative function of language. Children who are exposed to sign language babble in sign by making hand movements that represent real language (Petitto & Marentette, 1991).

Gesturing: Children communicate information through gesturing long before they speak, and there is some evidence that gesture usage predicts subsequent language development (Iverson & Goldin-Meadow, 2005). Deaf babies also use gestures to communicate wants, reactions, and feelings. Because gesturing seems to be easier than vocalization for some toddlers, sign language is sometimes taught to enhance one's ability to communicate by making use of the ease of gesturing. The rhythm and pattern of language is used when deaf babies sign just as it is when hearing babies babble.

Understanding: At around ten months of age, the infant *can understand more than he or she can say, which is referred to as* **receptive language**. You may have experienced this phenomenon as well if you have ever tried to learn a second language. You may have been able to follow a conversation more easily than contribute to it. One of the first words that children understand is their own name, usually by about 6 months, followed by commonly used words like "bottle," "mama," and "doggie" by 10 to 12 months (Mandel, Jusczyk, & Pisoni, 1995). Infants shake their head "no" around 6–9 months, and they respond to verbal requests to do things like "wave bye-bye" or "blow a kiss" around 9–12 months. Children also use contextual information, particularly the cues that parents provide, to help them learn language. Children learn that people are usually referring to things that they are looking at when they are speaking (Baldwin, 1993), and that that the speaker's emotional expressions are related to the content of their speech.

Holophrasic Speech: Children begin using their first words at about 12 or 13 months of age and may use partial words to convey thoughts at even younger ages. *These one word expressions are referred to as* **Holophrasic Speech.** For example, the child may say "ju" for the word "juice" and use this sound when referring to a bottle. The listener must interpret the meaning of the holophrase, and when this is someone who has spent time with the child, interpretation is not too difficult. But, someone who has not been around the child will have trouble knowing what is meant. Imagine the parent who to a friend exclaims, "Ezra's talking all the time now!" The friend hears only "ju da ga" to which the parent explains means, "I want some milk when I go with Daddy."

Language Errors: The early utterances of children contain many errors, for instance, confusing /b/ and /d/, or /c/ and /z/. The words children create are often simplified, in part because they are not yet able to make the more complex sounds of the real language (Dobrich & Scarborough, 1992). Children may say "keekee" for kitty, "nana" for banana, and "vesketti" for spaghetti because it is easier. Often these early words are accompanied by gestures that may also be easier to produce than the words

themselves. Children's pronunciations become increasingly accurate between 1 and 3 years, but some problems may persist until school age.

A child who learns that a word stands for an object may initially think that the *word can be used for only that particular object*, which is referred to as **Underextension.** Only the family's Irish Setter is a "doggie", for example. More often, however, a child may think that *a label applies to all objects that are similar to the original object*, which is called **Overextension.** For example, all animals become "doggies".

First words and cultural influences: First words if the child is using English tend to be nouns. The child labels objects such as cup, ball, or other items that they regularly interact with. In a verb-friendly language such as Chinese, however, children may learn more verbs. This may also be due to the different emphasis given to objects based on culture. Chinese children may be taught to notice action and relationships between objects, while children from the United States may be taught to name an object and its qualities (color, texture, size, etc.). These differences can be seen when comparing interpretations of art by older students from China and the United States.

Two word sentences and telegraphic (text message) speech: By the time they become toddlers, children have a vocabulary of about 50-200 words and begin putting those words together in telegraphic speech, such as "baby bye-bye" or "doggie pretty". Words needed to convey messages are used, but the articles and other parts of speech necessary for grammatical correctness are not yet used. These expressions sound like a telegraph, or perhaps a better analogy today would be that they read like a text message. **Telegraphic Speech/Text Message Speech** *occurs when unnecessary words are not used*. "Give baby ball" is used rather than "Give the baby the ball."

Infant-directed Speech: Why is a horse a "horsie"? Have you ever wondered why adults tend to use "baby talk" or that sing-song type of intonation and exaggeration used when talking to children? This represents a universal tendency and is known as **Infant-directed Speech.** *It involves exaggerating the vowel and consonant sounds, using a high-pitched voice, and delivering the phrase with great facial expression* (Clark, 2009). Why is this done? Infants are frequently more attuned to the tone of voice of the person speaking than to the content of the words themselves, and are aware of the target of speech. Werker, Pegg, and McLeod (1994) found that infants listened longer to a woman who was speaking to a baby than to a woman who was speaking to another adult. It may be in order to clearly articulate the sounds of a word so that the child can hear the sounds involved. It may also be because when this type of speech is used, the infant pays more attention to the speaker and this sets up a pattern of interaction in which the speaker and listener are in tune with one another.

Theories of Language Development

Psychological theories of language learning differ in terms of the importance they place on nature and nurture. Remember that we are a product of both nature and nurture. Researchers now believe that language acquisition is partially inborn and partially learned through our interactions with our linguistic environment (Gleitman & Newport, 1995; Stork & Widdowson, 1974).

Learning Theory: Perhaps the most straightforward explanation of language development is that it occurs through the principles of learning, including association and reinforcement (Skinner, 1953). Additionally, Bandura (1977) described the importance of observation and imitation of others in learning language. There must be at least some truth to the idea that language is learned through environmental interactions or nurture. Children learn the language that they hear spoken around them rather than some other language. Also supporting this idea is the gradual improvement of language skills with time. It seems that children modify their language through imitation and reinforcement, such as parental praise and being understood. For example, when a two-year-old child asks for juice, he might say, "me juice," to which his mother might respond by giving him a cup of apple juice.

However, language cannot be entirely learned. For one, children learn words too fast for them to be learned through reinforcement. Between the ages of 18 months and 5 years, children learn up to 10 new words every day (Anglin, 1993). More importantly, language is more *generative* than it is imitative**.** Language is not a predefined set of ideas and sentences that we choose when we need them, but rather a system of rules and procedures that allows us to create an infinite number of statements, thoughts, and ideas, including those that have never previously occurred. When a child says that she "swimmed" in the pool, for instance, she is showing generativity. No adult speaker of English would ever say "swimmed," yet it is easily generated from the normal system of producing language.

Other evidence that refutes the idea that all language is learned through experience comes from the observation that children may learn languages better than they ever hear them. Deaf children whose parents do not speak ASL very well nevertheless are able to learn it perfectly on their own, and may even make up their own language if they need to (Goldin-Meadow & Mylander, 1998). A group of deaf children in a school in Nicaragua, whose teachers could not sign, invented a way to communicate through made-up

signs (Senghas, Senghas, & Pyers, 2005). The development of this new Nicaraguan Sign Language has continued and changed as new generations of students have come to the school and started using the language. Although the original system was not a real language, it is becoming closer and closer every year, showing the development of a new language in modern times.

Figure 3.19: Three theorists who provide explanations for language development. From left: B.F. Skinner, Source. Albert Bandura. Source. Noam Chomsky. Source.

Chomsky and Nativism: The linguist Noam Chomsky is a believer in the nature approach to language, arguing that human brains contain a **Language Acquisition Device** that includes a *universal grammar* that underlies all human language (Chomsky, 1965, 1972). According to this approach, each of the many languages spoken around the world (there are between 6,000 and 8,000) is an individual example of the same underlying set of procedures that are hardwired into human brains. Chomsky's account proposes that children are born with a knowledge of general rules of syntax that determine how sentences are constructed. Language develops as long as the infant is exposed to it. No teaching, training, or reinforcement is required for language to develop as proposed by Skinner.

Chomsky differentiates between the **deep structure** of an idea; that is, *how the idea is represented in the fundamental universal grammar that is common to all languages*, and the **surface structure** of the idea or *how it is expressed in any one language*. Once we hear or express a thought in surface structure, we generally forget exactly how it happened. At the end of a lecture, you will remember a lot of the deep structure (i.e., the ideas expressed by the instructor), but you cannot reproduce the surface structure (the exact words that the instructor used to communicate the ideas).

Although there is general agreement among psychologists that babies are genetically programmed to learn language, there is still debate about Chomsky's idea that there is a universal grammar that can account for all language learning. Evans and Levinson (2009) surveyed the world's languages and found that none of the presumed underlying features of the language acquisition device were entirely universal. In their search they found languages that did not have noun or verb phrases, that did not have tenses (e.g., past, present, future), and even some that did not have nouns or verbs at all, even though a basic assumption of a universal grammar is that all languages should share these features.

Critical Periods: Anyone who has tried to master a second language as an adult knows the difficulty of language learning. Yet children learn languages easily and naturally. Children who are not exposed to language early in their lives will likely never learn one. Case studies, including Victor the "Wild Child," who was abandoned as a baby in France and not discovered until he was 12, and Genie, a child whose parents kept her locked in a closet from 18 months until 13 years of age, are (fortunately) two of the only known examples of these deprived children. Both of these children made some progress in socialization after they were rescued, but neither of them ever developed language (Rymer, 1993). This is also why it is important to determine quickly if a child is deaf, and to communicate in sign language immediately. Deaf children who are not exposed to sign language during their early years will likely never learn it (Mayberry, Lock, & Kazmi, 2002). The concept of critical periods highlights the importance of both nature and nurture for language development.

Figure 3.20: Victor of Aveyon. Source.

Social pragmatics: Another view emphasizes the very social nature of human language. Language from this view is not only a cognitive skill, but also a social one. Language is a tool humans use to communicate, connect to, influence, and inform others. Most of all, language comes out of a need to cooperate. The social nature of language has been demonstrated by a number of studies that have shown that children use several pre-linguistic skills (such as pointing and other gestures) to communicate not only their own needs, but what others may need. So a child watching her mother search for an object may point to the object to help her mother find it.

Eighteen-month to 30-month-olds have been shown to make linguistic repairs when it is clear that another person does not understand them (Grosse, Behne, Carpenter & Tomasello, 2010). Grosse et al. (2010) found that even when the child was given the desired object, if there had been any misunderstanding along the way (such as a delay in being handed the object, or the experimenter calling the object by the wrong name), children would make linguistic repairs. This would suggest that children are using language not only as a means of achieving some material goal, but to make themselves understood in the mind of another person.

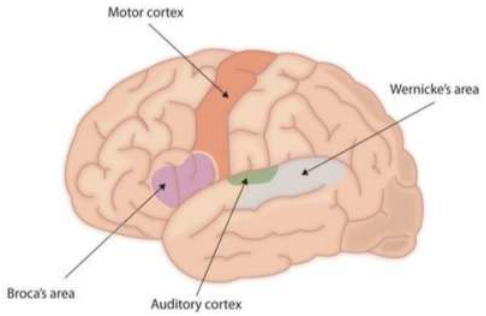

Figure 3.21 Drawing of Brain Showing Broca's and Wernicke's Areas. For most people, the left hemisphere is specialized for language. Broca's area, near the motor cortex, is involved in language production, whereas Wernicke's area, near the auditory cortex, is specialized for language comprehension. Source.

Brain Areas for Language: For the 90% of people who are right-handed, language is stored and controlled by the left cerebral cortex, although for some left-handers this pattern is reversed.Thesedifferencescan easily be seen in the results of neuroimaging studies that show that listening to and producing language creates greater activity in the left hemisphere than in the right. **Broca's area**, *an area in front of the left hemisphere near the motor cortex, is responsible for language production* (Figure 3.21). This area was first localized in the 1860s by the French physician Paul Broca, who studied patients with lesions to various parts of the brain. **Wernicke's area**, *an area of the brain next to the auditory cortex, is responsible for language comprehension.*

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8.2: Language Development

Vocabulary growth: A child's vocabulary expands between the ages of two to six from about 200 words to over 10,000 words. This "vocabulary spurt" typically involves 10-20 new words per week and is accomplished through a process called **fast-mapping**. *Words are easily learned by making connections between new words and concepts already known*. The parts of speech that are learned depend on the language and what is emphasized. Children speaking verb-friendly languages, such as Chinese and Japanese, learn verbs more readily, while those speaking English tend to learn nouns more readily. However, those learning less verb-friendly languages, such as English, seem to need assistance in grammar to master the use of verbs (Imai et al., 2008).

Literal meanings: Children can repeat words and phrases after having heard them only once or twice, but they do not always understand the meaning of the words or phrases. This is especially true of expressions or figures of speech which are taken literally. For example, a classroom full of preschoolers hears the teacher say, "Wow! That was a piece of cake!" The children began asking "Cake? Where is my cake? I want cake!"

Overregularization: Children learn rules of grammar as they learn language but may apply these rules inappropriately at first. For instance, a child learns to add "ed" to the end of a word to indicate past tense. Then form a sentence such as "I goed there. I doed that." This is typical at ages two and three. They will soon learn new words such as "went" and "did" to be used in those situations.

The Impact of Training: Remember Vygotsky and the Zone of Proximal Development? Children can be assisted in learning language by others who listen attentively, model more accurate pronunciations and encourage elaboration. The child exclaims, "I'm goed there!" and the adult responds, "You went there? Say, 'I went there.' Where did you go?" Children may be ripe for language as Chomsky suggests, but active participation in helping them learn is important for language development as well. The process of scaffolding is one in which the guide provides needed assistance to the child as a new skill is learned.

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8.3: Language Development

Vocabulary: One of the reasons that children can classify objects in so many ways is that they have acquired a vocabulary to do so. By fifth grade, a child's vocabulary has grown to 40,000 words. It grows at a rate that exceeds that of those in early childhood. This language explosion, however, differs from that of younger children because it is facilitated by being able to associate new words with those already known, and because it is accompanied by a more sophisticated understanding of the meanings of a word.

New Understanding: Those in middle and late childhood are also able to think of objects in less literal ways. For example, if asked for the first word that comes to mind when one hears the word "pizza", the younger child is likely to say "eat" or some word that describes what is done with a pizza. However, the older child is more likely to place pizza in the appropriate category and say "food". This sophistication of vocabulary is also evidenced by the fact that older children tell jokes and delight in doing do. They may use jokes that involve plays on words such as "knock- knock" jokes or jokes with punch lines. Young children do not understand play on words and tell "jokes" that are literal or slapstick, such as "A man fell down in the mud! Isn't that funny?"

Grammar and Flexibility: Older children are also able to learn new rules of grammar with more flexibility. While younger children are likely to be reluctant to give up saying "I goed there", older children will learn this rather quickly along with other rules of grammar.

Figure 5.7. Source.

Bilingualism: Although monolingual speakers often do not realize it, the majority of children around the world are **Bilingual**, *meaning that they understand and use two languages* (Meyers- Sutton, 2005). Even in the United States, which is a relatively monolingual society, more than 47 million people speak a language other than English at home, and about 10 million of these people are children or youths in public schools (United States Department of Commerce, 2003). The large majority of bilingual students (75%) are Hispanic, but the rest represent more than a hundred different language groups from around the world. In larger communities throughout the United States, it is therefore common for a single classroom to contain students from several language backgrounds at once. In classrooms, as in other social settings, bilingualism exists in different forms and degrees. At one extreme are students who speak both English and another language fluently; at the other extreme are those who speak only limited versions of both languages. In between are students who speak their home (or heritage) language much better than English, as well as others who have partially lost their heritage language in the process of learning English (Tse, 2001). Commonly, a student may speak a language satisfactorily, but be challenged by reading or writing it. Whatever the case, each bilingual student poses unique challenges to teachers.

The student who speaks both languages fluently has a definite cognitive advantage. As you might suspect and research confirmed, a fully fluent bilingual student is in a better position to express concepts or ideas in more than one way, and to be aware of doing so (Jimenez, Garcia, & Pearson, 1995; Francis, 2006). Unfortunately, the bilingualism of many students is unbalanced in the sense that they are either still learning English, or else they have lost some earlier ability to use their original, heritage language. Losing one’s original language is a concern as research finds that language loss limits students' ability to learn English as well or as quickly as they could do. Having a large vocabulary in a first language has been shown to save time in learning vocabulary in a second language (Hansen, Umeda & McKinney, 2002). Preserving the first language is important if a student has impaired skill in all languages and therefore needs intervention or help from a speech-language specialist. Research has found, in such cases, that the specialist can be more effective if the specialist speaks and uses the first language as well as English (Kohnert, Yim, Nett, Kan, & Duran, 2005).

Communication Disorders

At the end of early childhood children are often assessed in terms of their ability to speak properly. By first grade, about 5% of children have a notable speech disorder (Medline Plus, 2016c).

Fluency disorders: Fluency disorders *affect the rate of speech*. Speech may be labored and slow, or too fast for listeners to follow. The most common fluency disorder is stuttering. **Stuttering** *is a speech disorder in which sounds, syllables, or words are repeated or last longer than normal*. These problems cause a break in the flow of speech, which is called dysfluency (Medline Plus, 2016b). About 5% of young children, aged two-five, will develop some stuttering that may last from several weeks to several years (Medline Plus, 2016c). Approximately 75% of children recover from stuttering. For the remaining 25%, stuttering can persist as a lifelong communication disorder (National Institute on Deafness and other Communication Disorders, NIDCD, 2016). This is called developmental stuttering and is the most common form of stuttering. Brain injury, and in very rare instances, emotional trauma may be other triggers for developing problems with stuttering. In most cases of developmental stuttering, other family members share the same communication disorder. Researchers have recently identified variants in four genes that are more commonly found in those who stutter (NIDCD, 2016).

Articulation disorder: An **articulation disorder** *refers to the inability to correctly produce speech sounds (phonemes) because of imprecise placement, timing, pressure, speed, or flow of movement of the lips, tongue, or throat* (NIDCD, 2016). Sounds can be substituted, left off, added or changed. These errors may make it hard for people to understand the speaker. They can range from problems with specific sounds, such as lisping to severe impairment in the phonological system. Most children have problems pronouncing words early on while their speech is developing. However, by age three, at least half of what a child says should be understood by a stranger. By age five, a child's speech should be mostly intelligible. Parents should seek help if by age six the child is still having trouble producing certain sounds. It should be noted that accents are not articulation disorders (Medline Plus, 2016a).

Voice disorders: Disorders of the voice *involve problems with pitch, loudness, and quality of the voice* (American Speech-Language and Hearing Association, 2016). It only becomes a disorder when problems with the voice makes the child unintelligible. In children, voice disorders are significantly more prevalent in males than in females. Between 1.4% and 6% of children experience problems with the quality of their voice. Causes can be due to structural abnormalities in the vocal cords and/or larynx, functional factors, such as vocal fatigue from overuse, and in rarer cases psychological factors, such as chronic stress and anxiety.

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CHAPTER OVERVIEW

9: Psychosocial Development- Emotions, Temperament, Attachment

9.1: Psychosociological Development in Infancy and Toddlerhood
9.2: Forming Attachments
9.3: Erikson - Autonomy vs. Shame and Doubt
9.4: Psychosocial Development in Early Childhood
9.5: Socioemotional Development in Middle and Late Childhood

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9.1: Psychosociological Development in Infancy and Toddlerhood

Learning Objectives: Psychosocial Development in Infancy and Toddlerhood

- Identify styles of teperament and explore goodness-of-fit
- Describe the early theories of attachment
- Contrast styles of attachment according to the Strange Situation Technique
- Explain the factors that influence attachment
- Describe self-awareness, stranger wariness, and separation anxiety
- Use Erikson's theory to characterize psychosocial development during infancy

Temperament

Perhaps you have spent time with a number of infants. How were they alike? How did they differ? How do you compare with your siblings or other children you have known well. You may have noticed that some seemed to be in a better mood than others and that some were more sensitive to noise or more easily distracted than others. These differences may be attributed to temperament. **Temperamen**t *is the innate characteristics of the infant, including mood, activity level, and emotional reactivity, noticeable soon after birth.*

In a 1956 landmark study, Chess and Thomas (1996) evaluated 141 children's temperament based on parental interviews. Referred to as the New York Longitudinal Study, infants were assessed on 9 dimensions of temperament including: Activity level, rhythmicity (regularity of biological functions), approach/withdrawal (how children deal with new things), adaptability to situations, intensity of reactions, threshold of responsiveness (how intense a stimulus has to be for the child to react), quality of mood, distractibility, attention span, and persistence. Based on the infants' behavioral profiles, they were categorized into three general types of temperament:

- **Easy Child** (40%) who is able to quickly adapt to routine and new situations, remains calm, is easy to soothe, and usually is in a positive mood.
- **Difficult Child** (10%) who reacts negatively to new situations, has trouble adapting to routine, is usually negative in mood, and cries frequently.
- **Slow-to-Warm-Up Child** (15%) has a low activity level, adjusts slowly to new situations and is often negative in mood.

As can be seen the percentages do not equal 100% as some children were not able to be placed neatly into one of the categories. Think about how you might approach each type of child in order to improve your interactions with them. An easy child will not need much extra attention, while a slow to warm up child may need to be given advance warning if new people or situations are going to be introduced. A difficult child may need to be given extra time to burn off their energy. A caregiver's ability to work well and accurately read the child will enjoy a **Goodness- of-Fit,** *meaning their styles match and communication and interaction can flow.* Parents who recognize each child's temperament and accept it, will nurture more effective interactions with the child and encourage more adaptive functioning. For example, an adventurous child whose parents regularly take her outside on hikes would provide a good "fit" to her temperament.

Parenting is bidirectional: Not only do parents affect their children, children influence their parents. Child characteristics, such as temperament, affect parenting behaviors and roles. For example, an infant with an easy temperament may enable parents to feel more effective, as they are easily able to soothe the child and elicit smiling and cooing. On the other hand, a cranky or fussy infant elicits fewer positive reactions from his or her parents and may result in parents feeling less effective in the parenting role (Eisenberg et al., 2008). Over
time, parents of more difficult children may become more punitive and less patient with their children (Clark, Kochanska, & Ready, 2000; Eisenberg et al., 1999; Kiff, Lengua, & Zalewski, 2011). Parents who have a fussy, difficult child are less satisfied with their marriages and have greater challenges in balancing work and family roles (Hyde, Else-Quest, & Goldsmith, 2004). Thus, child temperament is one of the child characteristics that influences how parents behave with their children.

Temperament does not change dramatically as we grow up, but we may learn how to work around and manage our temperamental qualities. Temperament may be one of the things about us that stays the same throughout development. In contrast, **personality**, *defined as an individual's consistent pattern of feeling, thinking, and behaving,* is the result of the continuous interplay between biological disposition and experience.

Figure 3.22. Source.

Personality also develops from temperament in other ways (Thompson, Winer, & Goodvin, 2010). As children mature biologically, temperamental characteristics emerge and change over time. A newborn is not capable of much self-control, but as brain-based capacities for self- control advance, temperamental changes in self-regulation become more apparent. For example, a newborn who cries frequently doesn't necessarily have a grumpy personality; over time, with sufficient parental support and increased sense of security, the child might be less likely to cry.

In addition, personality is made up of many other features besides temperament. Children's developing self-concept, their motivations to achieve or to socialize, their values and goals, their coping styles, their sense of responsibility and conscientiousness, and many other qualities are encompassed into personality. These qualities are influenced by biological dispositions, but even more by the child's experiences with others, particularly in close relationships, that guide the growth of individual characteristics. Indeed, personality development begins with the biological foundations of temperament but becomes increasingly elaborated, extended, and refined over time. The newborn that parents gazed upon thus becomes an adult with a personality of depth and nuance**.**

Infant Emotions

At birth, infants exhibit two emotional responses: Attraction and withdrawal. They show attraction to pleasant situations that bring comfort, stimulation, and pleasure, and they withdraw from unpleasant stimulation such as bitter flavors or physical discomfort. At around two months, infants exhibit social engagement in the form of social smiling as they respond with smiles to those who engage their positive attention (Lavelli & Fogel, 2005).

Social smiling becomes more stable and organized as infants learn to use their smiles to engage their parents in interactions. Pleasure is expressed as laughter at 3 to 5 months of age, and displeasure becomes more specific as fear, sadness, or anger between ages 6 and 8 months. Anger is often the reaction to being prevented from obtaining a goal, such as a toy being removed (Braungart-Rieker, Hill-Soderlund, & Karrass, 2010). In contrast, sadness is typically the response when infants are deprived of a caregiver (Papousek, 2007). *Fear is often associated with the presence of a stranger, known as* **stranger wariness,** *or the departure of significant others known as* **separation anxiety.** Both appear sometime between 6 and 15 months after object permanence has been acquired. Further, there is some indication that infants may experience jealousy as young as 6 months of age (Hart & Carrington, 2002).

Emotions are often divided into two general categories: **Basic emotions**, such as *interest, happiness, anger, fear, surprise, sadness and disgust,* which appear first, and **self-conscious emotions**, such as *envy, pride, shame, guilt, doubt, and embarrassment*. Unlike primary emotions, secondary emotions appear as children start to develop a self-concept, and require social instruction on when to feel such emotions. The situations in which children learn self- conscious emotions varies from culture to culture. Individualistic cultures teach us to feel pride in personal accomplishments, while in more collective cultures children are taught to not call attention to themselves, unless you wish to feel embarrassed for doing so (Akimoto & Sanbinmatsu, 1999).

Facial expressions of emotion are important regulators of social interaction. In the developmental literature, this concept has been investigated under the concept of **social referencing;** that is, *the process whereby infants seek out information from others to clarify a situation and then use that information to act* (Klinnert, Campos, & Sorce, 1983). To date, the strongest demonstration of social referencing comes from work on the visual cliff. In the first study to investigate this concept, Campos and colleagues (Sorce, Emde, Campos, & Klinnert, 1985) placed mothers on the far end of the "cliff" from the infant. Mothers first smiled to the infants and placed a toy on top of the safety glass to attract them; infants invariably began crawling to their mothers. When the infants were in the center of the table, however, the mother then posed an expression of fear, sadness, anger, interest, or joy. The results were clearly different for the different faces; no infant crossed the table when the mother showed fear; only 6% did when the mother posed anger, 33% crossed when the mother posed sadness, and approximately 75% of the infants crossed when the mother posed joy or interest.

Figure 3.23. Source.

Other studies provide similar support for facial expressions as regulators of social interaction. Experimenters posed facial expressions of neutral, anger, or disgust toward babies as they moved toward an object and measured the amount of inhibition the babies showed in touching the object (Bradshaw, 1986). The results for 10- and 15-month olds were the same: Anger produced the greatest inhibition, followed by disgust, with neutral the least. This study was later replicated using joy and disgust expressions, altering the method so that the infants were not allowed to touch the toy (compared with a distractor object) until one hour after exposure to the expression (Hertenstein & Campos, 2004). At 14 months of age, significantly more infants touched the toy when they saw joyful expressions, but fewer touched the toy when the infants saw disgust.

A final emotional change is in self-regulation. **Emotional self-regulation** *refers to strategies we use to control our emotional states so that we can attain goals* (Thompson & Goodvin, 2007). This requires effortful control of emotions and initially requires assistance from caregivers (Rothbart, Posner, & Kieras, 2006). Young infants have very limited capacity to adjust their emotional states and depend on their caregivers to help soothe themselves. Caregivers can offer distractions to redirect the infant's attention and comfort to reduce the emotional distress. As areas of the infant's prefrontal cortex continue to develop, infants can tolerate more stimulation. By 4 to 6 months, babies can begin to shift their attention away from upsetting stimuli (Rothbart et al, 2006). Older infants and toddlers can more effectively communicate their need for help and can crawl or walk toward or away from various situations (Cole, Armstrong, & Pemberton, 2010). This aids in their ability to self-regulate. Temperament also plays a role in children's ability to control their emotional states, and individual differences have been noted in the emotional self-regulation of infants and toddlers (Rothbart & Bates, 2006).

Figure 3.24. Source.

Development of sense of self: During the second year of life, children begin to recognize themselves as they gain a sense of self as object. In a classic experiment by Lewis and Brooks (1978) children 9 to 24 months of age were placed in front of a mirror after a spot of rouge was placed on their nose as their mothers pretended to wipe something off the child's face. If the child reacted by touching his or her own nose rather that of the "baby" in the mirror, it was taken to suggest that the child recognized the reflection as him- or herself. Lewis and Brooks found that somewhere between 15 and 24 months most infants developed a sense of self-awareness. **Self-awareness** *is the realization that you are separate from others* (Kopp, 2011). Once a child has achieved self-awareness, the child is moving toward understanding social emotions such as guilt, shame or embarrassment, as well as, sympathy or empathy.

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9.2: Forming Attachments

Attachment *is the close bond with a caregiver from which the infant derives a sense of security*. The formation of attachments in infancy has been the subject of considerable research as attachments have been viewed as foundations for future relationships. Additionally, attachments form the basis for confidence and curiosity as toddlers, and as important influences on self- concept.

Figure 3.25: Mutually enjoyable interactions promote infant bonding. Credit: Peter Shanks.

Freud's Psychoanalytic Theory: According to Freud (1938) infants are oral creatures who obtain pleasure from sucking and mouthing objects. Freud believed the infant will become attached to a person or object that provides this pleasure. Consequently, infants were believed to become attached to their mother because she was the one who satisfied their oral needs and provided pleasure. Freud further believed that the infants will become attached to their mothers "if the mother is relaxed and generous in her feeding practices, thereby allowing the child a lot of oral pleasure," (Shaffer, 1985, p. 435). Was Freud correct in his explanation for why infants became attached?

Harlow's Research: In one classic study showing if nursing was the most important factor to attachment, Wisconsin University psychologists Harry and Margaret Harlow investigated the responses of young monkeys. The infants were separated from their biological mothers, and two surrogate mothers were introduced to their cages. One, the wire mother, consisted of a round wooden head, a mesh of cold metal wires, and a bottle of milk from which the baby monkey could drink. The second mother was a foam-rubber form wrapped in a heated terry-cloth blanket. The infant monkeys went to the wire mother for food, but they overwhelmingly preferred and spent significantly more time with the warm terry-cloth mother.The warm terry-cloth mother provided no food but did provide comfort (Harlow, 1958). *The infant's need for physical closeness and touching is referred to as* **contact comfort**. Contact comfort is believed to be the foundation for attachment. The Harlows' studies confirmed that babies have social as well as physical needs. Both monkeys and human babies need a secure base that allows them to feel safe. From this base, they can gain the confidence they need to venture out and explore their worlds.

Bowlby's Theory: Building on the work of Harlow and others, John Bowlby developed the concept of attachment theory. He defined attachment as the affectional bond or tie that an infant forms with the mother (Bowlby, 1969). An infant must form this bond with a primary caregiver in order to have normal social and emotional development. In addition, Bowlby proposed that this attachment bond is very powerful and continues throughout life. He used the concept of secure base to define a healthy attachment between parent and child (Bowlby, 1982). A **secure base** *is a parental presence that gives the child a sense of safety as the child explores the surroundings.*

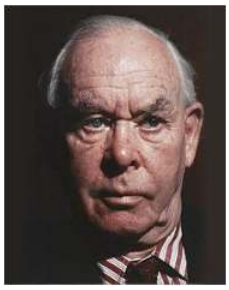

Figure 3.26: John Bowlby. Source.

Bowlby said that two things are needed for a healthy attachment: The caregiver must be responsive to the child's physical, social, and emotional needs; and the caregiver and child must engage in mutually enjoyable interactions (Bowlby, 1969). Additionally, Bowlby observed that infants would go to extraordinary lengths to prevent separation from their parents, such as crying, refusing to be comforted, and waiting for the caregiver to return. He observed that these same expressions were common to many other mammals, and consequently argued that these negative responses to separation serve an evolutionary function. Because

mammalian infants cannot feed or protect themselves, they are dependent upon the care and protection of adults for survival. Thus, those infants who were able to maintain proximity to an attachment figure were more likely to survive and reproduce.

Erikson: Trust vs. Mistrust

As previously discussed in chapter 1, Erikson formulated an eight stage theory of psychosocial development. Erikson was in agreement on the importance of a secure base, arguing that the most important goal of infancy was the development of a basic sense of trust in one's caregivers. Consequently, the first stage, trust vs. mistrust, highlights the importance of attachment. Erikson maintained that the first year to year and a half of life involves the establishment of a sense of trust (Erikson, 1982). Infants are dependent and must rely on others to meet their basic physical needs as well as their needs for stimulation and comfort. A caregiver who consistently meets these needs instills a sense of trust or the belief that the world is a trustworthy place. The caregiver should not worry about overly indulging a child's need for comfort, contact or stimulation.

Problems establishing trust: Erikson (1982) believed that mistrust could contaminate all aspects of one's life and deprive the individual of love and fellowship with others. Consider the implications for establishing trust if a caregiver is unavailable or is upset and ill-prepared to care for a child. Or if a child is born prematurely, is unwanted, or has physical problems that make him or her less desirable to a parent. Under these circumstances, we cannot assume that the parent is going to provide the child with a feeling of trust.

Mary Ainsworth and the Strange Situation Technique

Developmental psychologist Mary Ainsworth, a student of John Bowlby, continued studying the development of attachment in infants. Ainsworth and her colleagues created a laboratory test that measured an infant's attachment to his or her parent. The test is called **The Strange Situation Technique** because it is *conducted in a context that is unfamiliar to the child and therefore likely to heighten the child's need for his or her parent* (Ainsworth, 1979).

During the procedure, that lasts about 20 minutes, the parent and the infant are first left alone, while the infant explores the room full of toys. Then a strange adult enters the room and talks for a minute to the parent, after which the parent leaves the room. The stranger stays with the infant for a few minutes, and then the parent again enters and the stranger leaves the room. During the entire session, a video camera records the child's behaviors, which are later coded by trained coders. The investigators were especially interested in how the child responded to the caregiver leaving and returning to the room, referred to as the "reunion." On the basis of their behaviors, the children are categorized into one of four groups where each group reflects a different kind of attachment relationship with the caregiver. One style is secure and the other three styles are referred to as insecure.

- A child with a **secure attachment style** usually explores freely while the caregiver is present and may engage with the stranger. The child will typically play with the toys and bring one to the caregiver to show and describe from time to time. The child may be upset when the caregiver departs, but is also happy to see the caregiver return.
- A child with an **ambivalent** (sometimes called resistant) **attachment style** is wary about the situation in general, particularly the stranger, and stays close or even clings to the caregiver rather than exploring the toys. When the caregiver leaves, the child is extremely distressed and is ambivalent when the caregiver returns. The child may rush to the caregiver, but then fails to be comforted when picked up. The child may still be angry and even resist attempts to be soothed.
- A child with an **avoidant attachment style** will avoid or ignore the mother, showing little emotion when the mother departs or returns. The child may run away from the mother when she approaches. The child will not explore very much, regardless of who is there, and the stranger will not be treated much differently from the mother.
- A child with a **disorganized/disoriented attachment style** seems to have an inconsistent way of coping with the stress of the strange situation. The child may cry during the separation, but avoid the mother when she returns, or the child may approach the mother but then freeze or fall to the floor.

How common are the attachment styles among children in the United States? It is estimated that about 65 percent of children in the United States are securely attached. Twenty percent exhibit avoidant styles and 10 to 15 percent are ambivalent. Another 5 to 10 percent may be characterized as disorganized.

Figure 3.27. Source.

Some cultural differences in attachment styles have been found (Rothbaum, Weisz, Pott, Miyake, & Morelli, 2010). For example, German parents value independence and Japanese mothers are typically by their children's sides. As a result, the rate of insecure-avoidant attachments is higher in Germany and insecure-resistant attachments are higher in Japan. These differences reflect cultural variation rather than true insecurity, however (van Ijzendoorn and Sagi, 1999).

Keep in mind that methods for measuring attachment styles have been based on a model that reflects middle-class, U. S. values and interpretation. Newer methods for assessment attachment styles involve using a **Q-sort technique** *in which a large number of behaviors are recorded on cards and the observer sorts the cards in a way that reflects the type of behavior that occurs within the situation* (Waters, 1987). There are 90 items in the third version of the Q-sort technique, and examples of the behaviors assessed include:

- When child returns to mother after playing, the child is sometimes fussy for no clear reason.
- When the child is upset or injured, the child will accept comforting from adults other than mother.
- Child often hugs or cuddles against mother, without her asking or inviting the child to do so
- When the child is upset by mother's leaving, the child continues to cry or even gets angry after she is gone.

At least two researchers observe the child and parent in the home for 1.5-2 hours per visit. Usually two visits are sufficient to gather adequate information. The parent is asked if the behaviors observed are typical for the child. This information is used to test the validity of the Strange Situation classifications across age, cultures, and with clinical populations.

Caregiver Interactions and the Formation of Attachment: Most developmental psychologists argue that a child becomes **securely attached** when there is consistent contact from one or more caregivers who meet the physical and emotional needs of the child in a responsive and appropriate manner. However, even in cultures where mothers do not talk, cuddle, and play with their infants, secure attachments can develop (LeVine et. al., 1994).

The **insecure ambivalent style** occurs when the parent is insensitive and responds inconsistently to the child's needs. Consequently, the infant is never sure that the world is a trustworthy place or that he or she can rely on others without some anxiety. A caregiver who is unavailable, perhaps because of marital tension, substance abuse, or preoccupation with work, may send a message to the infant he or she cannot rely on having needs met. An infant who receives only sporadic attention when experiencing discomfort may not learn how to calm down. The child may cry if separated from the caregiver and also cry upon their return. They seek constant reassurance that never seems to satisfy their doubt. Keep in mind that clingy behavior can also just be part of a child's natural disposition or temperament and does not necessarily reflect some kind of parental neglect. Additionally, a caregiver that attends to a child's frustration can help teach them to be calm and to relax.

The **insecure avoidant style** is marked by insecurity, but this style is also characterized by a tendency to avoid contact with the caregiver and with others. This child may have learned that needs typically go unmet and learns that the caregiver does not provide care and cannot be relied upon for comfort, even sporadically. An insecure avoidant child learns to be more independent and disengaged.

The **insecure disorganized/disoriented style** represents the most insecure style of attachment and occurs when the child is given mixed, confused, and inappropriate responses from the caregiver. For example, a mother who suffers from schizophrenia may laugh when a child is hurting or cry when a child exhibits joy. The child does not learn how to interpret emotions or to connect with the unpredictable caregiver. This type of attachment is also often seen in children who have been abused. Research has shown that abuse disrupts a child's ability to regulate their emotions (Main & Solomon, 1990).

Figure 3.28. Source.

Caregiver Consistency: Having a consistent caregiver may be jeopardized if the infant is cared for in a day care setting with a high turn-over of staff or if institutionalized and given little more than basic physical care. Infants who, perhaps because of being in orphanages with inadequate care, have not had the opportunity to attach in infancy may still form initial secure attachments several years later. However, they may have more emotional problems of depression, anger, or be overly friendly as they interact with others (O'Connor et. al., 2003).

Social Deprivation: Severe deprivation of parental attachment can lead to serious problems. According to studies of children who have not been given warm, nurturing care, they may show developmental delays, failure to thrive, and attachment disorders (Bowlby, 1982). **Non-organic failure to thrive** is the *diagnosis for an infant who does not grow, develop, or gain weight on schedule*. In addition, postpartum depression can cause even a well-intentioned mother to neglect her infant.

Reactive Attachment Disorder: Children who experience social neglect or deprivation, repeatedly change primary caregivers that limit opportunities to form stable attachments, or are reared in unusual settings (such as institutions) that limit opportunities to form stable attachments can certainly have difficulty forming attachments. According to the Diagnostic and Statistical

Manual of Mental Disorders, 5th edition (American Psychiatric Association, 2013), *those children experiencing neglectful situations and also displaying markedly disturbed and developmentally inappropriate attachment behavior, such as being inhibited and withdrawn, minimal social and emotional responsiveness to others, and limited positive affect, may be diagnosed with* **Reactive Attachment Disorder.** This disorder often occurs with developmental delays, especially in cognitive and language areas. Fortunately, the majority of severely neglected children do not develop Reactive Attachment Disorder, which occurs in less than 10% of such children. The quality of the caregiving environment after serious neglect affects the development of this disorder.

Resiliency: *Being able to overcome challenges and successfully adapt* is **Resiliency.** Even young children can exhibit strong resiliency to harsh circumstances. Resiliency can be attributed to certain personality factors, such as an easy-going temperament. Some children are warm, friendly, and responsive, whereas others tend to be more irritable, less manageable, and difficult to console, and these differences play a role in attachment (Gillath, Shaver, Baek, & Chun, 2008; Seifer, Schiller, Sameroff, Resnick, & Riordan, 1996). It seems safe to say that attachment, like most other developmental processes, is affected by an interplay of genetic and socialization influences.

Receiving support from others also leads to resiliency. A positive and strong support group can help a parent and child build a strong foundation by offering assistance and positive attitudes toward the newborn and parent. In a direct test of this idea, Dutch researcher van den Boom (1994) randomly assigned some babies' mothers to a training session in which they learned to better respond to their children's needs. The research found that these mothers' babies were more likely to show a secure attachment style in comparison to the mothers in a control group that did not receive training.

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9.3: Erikson - Autonomy vs. Shame and Doubt

As the child begins to walk and talk, an interest in independence or autonomy replaces a concern for trust. The toddler tests the limits of what can be touched, said, and explored. Erikson (1982) believed that toddlers should be allowed to explore their environment as freely as safety allows and in so doing will develop a sense of independence that will later grow to self-esteem, initiative, and overall confidence. If a caregiver is overly anxious about the toddler's actions for fear that the child will get hurt or violate other's expectation, the caregiver can give the child the message that he or she should be ashamed of their behavior and instill a sense of doubt in their own abilities. Parenting advice based on these ideas would be to keep your toddler safe, but let him or her learn by doing.

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9.4: Psychosocial Development in Early Childhood

Learning Objectives: Psychosocial Development in Early Childhood

- *Describe Erikson's third stage of initiative vs. guilt*
- *Describe the changes in self-concept and self-esteem*
- *Describe children's understanding of others*
- *Describe emotional regulation and delayed gratification*
- *Describe young children's understanding of morality*
- *Summarize the main theories of gender development*
- *Describe the major parenting styles and their consequences for children*
- *Describe the role of siblings in children's development*
- *Summarize the types of play in which children engage*
- *Describe the influence of the media on young children's social development*

Erikson: Initiative vs. Guilt

The trust and autonomy of previous stages develop into a desire to take initiative or to think of ideas and initiative action (Erikson, 1982). Children may want to build a fort with the cushions from the living room couch or open a lemonade stand in the driveway or make a zoo with their stuffed animals and issue tickets to those who want to come. Or they may just want to get themselves ready for bed without any assistance. To reinforce taking initiative, caregivers should offer praise for the child's efforts and avoid being critical of messes or mistakes. Placing pictures of drawings on the refrigerator, purchasing mud pies for dinner, and admiring towers of legos will facilitate the child's sense of initiative.

Self-Concept and Self-Esteem

Early childhood is a time of forming an initial sense of self. **Self-concept** *is our self-description according to various categories*, such as our external and internal qualities. In contrast, **self- esteem** *is an evaluative judgment about who we are*. The emergence of cognitive skills in this age group results in improved perceptions of the self. If asked to describe yourself to others you would likely provide some physical descriptors, group affiliation, personality traits, behavioral quirks, and important values and beliefs. When researchers ask young children the same open- ended question, the children provide physical descriptors, preferred activities, and favorite possessions. Thus, a three year-old might describe herself as a three years-old girl with red hair, who likes to play with legos. This *focus on external qualities* is referred to as the **categorical self**. However, even children as young as three know there is more to themselves than these external characteristics. Harter and Pike (1984) challenged the method of measuring personality with an open-ended question as they felt that language limitations were hindering the ability of young children to express their self-knowledge. They suggested a change to the method of measuring self-concept in young children, whereby researchers provide statements that ask whether something is true of the child (e.g., "I like to boss people around", "I am grumpy most of the time"). Consistent with Harter and Pike's suspicions, those in early childhood answer these statements in an internally consistent manner, especially after the age of four (Goodvin, Meyer, Thompson & Hayes, 2008) and often give similar responses to what others (parents and teachers) say about the child (Brown, Mangelsdorf, Agathen, & Ho, 2008; Colwell & Lindsey, 2003).

Figure 4.20. Source.

Young children tend to have a generally positive self- image. This optimism is often the result of a lack of social comparison when making self-evaluations (Ruble, Boggiano, Feldman, & Loeble, 1980), and with comparison between what the child once could do to what they can do now (Kemple, 1995). However, this does not mean that preschool children are exempt from negative self-evaluations. Preschool children with insecure attachments to their caregivers tend to have lower self-esteem at age four (Goodvin et al., 2008). Maternal negative affect was also found by Goodwin and her colleagues to produce more negative self-evaluations in preschool children.

Self-Control

Self-control is not a single phenomenon, but is multi-facetted. It includes **response initiation,** the ability to not initiate a behavior before you have evaluated all of the information, **response inhibition,** the ability to stop a behavior that has already begun, and **delayed gratification**, the ability to hold out for a larger reward by forgoing a smaller immediate reward (Dougherty, Marsh, Mathias, & Swann, 2005). It is in early childhood that we see the start of self-control, a process that takes many years to fully develop. In the now classic "Marshmallow Test" (Mischel, Ebbesen, & Zeiss, 1972) children are confronted with the choice of a small immediate reward (a marshmallow) and a larger delayed reward (more marshmallows). Walter Mischel and his colleagues over the years have found that the ability to delay gratification at the age of four predicted better academic performance and health later in life (Mischel, et al., 2011). Self- control is related to executive function, discussed earlier in the chapter. As executive function improves, children become less impulsive (Traverso, Viterbori, & Usai, 2015).

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9.5: Socioemotional Development in Middle and Late Childhood

Learning Objectives: Socioemotional Development in Middle and Late Childhood

- Describe Erikson's fourth stage of industry vs. inferiority
- Describe the changes in self-concept, self-esteem, and self-efficacy
- Explain Kohlberg's stages of moral development
- Describe the importance of peers, the stages of friendships, peer acceptance, and the consequences of peer acceptance
- Describe bullying, cyberbullying and the consequences of bullying
- Identify the types of families where children reside
- Identify the five family tasks
- Explain the consequences of divorce on children
- Describe the effects of cohabitation and remarriage on children
- Describe the characteristics and developmental stages of blended families

Erikson: Industry vs. Inferiority

According to Erikson, children in middle and late childhood are very busy or industrious (Erikson, 1982). They are constantly doing, planning, playing, getting together with friends, and achieving. This is a very active time, and a time when they are gaining a sense of how they measure up when compared with peers. Erikson believed that if these industrious children can be successful in their endeavors, they will get a sense of confidence for future challenges. If not, a sense of inferiority can be particularly haunting during middle and late childhood.

Self-Understanding

Self-concept *refers to beliefs about general personal identity* (Seiffert, 2011). These beliefs include personal attributes, such as one's age, physical characteristics, behaviors, and competencies. Children in middle and late childhood have a more realistic sense of self than do those in early childhood, and they better understand their strengths and weaknesses. This can be attributed to greater experience in comparing their own performance with that of others, and to greater cognitive flexibility. Children in middle and late childhood are also able to include other peoples' appraisals of them into their self-concept, including parents, teachers, peers, culture, and media. Internalizing others' appraisals and creating social comparison affect children's **self-esteem**, *which is defined as an evaluation of one's identity*. Children can have individual assessments of how well they perform a variety of activities and also develop an overall global self-assessment. If there is a discrepancy between how children view themselves and what they consider to be their ideal selves, their self-esteem can be negatively affected.

Figure 5.20: Hopefully these children have self-efficacy about playing the violin. Source.

Another important development in self-understanding is **self-efficacy**, *which is the belief that you are capable of carrying out a specific task or of reaching a specific goal* (Bandura, 1977, 1986, 1997). Large discrepancies between self-efficacy and ability can create motivational problems for the individual (Seifert, 2011). If a student believes that he or she can solve mathematical problems, then the student is more likely to attempt the mathematics homework that the teacher assigns. Unfortunately, the converse is also true. If a student believes that he or she is incapable of math, then the student is less likely to attempt the math homework regardless of the student's actual ability in math. Since self-efficacy is self-constructed, it is possible for students to miscalculate or misperceive their true skill, and these misperceptions can have complex effects on students' motivations. It is

possible to have either too much or too little self-efficacy, and according to Bandura (1997) the optimum level seems to be either at, or slightly above, true ability.

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CHAPTER OVERVIEW

10: Psychosocial- Self, Moral, Family, and Peers

10.1: Parenting Styles
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10.3: Kohlberg’s Stages of Moral Development
10.4: Friends and Peers
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10.1: Parenting Styles

Relationships between parents and children continue to play a significant role in children's development during early childhood. As children mature, parent-child relationships naturally change. Preschool and grade-school children are more capable, have their own preferences, and sometimes refuse or seek to compromise with parental expectations. This can lead to greater parent-child conflict, and how conflict is managed by parents further shapes the quality of parent-child relationships.

Baumrind (1971) identified a model of parenting that focuses on the level of control/ expectations that parents have regarding their children and how warm/responsive they are. This model resulted in four parenting styles. In general, children develop greater competence and self-confidence when parents have high, but reasonable expectations for children's behavior, communicate well with them, are warm, loving and responsive, and use reasoning, rather than coercion as preferred responses to children's misbehavior. This kind of parenting style has been described as **Authoritative** (Baumrind, 2013). *Authoritative parents are supportive and show interest in their kids' activities, but are not overbearing and allow them to make constructive mistakes*. Parents allow negotiation where appropriate, and consequently this type of parenting is considered more democratic.

Figure 4.22: Authoritative Parenting. Source.

Authoritarian, *is the traditional model of parenting in which parents make the rules and children are expected to be obedient.* Baumrind suggests that authoritarian parents tend to place maturity demands on their children that are unreasonably high and tend to be aloof and
distant. Consequently, children reared in this way may fear rather than respect their parents and, because their parents do not allow discussion, may take out their frustrations on safer targets- perhaps as bullies toward peers.

Permissive *parenting involves holding expectations of children that are below what could be reasonably expected from them.* Children are allowed to make their own rules and determine their own activities. Parents are warm and communicative, but provide little structure for their children. Children fail to learn self-discipline and may feel somewhat insecure because they do not know the limits.

Uninvolved *parents are disengaged from their children. They do not make demands on their children and are non-responsive.* These children can suffer in school and in their relationships with their peers (Gecas & Self, 1991).

Keep in mind that most parents do not follow any model completely. Real people tend to fall somewhere in between these styles. Sometimes parenting styles change from one child to the next or in times when the parent has more or less time and energy for parenting. Parenting styles can also be affected by concerns the parent has in other areas of his or her life. For example, parenting styles tend to become more authoritarian when parents are tired and perhaps more authoritative when they are more energetic. Sometimes parents seem to change their parenting approach when others are around, maybe because they become more self-conscious as parents or are concerned with giving others the impression that they are a "tough" parent or an "easygoing" parent. Additionally, parenting styles may reflect the type of parenting someone saw modeled while growing up. See Table 4.3 for Baumrind's parenting style descriptions.

Table 4.3: Comparison of Four Parenting Styles

		Expectations/Control	
		Low	High
Warmth/ Responsiveness	Low	uninvolved	authoritarian
	High	permissive	authoritative

Culture: The impact of culture and class cannot be ignored when examining parenting styles. The model of parenting described above assumes that the authoritative style is the best because this style is designed to help the parent raise a child who is

independent, self-reliant and responsible. These are qualities favored in “individualistic” cultures such as the United States, particularly by the middle class. However, in “collectivistic” cultures such as China or Korea, being obedient and compliant are favored behaviors. Authoritarian parenting has been used historically and reflects cultural need for children to do as they are told. African-American, Hispanic and Asian parents tend to be more authoritarian than non-Hispanic whites. In societies where family members’ cooperation is necessary for survival, rearing children who are independent and who strive to be on their own makes no sense. But in an economy based on being mobile in order to find jobs and where one’s earnings are based on education, raising a child to be independent is very important.

In a classic study on social class and parenting styles Kohn (1977) explains that parents tend to emphasize qualities that are needed for their own survival when parenting their children. Working class parents are rewarded for being obedient, reliable, and honest in their jobs. They are not paid to be independent or to question the management; rather, they move up and are considered good employees if they show up on time, do their work as they are told, and can be counted on by their employers. Consequently, these parents reward honesty and obedience in their children. Middle class parents who work as professionals are rewarded for taking initiative, being self-directed, and assertive in their jobs. They are required to get the job done without being told exactly what to do. They are asked to be innovative and to work independently. These parents encourage their children to have those qualities as well by rewarding independence and self-reliance. Parenting styles can reflect many elements of culture.

Spanking

Spanking is often thought of as a rite of passage for children, and this method of discipline continues to be endorsed by the majority of parents (Smith, 2012). Just how effective is spanking, however, and are there any negative consequences? After reviewing the research, Smith (2012) states “many studies have shown that physical punishment, including spanking, hitting and other means of causing pain, can lead to increased aggression, antisocial behavior, physical injury and mental health problems for children” (p. 60). Gershoff, (2008) reviewed decades of research and recommended that parents and caregivers make every effort to avoid physical punishment and called for the banning of physical discipline in all U.S. schools.

In a longitudinal study that followed more than 1500 families from 20 U.S. cities, parents’ reports of spanking were assessed at ages three and five (MacKenzie, Nicklas, Waldfogel, &

Brooks-Gunn, 2013). Measures of externalizing behavior and receptive vocabulary were assessed at age nine. Results indicated that those children who were spanked at least twice a week by their mothers scored 2.66 points higher on a measure of aggression and rule-breaking than those who were never spanked. Additionally, those who were spanked less, still scored 1.17 points higher than those never spanked. When fathers did the spanking, those spanked at least two times per week scored 5.7 points lower on a vocabulary test than those never spanked. This study revealed the negative cognitive effects of spanking in addition to the increase in aggressive behavior.

Internationally, physical discipline is increasingly being viewed as a violation of children’s human rights. Thirty countries have banned the use of physical punishment, and the United Nations Committee on the Rights of the Child (2014) called physical punishment “legalized violence against children” and advocated that physical punishment be eliminated in all settings.

Many alternatives to spanking are advocated by child development specialists and include:

- Praising and modeling appropriate behavior
- Providing time-outs for inappropriate behavior
- Giving choices
- Helping the child identify emotions and learning to calm down
- Ignoring small annoyances
- Withdrawing privileges

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10.2: Sibling Relationships

Siblings spend a considerable amount of time with each other and offer a unique relationship that is not found with same-age peers or with adults. Siblings play an important role in the development of social skills. Cooperative and pretend play interactions between younger and older siblings can teach empathy, sharing, and cooperation (Pike, Coldwell, & Dunn, 2005), as well as, negotiation and conflict resolution (Abuhatoum & Howe, 2013). However, the quality of sibling relationships is often mediated by the quality of the parent-child relationship and the psychological adjustment of the child (Pike et al., 2005). For instance, more negative interactions between siblings have been reported in families where parents had poor patterns of communication with their children (Brody, Stoneman, & McCoy, 1994). Children who have emotional and behavioral problems are also more likely to have negative interactions with their siblings. However, the psychological adjustment of the child can sometimes be a reflection of the parent-child relationship. Thus, when examining the quality of sibling interactions, it is often difficult to tease out the separate effect of adjustment from the effect of the parent-child relationship.

Figure 4.23: Siblings can have conflictual and supportive relationships. Source.

While parents want positive interactions between their children, conflicts are going to arise, and some confrontations can be the impetus for growth in children's social and cognitive skills. The sources of conflict between siblings often depend on their respective ages. Dunn and Munn (1987) revealed that over half of all sibling conflicts in early childhood were disputes about property rights. By middle childhood this starts shifting toward control over social situation, such as what games to play, disagreements about facts or opinions, or rude behavior (Howe, Rinaldi, Jennings, & Petrakos, 2002). Researchers have also found that the strategies children use to deal with conflict change with age, but that this is also tempered by the nature of the conflict.

Abuhatoum and Howe (2013) found that coercive strategies (e.g., threats) were preferred when the dispute centered on property rights, while reasoning was more likely to be used by older siblings and in disputes regarding control over the social situation. However, younger siblings also use reasoning, frequently bringing up the concern of legitimacy (e.g., "You're not the boss") when in conflict with an older sibling. This is a very common strategy used by younger siblings and is possibly an adaptive strategy in order for younger siblings to assert their autonomy (Abuhatoum & Howe, 2013). A number of researchers have found that children who can use non-coercive strategies are more likely to have a successful resolution, whereby a compromise is reached and neither child feels slighted (Ram & Ross, 2008; Abuhatoum & Howe, 2013).

Not surprisingly, friendly relationships with siblings often lead to more positive interactions with peers. The reverse is also true. A child can also learn to get along with a sibling, with, as the song says "a little help from my friends" (Kramer & Gottman, 1992).

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10.3: Kohlberg's Stages of Moral Development

Kohlberg (1963) built on the work of Piaget and was interested in finding out how our moral reasoning changes as we get older. He wanted to find out how people decide what is right and what is wrong. Just as Piaget believed that children's cognitive development follows specific patterns, Kohlberg (1984) argued that we learn our moral values through active thinking and reasoning, and that moral development follows a series of stages. Kohlberg's six stages are generally organized into three levels of moral reasons. To study moral development, Kohlberg posed moral dilemmas to children, teenagers, and adults, such as the following:

A man's wife is dying of cancer and there is only one drug that can save her. The only place to get the drug is at the store of a pharmacist who is known to overcharge people for drugs. The man can only pay $1,000, but the pharmacist wants $2,000, and refuses to sell it to him for less, or to let him pay later. Desperate, the man later breaks into the pharmacy and steals the medicine. Should he have done that? Was it right or wrong? Why? (Kohlberg, 1984)

- **Level One-Preconventional Morality:** In stage one, moral reasoning is based on concepts of punishment. The child believes that if the consequence for an action is punishment, then the action was wrong. In the second stage, the child bases his or her thinking on self-interest and reward. "You scratch my back, I'll scratch yours." The youngest subjects seemed to answer based on what would happen to the man as a result of the act. For example, they might say the man should not break into the pharmacy because the pharmacist might find him and beat him. Or they might say that the man should break in and steal the drug and his wife will give him a big kiss. Right or wrong, both decisions were based on what would physically happen to the man as a result of the act. This is a self-centered approach to moral decision-making. He called this most superficial understanding of right and wrong **preconventional morality.** *Preconventional morality focuses on self-interest. Punishment is avoided and rewards are sought.* Adults can also fall into these stages, particularly when they are under pressure.
- **Level Two-Conventional Morality:** Those tested who based their answers on what other people would think of the man as a result of his act, were placed in Level Two. For instance, they might say he should break into the store, and then everyone would think he was a good husband, or he should not because it is against the law. In either case, right and wrong is determined by what other people think. In stage three, the person wants to please others. At stage four, the person acknowledges the importance of social norms or laws and wants to be a good member of the group or society. A good decision is one that gains the approval of others or one that complies with the law. This he called **conventional morality**, *people care about the effect of their actions on others*. Some older children, adolescents, and adults use this reasoning.
- **Level Three-Postconventional Morality:** Right and wrong are based on social contracts established for the good of everyone and that can transcend the self and social convention. For example, the man should break into the store because, even if it is against the law, the wife needs the drug and her life is more important than the consequences the man might face for breaking the law. Alternatively, the man should not violate the principle of the right of property because this rule is essential for social order. In either case, the person's judgment goes beyond what happens to the self. It is based on a concern for others; for society as a whole, or for an ethical standard rather than a legal standard. This level is called **postconventional moral development** *because it goes beyond convention or what other people think to a higher, universal ethical principle of conduct that may or may not be reflected in the law.* Notice that such thinking is the kind Supreme Court justices do all day when deliberating whether a law is moral or ethical, which requires being able to think abstractly. Often this is not accomplished until a person reaches adolescence or adulthood. In the fifth stage, laws are recognized as social contracts. The reasons for the laws, like justice, equality, and dignity, are used to evaluate decisions and interpret laws. In the sixth stage, individually determined universal ethical principles are weighed to make moral decisions. Kohlberg said that few people ever reach this stage. The six stages can be reviewed in Table 5.6.

Table 5.6 Lawrence Kohlberg's Levels of Moral Reasoning

Age	Moral Level	Description
Young children- usually prior to age 9	Preconventional morality	**Stage 1:** Focus is on self-interest, and punishment is avoided. The man shouldn't steal the drug, as he may get caught and go to jail. **Stage 2:** Rewards are sought. A person at this level will argue that the man should steal the drug because he does not want to lose his wife who takes care of him.

Age	Moral Level	Description
Older children, adolescents, and most adults	Conventional morality	**Stage 3:** Focus is on how situational outcomes impact others and wanting to please and be accepted. The man should steal the drug because that is what good husbands do. **Stage 4:** People make decisions based on laws or formalized rules. The man should obey the law because stealing is a crime.
Rare with adolescents and few adults	Postconventional morality	**Stage 5:** Individuals employ abstract reasoning to justify behaviors. The man should steal the drug because laws can be unjust, and you have to consider the whole situation. **Stage 6:** Moral behavior is based on self-chosen ethical principles. The man should steal the drug because life is more important than property.

Although research has supported Kohlberg's idea that moral reasoning changes from an early emphasis on punishment and social rules and regulations to an emphasis on more general ethical principles, as with Piaget's approach, Kohlberg's stage model is probably too simple. For one, people may use higher levels of reasoning for some types of problems, but revert to lower levels in situations where doing so is more consistent with their goals or beliefs (Rest, 1979). Second, it has been argued that the stage model is particularly appropriate for Western, rather than non-Western, samples in which allegiance to social norms, such as respect for authority, may be particularly important (Haidt, 2001). In addition, there is frequently little correlation between how we score on the moral stages and how we behave in real life.

Perhaps the most important critique of Kohlberg's theory is that it may describe the moral development of males better than it describes that of females. Gilligan (1982) has argued that, because of differences in their socialization, males tend to value principles of justice and rights, whereas females value caring for and helping others. Although there is little evidence for a gender difference in Kohlberg's stages of moral development (Turiel, 1998), it is true that girls and women tend to focus more on issues of caring, helping, and connecting with others than do boys and men (Jaffee & Hyde, 2000).

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10.4: Friends and Peers

As toddlers, children may begin to show a preference for certain playmates (Ross & Lollis, 1989). However, peer interactions at this age often involve more parallel play rather than intentional social interactions (Pettit, Clawson, Dodge, & Bates, 1996). By age four, many children use the word “friend” when referring to certain children, and do so with a fair degree of stability (Hartup, 1983). However, among young children “friendship” is often based on proximity, such as they live next door, attend the same school, or it refers to whomever they just happen to be playing with at the time (Rubin, 1980).

Friendships take on new importance as judges of one's worth, competence, and attractiveness in middle and late childhood. Friendships provide the opportunity for learning social skills, such as how to communicate with others and how to negotiate differences. Children get ideas from one another about how to perform certain tasks, how to gain popularity, what to wear or say, and how to act. This society of children marks a transition from a life focused on the family to a life concerned with peers. During middle and late childhood, peers increasingly play an important role. For example, peers play a key role in a child's self-esteem at this age as any parent who has tried to console a rejected child will tell you. No matter how complimentary and encouraging the parent may be, being rejected by friends can only be remedied by renewed acceptance. Children’s conceptualization of what makes someone a “friend” changes from a more egocentric understanding to one based on mutual trust and commitment. Both Bigelow (1977) and Selman (1980) believe that these changes are linked to advances in cognitive development.

Figure 5.21. Source.

Bigelow and La Gaipa (1975) outline three stages to children’s conceptualization of friendship. In stage one, **reward-cost**, friendship *focuses on mutual activities*. Children in early, middle, and late childhood all emphasize similar interests as the main characteristics of a good friend. Stage two, **normative expectation**, *focuses on conventional morality; that is, the emphasis is on a friend as someone who is kind and shares with you*. Clark and Bittle (1992) found that fifth graders emphasized this in a friend more than third or eighth graders. In the final stage, **empathy and understanding**, *friends are people who are loyal, committed to the relationship, and share intimate information*. Clark and Bittle (1992) reported eighth graders emphasized this more in a friend. They also found that as early as fifth grade, girls were starting to include a sharing of secrets, and not betraying confidences as crucial to someone who is a friend.

Selman (1980) outlines five stages of friendship from early childhood through to adulthood. In stage 0, **momentary physical interaction**, *a friend is someone who you are playing with at this point in time*. Selman notes that this is typical of children between the ages of three and six. These early friendships are based more on circumstances (e.g., a neighbor) than on genuine similarities. In stage 1, **one-way assistance**, *a friend is someone who does nice things for you*, such as saving you a seat on the school bus or sharing a toy. However, children in this stage, do not always think about what they are contributing to the relationships. Nonetheless, having a friend is important and children will sometimes put up with a not so nice friend, just to have a friend. Children as young as five and as old as nine may be in this stage. In stage 2, **fair- weather cooperation**, children are very concerned with fairness and reciprocity, and thus, *a friend is someone returns a favor*. In this stage, if a child does something nice for a friend there is an expectation that the friend will do something nice for them at the first available opportunity. When this fails to happen, a child may break off the friendship. Selman found that some children as young as seven and as old as twelve are in this stage. In stage 3, **intimate and mutual sharing**, typically between the ages of eight and fifteen, *a friend is someone who you can tell them things you would tell no one else*. Children and teens in this stage no longer “keep score”, and do things for a friend because they genuinely care for the person. If a friendship dissolves in the stage it is usually due to a violation of trust. However, children in this stage do expect their friend to share similar interests and viewpoints and may take it as a betrayal if a friend likes someone that they do not. In stage 4, **autonomous interdependence**, *a friend is someone who accepts you and that you accept as they are*. In this stage children, teens, and adults accept and even appreciate differences between themselves and their friends. They are also not as possessive, so they are less likely to feel threatened if their friends have other relationships or interests. Children are typically twelve or older in this stage.

Peer Relationships: Sociometric assessment *measures attraction between members of a group*, such as a classroom of students. In sociometric research children are asked to mention the three children they like to play with the most, and those they do not like to play with. The number of times a child is nominated for each of the two categories (like, do not like) is tabulated. **Popular children** *receive many votes in the "like" category, and very few in the "do not like" category*. In contrast, **rejected children** *receive more unfavorable votes, and few favorable ones*. **Controversial children** *are mentioned frequently in each category*, with several children liking them and several children placing them in the do not like category. **Neglected children** *are rarely mentioned in either category*, and the **average child** *has a few positive votes with very few negative ones* (Asher & Hymel, 1981).

Figure 5.22: Withdrawn children are targets for bullies. Source.

Most children want to be liked and accepted by their friends. Some popular children are nice and have good social skills. These **popular-prosocial** children *tend to do well in school and are cooperative and friendly*. **Popular-antisocial** children may *gain popularity by acting tough or spreading rumors about others* (Cillessen & Mayeux, 2004). Rejected children are sometimes excluded because they are **rejected-withdrawn**. *These children are shy and withdrawn* and are easy targets for bullies because they are unlikely to retaliate when belittled (Boulton, 1999). Other rejected children are **rejected-aggressive** and *are ostracized because they are aggressive, loud, and confrontational*. The aggressive-rejected children may be acting out of a feeling of insecurity. Unfortunately, their fear of rejection only leads to behavior that brings further rejection from other children. Children who are not accepted are more likely to experience conflict, lack confidence, and have trouble adjusting (Klima & Repetti, 2008; Schwartz, Lansford, Dodge, Pettit, & Bates, 2014).

Bullying

According to Stopbullying.gov (2016), a federal government website managed by the U.S. Department of Health & Human Services, **Bullying** *is defined as unwanted, aggressive behavior among school aged children that involves a real or perceived power imbalance*. Further, the aggressive behavior happens more than once or has the potential to be repeated. There are different types of bullying, including verbal bullying, which is saying or writing mean things, teasing, name calling, taunting, threatening, or making inappropriate sexual comments. Social bullying, also referred to as relational bullying, involves spreading rumors, purposefully excluding someone from a group, or embarrassing someone on purpose. Physical Bullying involves hurting a person's body or possessions.

A more recent form of bullying is **Cyberbullying,** *which involves electronic technology*. Examples of cyberbullying include sending mean text messages or emails, creating fake profiles, and posting embarrassing pictures, videos or rumors on social networking sites. Children who experience cyberbullying have a harder time getting away from the behavior because it can occur any time of day and without being in the presence of others. Additional concerns of cyberbullying include that messages and images can be posted anonymously, distributed quickly, and be difficult to trace or delete. Children who are cyberbullied are more likely to: experience in-person bullying, be unwilling to attend school, receive poor grades, use alcohol and drugs, skip school, have lower self-esteem, and have more health problems (Stopbullying.gov, 2016).

The National Center for Education Statistics and Bureau of Justice statistics indicate that in 2010-2011, 28% of students in grades 6-12 experienced bullying and 7% experienced cyberbullying. The 2013 Youth Risk Behavior Surveillance System, which monitors six types of health risk behaviors, indicate that 20% of students in grades 9-12 experienced bullying and 15% experienced cyberbullying (Stopbullying.gov, 2016).

Figure 5.23. Source.

Those at risk for bullying: Bullying can happen to anyone, but some students are at an increased risk for being bullied including lesbian, gay, bisexual, transgendered (LGBT) youth, those with disabilities, and those who are socially isolated. Additionally, those who are perceived as different, weak, less popular, overweight, or having low self-esteem, have a higher likelihood of being bullied.

Those who are more likely to bully: Bullies are often thought of as having low self-esteem, and then bully others to feel better about themselves. Although this can occur, many bullies in fact have high levels of self-esteem. They possess considerable popularity and social power and have well-connected peer relationships. They do not lack self-esteem, and instead lack empathy for others. They like to dominate or be in charge of others.

Bullied children often do not ask for help: Unfortunately, most children do not let adults know that they are being bullied. Some fear retaliation from the bully, while others are too embarrassed to ask for help. Those who are socially isolated may not know who to ask for help or believe that no one would care or assist them if they did ask for assistance. Consequently, it is important for parents and teacher to know the warning signs that may indicate a child is being bullied. These include: unexplainable injuries, lost or destroyed possessions, changes in eating or sleeping patterns, declining school grades, not wanting to go to school, loss of friends, decreased self-esteem and/or self-destructive behaviors.

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10.5: Family Life

Family Tasks: One of the ways to assess the quality of family life is to consider the tasks of families. Berger (2014) lists five family functions:

- Providing food, clothing and shelter
- Encouraging learning
- Developing self-esteem
- Nurturing friendships with peers
- Providing harmony and stability

Notice that in addition to providing food, shelter, and clothing, families are responsible for helping the child learn, relate to others, and have a confident sense of self. Hopefully, the family will provide a harmonious and stable environment for living. A good home environment is one in which the child's physical, cognitive, emotional, and social needs are adequately met. Sometimes families emphasize physical needs, but ignore cognitive or emotional needs. Other times, families pay close attention to physical needs and academic requirements, but may fail to nurture the child's friendships with peers or guide the child toward developing healthy relationships. Parents might want to consider how it feels to live in the household as a child. The tasks of families listed above are functions that can be fulfilled in a variety of family types-not just intact, two-parent households.

Parenting Styles: As discussed in the previous chapter, parenting styles affect the relationship parents have with their children. During middle and late childhood, children spend less time with parents and more time with peers, and consequently parents may have to modify their approach to parenting to accommodate the child's growing independence. The authoritative style, which incorporates reason and engaging in joint decision-making whenever possible may be the most effective approach (Berk, 2007). However, Asian-American, African-American, and Mexican-American parents are more likely than European-Americans to use an authoritarian style of parenting. This authoritarian style of parenting that using strict discipline and focuses on obedience is also tempered with acceptance and warmth on the part of the parents. Children raised in this manner tend to be confident, successful and happy (Chao, 2001; Stewart & Bond, 2002).

Living Arrangements: Certainly the living arrangements of children have changed significantly over the years. In 1960, 92% of children resided with married parents, while only 5% had parents who were divorced or separated and 1% resided with parents who had never been married. By 2008, 70% of children resided with married parents, 15% had parent who were divorced or separated, and by 2010, 14% resided with parents who had never married (Pew Research Center, 2010). By 2013 only 61% of children resided with married parents, and of those only 46% were being raised by both of their biological parents (Livingston, 2014).

Based on the 2010 United States Census, when just looking at households that contain spouses or unmarried partners with children, the majority of households with children are married, opposite sex couples (Lofquist, 2011). However, same sex couples have higher percentages of adopted children than opposite sex couples. Table 5.7 identifies the number of same sex and opposite sex households with children.

Table 5.7: 2010 Census Data on Households with Children in the United States. Source.

	Total Households	Married Opposite-Sex Couples	Unmarried Opposite-Sex Couples	Same-Sex Couples
Households with children	25,233,794	22,872,151 (90.6%)	2,267,016 (8.9%)	94,627 (0.4%)
Biological only		90.80%	88%	72.80%
Step only or adopted only		4.40%	5.20%	21.20%
Combination		4.80%	6.80%	6%

Lesbian and Gay Parenting: Research has consistently shown that the children of lesbian and gay parents are as successful as those of heterosexual parents, and consequently efforts are being made to ensure that gay and lesbian couples are provided with the same legal rights as heterosexual couples when adopting children (American Civil Liberties Union, 2016).

Figure 5.24. Source.

Patterson (2013) reviewed more than 25 years of social science research on the development of children raised by lesbian and gay parents and found no evidence of detrimental effects. In fact, research has demonstrated that children of lesbian and gay parents are as well-adjusted overall as those of heterosexual parents. Specifically, research comparing children based on parental sexual orientation has not shown any differences in the development of gender identity, gender role development, or sexual orientation. Additionally, there were no differences between the children of lesbian or gay parents and those of heterosexual parents in separation-individuation, behavior problems, self-concept, locus of control, moral judgment, school adjustment, intelligence, victimization, and substance use. Further, research has consistently found that children and adolescents of gay and lesbian parents report normal social relationships with family members, peers, and other adults. Patterson concluded that there is no evidence to support legal discrimination or policy bias against lesbian and gay parents.

Divorce: Using families in the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care and Youth Development, Weaver and Schofield (2015) found that children from divorced families had significantly more behavior problems than those from a matched sample of children from non-divorced families. These problems were evident immediately after the separation and also in early and middle adolescence. An analysis of divorce factors indicated that children exhibited more externalizing behaviors if the family had fewer financial resources before the separation. It was hypothesized that the lower income and lack of educational and community resources contributed to the stress involved in the divorce. Additional factors contributing to children's behavior problems included a post-divorce home that was less supportive and stimulating, and a mother that was less sensitive and more depressed.

Additional concerns include that the child will grieve the loss of the parent they no longer see as frequently. The child may also grieve about other family members that are no longer available. Very often, divorce means a change in the amount of money coming into the household. Children experience new constraints on spending or entertainment. School-aged children, especially, may notice that they can no longer have toys, clothing or other items to which they have grown accustomed. Or it may mean that there is less eating out or being able to afford participation in extracurricular activities. The custodial parent may experience stress at not being able to rely on child support payments or having the same level of income as before. This can affect decisions regarding healthcare, vacations, rents, mortgages and other expenditures, and the stress can result in less happiness and relaxation in the home. The parent who has to take on more work may also be less available to the children. Children may also have to adjust to other changes accompanying a divorce. The divorce might mean moving to a new home and changing schools or friends. It might mean leaving a neighborhood that has meant a lot to them as well.

Relationships of adult children of divorce are identified as more problematic than those adults from intact homes. For 25 years, Hetherington and Kelly (2002) followed children of divorce and those whose parents stayed together. The results indicated that 25% of adults whose parents had divorced experienced social, emotional, or psychological problems compared with only 10% of those whose parents remained married. For example, children of divorce have more difficulty forming and sustaining intimate relationships as young adults, are more dissatisfied with their marriage, and consequently more likely to get divorced themselves (Arkowitz & Lilienfeld, 2013). One of the most commonly cited long-term effects of divorce is that children of divorce may have lower levels of education or occupational status. This may be a consequence of lower income and resources for funding education rather than to divorce per se. In those households where economic hardship does not occur, there may be no impact on long-term economic status (Drexler, 2005).

According to Arkowitz and Lilienfeld (2013), long-term harm from parental divorce is not inevitable, however, and children can navigate the experience successfully. A variety of factors can positively contribute to the child's adjustment. For example, children

manage better when parents limit conflict, and provide warmth, emotional support and appropriate discipline. Further, children cope better when they reside with a well-functioning parent and have access to social support from peers and other adults. Those at a higher socioeconomic status may fare better because some of the negative consequences of divorce are a result of financial hardship rather than divorce per se (Drexler, 2005).

Although they may experience more problems than children from non-divorced families, most children of divorce lead happy, well-adjusted lives and develop strong, positive relationships with their custodial parent (Seccombe & Warner, 2004). In the United States and Canada, most children reside with their mother in single-parent households (Berk, 2007). Children from single- parent families talk to their mothers more often than children of two-parent families (McLanahan & Sandefur, 1994). In a study of college-age respondents, Arditti (1999) found that increasing closeness and a movement toward more democratic parenting styles was experienced. Others have also found that relationships between mothers and children become closer and stronger (Guttman, 1993) and suggest that greater equality and less rigid parenting is beneficial after divorce (Steward, Copeland, Chester, Malley, & Barenbaum, 1997).

Certain characteristics of the child can also facilitate post-divorce adjustment. Specifically, children with an easygoing temperament, who problem-solve well, and seek social support manage better after divorce. A further protective factor for children is intelligence (Weaver & Schofield, 2015). Children with higher IQ scores appear to be buffered from the effects of divorce. Children may be given more opportunity to discover their own abilities and gain independence that fosters self-esteem. If divorce means a reduction in tension, the child may feel relief. Overall, not all children of divorce suffer negative consequences and should not be subjected to stigma or social disapproval (Hetherington & Kelly, 2002). Furstenberg and Cherlin (1991) believe that the primary factor influencing the way that children adjust to divorce is the way the custodial parent adjusts to the divorce. If that parent is adjusting well, the children will benefit. This may explain a good deal of the variation we find in children of divorce.

Is cohabitation and remarriage more difficult than divorce for the child? The remarriage of a parent may be a more difficult adjustment for a child than the divorce of a parent (Seccombe & Warner, 2004). Parents and children typically have different ideas of how the stepparent should act. Parents and stepparents are more likely to see the stepparent's role as that of parent. A more democratic style of parenting may become more authoritarian after a parent remarries. Biological parents are more likely to continue to be involved with their children jointly when neither parent has remarried. They are least likely to jointly be involved if the father has remarried and the mother has not. Cohabitation can be difficult for children to adjust to because cohabiting relationships in the United States tend to be short-lived. About 50 percent last less than 2 years (Brown, 2000). The child who starts a relationship with the parent's live-in partner may have to sever this relationship later. Even in long-term cohabiting relationships, once it is over, continued contact with the child is rare.

Blended Families: About 60 percent of divorced parents remarry within a few years (Berk, 2007). Largely due to high rates of divorce and remarriage, we have seen the number of blended families in America grow considerably, although rates of remarriage are declining (Seccombe & Warner, 2004). Blended families are not new. In the 1700-1800s there were many blended families, but they were created because someone died and remarried. Most blended families today are a result of divorce and remarriage, and such origins lead to new considerations. Blended families are different from intact families and more complex in a number of ways that can pose unique challenges to those who seek to form successful blended family relationships (Visher & Visher, 1985). Children may be a part of two households, each with different rules that can be confusing.

Figure 5.25: Blended family. Source.

Members in blended families may not be as sure that others care and may require more demonstrations of affection for reassurance. For example, stepparents expect more gratitude and acknowledgment from the stepchild than they would with a biological child. Stepchildren experience more uncertainty/insecurity in their relationship with the parent and fear the parents will see them as sources of tension. Stepparents may feel guilty for a lack of feelings they may initially have toward their partner's children.

Children who are required to respond to the parent's new mate as though they were the child's "real" parent often react with hostility, rebellion, or withdrawal. This occurs especially if there has not been time for the relationship to develop.

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10.6: Adolescents' Relationships

Parents and Teens: Autonomy and Attachment

While most adolescents get along with their parents, they do spend less time with them (Smetana, 2011). This decrease in the time spent with families may be a reflection of a *teenager's greater desire for independence* or **autonomy.** It can be difficult for many parents to deal with this desire for autonomy. However, it is likely adaptive for teenagers to increasingly distance themselves and establish relationships outside of their families in preparation for adulthood. This means that both parents and teenagers need to strike a balance between autonomy, while still maintaining close and supportive familial relationships.

Children in middle and late childhood are increasingly granted greater freedom regarding moment-to-moment decision making. This continues in adolescence, as teens are demanding greater control in decisions that affect their daily lives. This can increase conflict between parents and their teenagers. For many adolescents this conflict centers on chores, homework, curfew, dating, and personal appearance. These are all things many teens believe they should manage that parents previously had considerable control over. Teens report more conflict with their mothers, as many mothers believe they should still have some control over many of these areas, yet often report their mothers to be more encouraging and supportive (Costigan, Cauce, & Etchison, 2007). As teens grow older, more compromise is reached between parents and teenagers (Smetana, 2011). Parents are more controlling of daughters, especially early maturing girls, than they are sons (Caspi, Lynam, Moffitt, & Silva, 1993). In addition, culture and ethnicity also play a role in how restrictive parents are with the daily lives of their children (Chen, Vansteenkiste, Beyers, Soensens, & Van Petegem, 2013).

Having supportive, less conflict ridden relationships with parents also benefits teenagers. Research on attachment in adolescence find that teens who are still securely attached to their parents have less emotional problems (Rawatlal, Kliewer & Pillay, 2015), are less likely to engage in drug abuse and other criminal behaviors (Meeus, Branje & Overbeek, 2004), and have more positive peer relationships (Shomaker & Furman, 2009).

Peers

As children become adolescents, they usually begin spending more time with their peers and less time with their families, and these peer interactions are increasingly unsupervised by adults. Children's notions of friendship often focus on shared activities, whereas adolescents' notions of

friendship increasingly focus on intimate exchanges of thoughts and feelings. During adolescence, peer groups evolve from primarily single-sex to mixed-sex. Adolescents within a peer group tend to be similar to one another in behavior and attitudes, which has been explained as a function of **homophily**, that is, *adolescents who are similar to one another choose to spend time together in a "birds of a feather flock together" way*. Adolescents who spend time together also shape each other's behavior and attitudes.

Peers can serve both positive and negative functions during adolescence. Negative peer pressure can lead adolescents to make riskier decisions or engage in more problematic behavior than they would alone or in the presence of their family. For example, adolescents are much more likely to drink alcohol, use drugs, and commit crimes when they are with their friends than when they are alone or with their family. One of the most widely studied aspects of adolescent peer influence is known as **deviant peer contagion** (Dishion & Tipsord, 2011), *which is the process by which peers reinforce problem behavior by laughing or showing other signs of approval that then increase the likelihood of future problem behavior*.

However, peers also serve as an important source of social support and companionship during adolescence, and adolescents with positive peer relationships are happier and better adjusted than those who are socially isolated or have conflictual peer relationships.

Crowds are an emerging level of peer relationships in adolescence. In contrast to friendships, which are reciprocal dyadic relationships, and **cliques**, which *refer to groups of individuals who interact frequently*, **crowds** are *characterized more by shared reputations or images than actual interactions* (Brown & Larson, 2009). These crowds reflect different prototypic identities, such as jocks or brains, and are often linked with adolescents' social status and peers' perceptions of their values or behaviors.

Figure 6.19. Crowds refer to different collections of people, like the “theater kids” or the “environmentalists.” In a way, they are kind of like clothing brands that label the people associated with that crowd. [Image: Garry Knight]

Romantic Relationships

Adolescence is the developmental period during which romantic relationships typically first emerge. By the end of adolescence, most American teens have had at least one romantic relationship (Dolgin, 2011). However, culture does play a role as Asian Americans and Latinas are less likely to date than other ethnic groups (Connolly, Craig, Goldberg, & Pepler, 2004). Dating serves many purposes for teens, including having fun, companionship, status, socialization, sexual experimentation, intimacy, and partner selection for those in late adolescence (Dolgin, 2011).

There are several stages in the dating process beginning with engaging in mixed-sex group activities in early adolescence (Dolgin, 2011). The same-sex peer groups that were common during childhood expand into mixed-sex peer groups that are more characteristic of adolescence. Romantic relationships often form in the context of these mixed-sex peer groups (Connolly, Furman, & Konarski, 2000). Interacting in mixed-sex groups is easier for teens as they are among a supportive group of friends, can observe others interacting, and are kept safe from a too early intimate relationship. By middle adolescence teens are engaging in brief, casual dating or in group dating with established couples (Dolgin, 2011). Then in late adolescence dating involves exclusive, intense relationships. These relationships tend to be long-lasting and continue for a year or longer, however, they may also interfere with friendships.

Figure 6.20. Source.

Although romantic relationships during adolescence are often short-lived rather than long-term committed partnerships, their importance should not be minimized. Adolescents spend a great deal of time focused on romantic relationships, and their positive and negative emotions are more tied to romantic relationships, or lack thereof, than to friendships, family relationships, or school (Furman & Shaffer, 2003). Romantic relationships contribute to adolescents’ identity formation, changes in family and peer relationships, and emotional and behavioral adjustment.

Furthermore, romantic relationships are centrally connected to adolescents’ emerging sexuality. Parents, policymakers, and researchers have devoted a great deal of attention to adolescents’ sexuality, in large part because of concerns related to sexual intercourse, contraception, and preventing teen pregnancies. However, sexuality involves more than this narrow focus. For example, adolescence is often when individuals who are lesbian, gay, bisexual, or transgender come to perceive themselves as such (Russell, Clarke, & Clary, 2009). Thus, romantic relationships are a domain in which adolescents experiment with new behaviors and identities.

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10.7: Gender

Another important dimension of the self is the sense of self as male or female. Preschool aged children become increasingly interested in finding out the differences between boys and girls both physically and in terms of what activities are acceptable for each. While two year olds can identify some differences and learn whether they are boys or girls, preschoolers become more interested in what it means to be male or female. This *self-identification based on a continuum from male to female* is known as **Gender Identity**. The development of gender and gender identity appears to be due to an interaction among biological, social and representational influences (Ruble, Martin, & Berenbaum, 2006).

Gender Roles, *or the expectations associated with being male or female*, are learned in one's culture throughout childhood and into adulthood. Learning theorists suggest that gender role socialization is a result of the ways in which parents, teachers, friends, schools, religious institutions, media and others send messages about what is acceptable or desirable behavior as males or females. This socialization begins early-in fact, it may even begin the moment a parent learns that a child is on the way. Knowing the sex of the child can conjure up images of the child's behavior, appearance, and potential on the part of a parent, and this stereotyping continues to guide perception through life. Consider parents of newborns, shown a 7 pound, 20 inch baby, wrapped in blue (a color designating males) describe the child as tough, strong, and angry when crying. Shown the same infant in pink (a color used in the United States for baby girls), these parents are likely to describe the baby as pretty, delicate, and frustrated when crying (Maccoby & Jacklin, 1987). Female infants are held more, talked to more frequently and given direct eye contact, while male infants play is often mediated through a toy or activity. In addition to being recipients of these cultural expectations, we are individuals who also modify these roles (Kimmel, 2008).

Figure 4.21: Gender roles. Source.

Sons are given tasks that take them outside the house and that have to be performed only on occasion, while girls are more likely to be given chores inside the home such as cleaning or cooking that is performed daily. Sons are encouraged to think for themselves when they encounter problems and daughters are more likely to be given assistance, even when they are working on an answer. This impatience is reflected in teachers waiting less time when asking a

female student for an answer than when asking for a reply from a male student (Sadker & Sadker, 1994). Girls are given the message from teachers that they must try harder and endure in order to succeed while boys' successes are attributed to their intelligence. Of course, the stereotypes of advisors can also influence which kinds of courses or vocational choices girls and boys are encouraged to make.

Based on what young children learn about gender from parents, peers, and those who they observe in society, *children develop their own conceptions of the attributes associated with maleness or femaleness* which is referred to as **Gender Schemas**. Friends discuss what is acceptable for boys and girls and popularity may be based on modeling what is considered ideal behavior or looks for the sexes. Girls tend to tell one another secrets to validate others as best friends while boys compete for position by emphasizing their knowledge, strength or accomplishments. This focus on accomplishments can even give rise to exaggerating accomplishments in boys, but girls are discouraged from showing off and may learn to minimize their accomplishments as a result.

Gender Dysphoria: A growing body of research is now focused on **Gender Dysphoria**, or *the distress accompanying a mismatch between one's gender identity and biological sex* (American Psychiatric Association, 2013). Although prevalence rates are low, at approximately 0.3 percent of the United States population (Russo, 2016), children who later identified as transgender, often stated that they were the opposite gender as soon as they began talking. Comments such as stating they prefer the toys, clothing and anatomy of the opposite sex, while rejecting the toys, clothing, and anatomy of their assigned sex are criteria for a diagnosis of Gender Dysphoria in children. Certainly many young children do not conform to the gender roles modeled by the culture and even push back against assigned roles. However, they do not experience discomfort regarding their gender identity and would not be

identified with Gender Dysphoria. A more comprehensive description of Gender Dysphoria, including current treatments, will be discussed in the chapter on adolescence.

How much does gender matter? In the United States, gender differences are found in social interactions, media messages, and in school experiences. Even into college and professional school, females are less vocal in the classrooms and much more at risk for sexual harassment from teachers, coaches, classmates, and professors. The stereotypes that males should be strong, forceful, active, dominant, and rational and that females should be pretty, subordinate, unintelligent, emotional, and gabby are portrayed in children's toys, books, commercials, video games, movies, television shows and music. In adulthood, these differences are reflected in income gaps between men and women. Women working full-time earn only about 74 percent the income of men. Additionally, women experience higher rates of rape, domestic violence, and eating disorders, while higher rates of violent death occur for men in young adulthood.

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CHAPTER OVERVIEW

11: Developmental Psychopathology

11.1: Autism Spectrum Disorder
11.2: Children with Learning Disabilities

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11.1: Autism Spectrum Disorder

A greater discussion on disorders affecting children and special educational services to assist them will occur in chapter 5. However, because characteristics of Autism Spectrum Disorder must be present in the early developmental period, as established by the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association (APA), 2013), this disorder will be presented here. So what exactly is an Autism Spectrum Disorder?

Autism spectrum disorder is probably the most misunderstood and puzzling of the neurodevelopmental disorders. Children with this disorder show signs of significant disturbances in three main areas: (a) deficits in social interaction, (b) deficits in communication, and (c) repetitive patterns of behavior or interests. These disturbances appear early in life and cause serious impairments in functioning (APA, 2013). The child with autism spectrum disorder might exhibit deficits in social interaction by not initiating conversations with other children or turning their head away when spoken to. These children do not make eye contact with others and seem to prefer playing alone rather than with others. In a certain sense, it is almost as though these individuals live in a personal and isolated social world others are simply not privy to or able to penetrate. Communication deficits can range from a complete lack of speech, to one word responses (e.g., saying “Yes” or “No” when replying to questions or statements that require additional elaboration), to echoed speech (e.g., parroting what another person says, either immediately or several hours or even days later), to difficulty maintaining a conversation because of an inability to reciprocate others’ comments. These deficits can also include problems in using and understanding nonverbal cues (e.g., facial expressions, gestures, and postures) that facilitate normal communication.

Repetitive patterns of behavior or interests can be exhibited a number of ways. The child might engage in stereotyped, repetitive movements (rocking, head-banging, or repeatedly dropping an object and then picking it up), or she might show great distress at small changes in routine or the environment. For example, the child might throw a temper tantrum if an object is not in its proper place or if a regularly-scheduled activity is rescheduled. In some cases, the person with autism spectrum disorder might show highly restricted and fixated interests that appear to be abnormal in their intensity. For instance, the child might learn and memorize every detail about something even though doing so serves no apparent purpose. Importantly, autism spectrum disorder is not the same thing as intellectual disability, although these two conditions can occur together. The DSM-5 specifies that the symptoms of autism spectrum disorder are not caused or explained by intellectual disability.

Figure 4.19 Dr. Temple Grandin, an advocate for individuals with autism. Source.

The qualifier “spectrum” in autism spectrum disorder is used to indicate that individuals with the disorder can show a range, or spectrum, of symptoms that vary in their magnitude and severity: Some severe, others less severe. The previous edition of the DSM included a diagnosis of Asperger’s disorder, generally recognized as a less severe form of autistic disorder; individuals diagnosed with Asperger’s disorder were described as having average or high intelligence and a strong vocabulary, but exhibiting impairments in social interaction and social communication, such as talking only about their special interests (Wing, Gould, & Gillberg, 2011). However, because research has failed to demonstrate that Asperger’s disorder differs qualitatively from autistic disorder, the DSM-5 does not include it. Some individuals with autism spectrum disorder, particularly those with better language and intellectual skills, can live and work independently as adults. However, most do not because the symptoms remain sufficient to cause serious impairment in many realms of life (APA, 2013).

Currently, estimates indicate that nearly 1 in 88 children in the United States has autism spectrum disorder; the disorder is 5 times more common in boys (1 out of 54) than girls (1 out of 252) (CDC, 2012). Rates of autistic spectrum disorder have increased dramatically since the 1980s. For example, California saw an increase of 273% in reported cases from 1987 through 1998 (Byrd, 2002); between 2000 and 2008, the rate of autism diagnoses in the United States increased 78% (CDC, 2012). Although it is difficult to interpret this increase, it is possible that the rise in prevalence is the result of the broadening of the diagnosis, increased efforts to identify cases in the community, and greater awareness and acceptance of the diagnosis. In addition, mental health professionals are now more knowledgeable about autism spectrum disorder and are better equipped to make the diagnosis, even in subtle cases (Novella, 2008).

The exact causes of autism spectrum disorder remain unknown despite massive research efforts over the last two decades (Meek, Lemery-Chalfant, Jahromi, & Valiente, 2013). Autism appears to be strongly influenced by genetics, as identical twins show concordance rates of 60%– 90%, whereas concordance rates for fraternal twins and siblings are 5%–10% (Autism Genome Project Consortium, 2007). Many different genes and gene mutations have been implicated in autism (Meek et al., 2013). Among the genes involved are those important in the formation of synaptic circuits that facilitate communication between different areas of the brain (Gauthier et al., 2011). A number of environmental factors are also thought to be associated with increased risk for autism spectrum disorder, at least in part, because they contribute to new mutations. These factors include exposure to pollutants, such as plant emissions and mercury, urban versus rural residence, and vitamin D deficiency (Kinney, Barch, Chayka, Napoleon, & Munir, 2009).

There is no scientific evidence that a link exists between autism and vaccinations (Hughes, 2007). Indeed, a recent study compared the vaccination histories of 256 children with autism spectrum disorder with that of 752 control children across three time periods during their first two years of life (birth to 3 months, birth to 7 months, and birth to 2 years) (DeStefano, Price, & Weintraub, 2013). At the time of the study, the children were between 6 and 13 years old, and their prior vaccination records were obtained. Because vaccines contain immunogens (substances that fight infections), the investigators examined medical records to see how many immunogens children received to determine if those children who received more immunogens were at greater risk for developing autism spectrum disorder. The results of this study clearly demonstrated that the quantity of immunogens from vaccines received during the first two years of life were not at all related to the development of autism spectrum disorder.

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11.2: Children with Learning Disabilities

A **Learning Disability** (or LD) *is a specific impairment of academic learning that interferes with a specific aspect of schoolwork and that reduces a student's academic performance significantly.* A LD shows itself as a major discrepancy between a student's ability and some feature of achievement: The student may be delayed in reading, writing, listening, speaking, or doing mathematics, but not in all of these at once. A learning problem is not considered a learning disability if it stems from physical, sensory, or motor handicaps, or from generalized intellectual impairment. It is also not an LD if the learning problem really reflects the challenges of learning English as a second language. Genuine LDs are the learning problems left over after these other possibilities are accounted for or excluded. Typically, a student with an LD has not been helped by teachers' ordinary efforts to assist the student when he or she falls behind academically, though what counts as an “ordinary effort”, of course, differs among teachers, schools, and students. Most importantly, though, an LD relates to a fairly specific area of academic learning. A student may be able to read and compute well enough, for example, but not be able to write. LDs are by far the most common form of special educational need, accounting for half of all students with special needs in the United States and anywhere from 5 to 20 per cent of all students, depending on how the numbers are estimated (United States Department of Education, 2005; Ysseldyke & Bielinski, 2002). Students with LDs are so common, in fact, that most teachers regularly encounter at least one per class in any given school year, regardless of the grade level they teach.

These difficulties are identified in school because this is when children's academic abilities are being tested, compared, and measured. Consequently, once academic testing is no longer essential in that person's life (as when they are working rather than going to school) these disabilities may no longer be noticed or relevant, depending on the person's job and the extent of the disability.

Dyslexia is one of the most commonly diagnosed disabilities and *involves having difficulty in the area of reading*. This diagnosis is used for a number of reading difficulties. Common characteristics are difficulty with phonological processing, which includes the manipulation of sounds, spelling, and rapid visual/verbal processing. Additionally, the child may reverse letters, have difficulty reading from left to right, or may have problems associating letters with sounds. It appears to be rooted in neurological problems involving the parts of the brain active in recognizing letters, verbally responding, or being able to manipulate sounds. Recent studies have identified a number of genes that are linked to developing dyslexia (National Institute of Neurological Disorders and Stroke, 2016). Treatment typically involves altering teaching methods to accommodate the person's particular problematic area.

Dysgraphia or *a writing disability*, is often associated with dyslexia (Carlson, 2013). There are different types of dysgraphia, including phonological dysgraphia when the person cannot sound out words and write them phonetically. Orthographic dysgraphia is demonstrated by those individuals who can spell regularly spelled words, but not irregularly spelled ones. Some individuals with dysgraphia experience difficulties in motor control and experience trouble forming letters when using a pen or pencil.

Figure 5.18. Source.

Dyscalculia *refers to problems in math*. Cowan and Powell (2014) identified several terms used when describing difficulties in mathematics including dyscalculia, mathematical learning disability, and mathematics disorder. All three terms refer to students with average intelligence who exhibit poor academic performance in mathematics. When evaluating a group of third graders, Cowan and Powell (2014) found that children with dyscalculia demonstrated problems with working memory, reasoning, processing speed and oral language, all of which are referred to as domain-general factors. Additionally, problems with multi-digit skills, including number system knowledge, were also exhibited.

A child with **Attention Deficit Hyperactivity Disorder** (ADHD) *shows a constant pattern of inattention and/or hyperactive and impulsive behavior that interferes with normal functioning* (American Psychological Association (APA), 2013). Some of the signs of inattention include great difficulty with, and avoidance of, tasks that require sustained attention(suchasconversationsorreading),failure to follow instructions (often resulting in failure to complete school work and other duties), disorganization (difficulty keeping things in order, poor time management, sloppy and messy work), lack of attention to

detail, becoming easily distracted, and forgetfulness. Hyperactivity is characterized by excessive movement, and includes fidgeting or squirming, leaving one's seat in situations when remaining seated is expected, having trouble sitting still (e.g., in a restaurant), running about and climbing on things, blurting out responses before another person's question or statement has been completed, difficulty waiting one's turn for something, and interrupting and intruding on others. Frequently, the hyperactive child comes across as noisy and boisterous. The child's behavior is hasty, impulsive, and seems to occur withoutmuch forethought; these characteristics may explain why adolescents and young adults diagnosed with ADHD receive more traffic tickets and have more automobile accidents than do others their age (Thompson, Molina, Pelham, & Gnagy, 2007).

Figure 5.19. Source.

ADHD occurs in about 5% of children (APA, 2013). On the average, boys are 3 times more likely to have ADHD than are girls; however, such findings might reflect the greater propensity of boys to engage in aggressive and antisocial behavior and thus incur a greater likelihood of being referred to psychological clinics (Barkley, 2006). Children with ADHD face severe academic and social challenges. Compared to their non-ADHD counterparts, children with ADHD have lower grades and standardized test scores and higher rates of expulsion, grade retention, and dropping out (Loe & Feldman, 2007). They also are less well- liked and more often rejected by their peers (Hoza et al., 2005).

ADHD can persist into adolescence and adulthood (Barkley, Fischer, Smallish, & Fletcher, 2002). A recent study found that 29.3% of adults who had been diagnosed with ADHD decades earlier still showed symptoms (Barbaresi et al., 2013). Somewhat troubling, this study also reported that nearly 81% of those whose ADHD persisted into adulthood had experienced at least one other comorbid disorder, compared to 47% of those whose ADHD did not persist. Additional concerns when an adult has ADHD include: Worse educational attainment, lower socioeconomic status, less likely to be employed, more likely to be divorced, and more likely to have non-alcohol-related substance abuse problems (Klein et al., 2012).

Causes of ADHD: Family and twin studies indicate that genetics play a significant role in the development of ADHD. Burt (2009), in a review of 26 studies, reported that the median rate of concordance for identical twins was .66, whereas the median concordance rate for fraternaltwinswas.20.The specific genes involved in ADHD are thought to include at least two that are important in the regulation of the neurotransmitter dopamine (Gizer, Ficks, & Waldman, 2009), suggesting that dopamine may be important in ADHD. Indeed, medications used in the treatment of ADHD, such as methylphenidate (Ritalin) and amphetamine with dextroamphetamine (Adderall), have stimulant qualities and elevate dopamine activity. People with ADHD show less dopamine activity in key regions of the brain, especially those associated with motivation and reward (Volkow et al., 2009), which provides support to the theory that dopamine deficits may be a vital factor in the development this disorder (Swansonetal.,2007).

Brain imaging studies have shown that children with ADHD exhibit abnormalities in their frontal lobes, an area in which dopamine is in abundance. Compared to children without ADHD, those with ADHD appear to have smaller frontal lobe volume, and they show less frontal lobe activation when performing mental tasks. Recall that one of the functions of the frontal lobes is to inhibit our behavior. Thus, abnormalities in this region may go a long way toward explaining the hyperactive, uncontrolled behavior of ADHD.

Many parents attribute their child's hyperactivity to sugar. A statistical review of 16 studies, however, concluded that sugar consumption has no effect at all on the behavioral and cognitive performance of children (Wolraich, Wilson, & White, 1995). Additionally, although food additives have been shown to increase hyperactivity in non-ADHD children, the effect is rather small (McCann et al., 2007). Numerous studies, however, have shown a significant relationship between exposure to nicotine in cigarette smoke during the prenatal period and ADHD (Linnet et al., 2003). Maternal smoking during pregnancy is associated with the development of more severe symptoms of the disorder (Thakur et al., 2013).

Treatment for ADHD: Recommended treatment for ADHD includes behavioral interventions, cognitive behavioral therapy, parent and teacher education, recreational programs, and lifestyle changes, such as getting more sleep (Clay, 2013). For some children medication is prescribed. Parents are often concerned that stimulant medication may result in their child acquiring a substance use disorder. However, research using longitudinal studies has demonstrated that children diagnosed with ADHD who received

pharmacological treatment had a lower risk for substance abuse problems than those children who did not receive medication (Wilens, Fararone, Biederman,&Gunawardene,2003). Theriskofsubstanceabuseproblemsappearstobeeven greater for those with ADHD who are un-medicated and also exhibit antisocial tendencies (Marshal & Molina, 2006).

Is the prevalence rate of ADHD increasing? Many people believe that the rates of ADHD have increased in recent years, and there is evidence to support this contention. In a recent study, investigators found that the parent-reported prevalence of ADHD among children (4–17 years old) in the United States increased by 22% during a 4-year period, from 7.8% in 2003 to 9.5% in 2007 (CDC, 2010). ADHD may be over-diagnosed by doctors who are too quick to medicate children as a behavior treatment. There is also greater awareness of ADHD now than in the past. Nearly everyone has heard of ADHD, and most parents and teachers are aware of its key symptoms. Thus, parents may be quick to take their children to a doctor if they believe their child possesses these symptoms, or teachers may be more likely now than in the past to notice the symptoms and refer the child for evaluation. Further, the use of computers, video games, iPhones, and other electronic devices has become pervasive among children in the early 21st century, and these devices could potentially shorten children's attentions spans. Thus, what might seem like inattention to some parents and teachers could simply reflect exposure to too much technology.

Children with Disabilities: Legislation

Since the 1970s political and social attitudes have moved increasingly toward including people with disabilities into a wide variety of "regular" activities. In the United States, the shift is illustrated clearly in the Federal legislation that was enacted during this time. Three major laws were passed that guaranteed the rights of persons with disabilities, and of children and students with disabilities in particular. The third law has had the biggest impact on education.

Rehabilitation Act of 1973, Section 504: This law, the first of its kind, required that individuals with disabilities be accommodated in any program or activity that receives Federal funding (PL 93-112, 1973). Although this law was not intended specifically for education, in practice it has protected students' rights in some extra-curricular activities (for older students) and in some child care or after-school care programs (for younger students). If those programs receive Federal funding of any kind, the programs are not allowed to exclude children or youths with disabilities, and they have to find reasonable ways to accommodate the individuals' disabilities.

Americans with Disabilities Act of 1990 (or ADA): This legislation also prohibited discrimination on the basis of disability, just as Section 504 of the Rehabilitation Act had done (PL 101-336, 1990). Although the ADA also applies to all people (not just to students), its provisions are more specific and "stronger" than those of Section 504. In particular, ADA extends to all employment and jobs, not just those receiving Federal funding. It also specifically requires accommodations to be made in public facilities such as with buses, restrooms, and telephones. ADA legislation is therefore responsible for some of the "minor" renovations in schools that you may have noticed in recent years, like wheelchair-accessible doors, ramps, and restrooms, and public telephones with volume controls.

Individuals with Disabilities Education Act (or IDEA): As its name implied this legislation was more focused on education than either Section 504 or ADA. It was first passed in 1975 and has been amended several times since, including most recently in 2004 (PL 108-446, 2004). In its current form, the law guarantees the following rights related to education for anyone with a disability from birth to age 21. The first two influence schooling in general, but the last three affect the work of classroom teachers rather directly:

- *Free, appropriate education*: An individual or an individual's family should not have to pay for education simply because the individual has a disability, and the educational program should be truly educational; i.e., not merely care-taking or babysitting the person.
- *Due process*: In case of disagreements between an individual with a disability and the schools or other professionals, there must be procedures for resolving the disagreements that are fair and accessible to all parties, including the person himself or herself or the person's representative.
- *Fair evaluation of performance in spite of disability*: Tests or other evaluations should not assume test taking skills that a person with a disability cannot reasonably be expected to have, such as holding a pencil, hearing or seeing questions, working quickly, or understanding and speaking orally. Evaluation procedures should be modified to allow or these differences. This provision of the law applies both to evaluations made by teachers and to school-wide or "high-stakes" testing programs.
- *Education in the "least restrictive environment":* Education for someone with a disability should provide as many educational opportunities and options for the person as possible, both in the short term and in the long term. In practice this requirement has meant including students in regular classrooms and school activities as much as possible, though often not totally.

- *An individualized educational program*: Given that every disability is unique, instructional planning for a person with a disability should be unique or individualized as well. In practice this provision has led to classroom teachers planning individualized programs jointly with other professionals (like reading specialists, psychologists, or medical personnel) as part of a team.

Evaluation and diagnosis can be the first step in helping provide children with disabilities the type of instruction and resources that will benefit them educationally, but diagnosis and labeling also have social implications. It is important to consider that children can be misdiagnosed and that once a child has received a diagnostic label, the child, teachers, and family members may tend to interpret actions of the child through that label. The label can also influence the child's self-concept. Consider, for example, a child who is misdiagnosed as learning disabled. That child may expect to have difficulties in school, lack confidence, and because of these expectations experience trouble. This **self-fulfilling prophecy** *or tendency to act in such a way as to make what you predict will happen, will come true.* This calls our attention to the power that labels can have whether or not they are accurately applied. It is also important to consider that children's difficulties can change over time; a child who has problems in school, may improve later or may live under circumstances as an adult where the problem (such as a delay in math skills or reading skills) is no longer relevant. That person, however, will still have a label as learning disabled. It should be recognized that the distinction between abnormal and normal behavior is not always clear; some abnormal behavior in children is fairly common.

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